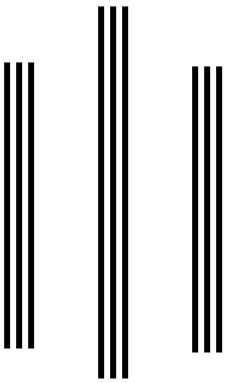
# DIVIDEND POLICY OF NEPALESE COMMERCIAL BANKS
## (EVEREST BANK, NABIL BANK AND NIC BANK)

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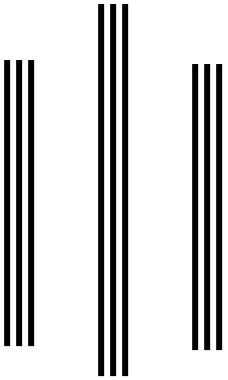

**A Thesis Submitted to:**

**Office of Dean**

**Faculty of Management**

**Tribhuwan University**

***In partial fulfillment of requirements for the degree of***

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

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# TRIBHUWAN UNIVERSITY
# POST GRADUATE CAMPUS
**Biratnagar**
**Morang, Nepal**

**Ref. No. :-** **Ph No:- 021-470966**

## RECOMMENDATION

This is to certify that the thesis:

***Submitted by:***
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**DIVIDEND POLICY OF NEPALESE COMMERCIAL BANKS (EVEREST BANK, NABIL BANK, NIC BANK)**

*has been prepared as approved by this Department in the prescribed format of the faculty of Management, Tribhuvan University, this thesis forwarded for examination.*

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Date: 2068/……../…..

# TRIBHUWAN UNIVERSITY
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## VIVA-VOCE SHEET

*We have concluded the Viva-Voice Examination of the thesis presented by*
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## DIVIDEND POLICY OF NEPALESE COMMERCIAL BANKS (EVEREST BANK, NABIL BANK, NIC BANK)

*and found the thesis to be the original work of the student and written according to the presented format. We recommend the thesis to be accepted as partial fulfillment of the requirement for Master's Degree in Business Studies (MBS)*

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# LIST OF ABBREVIATIONS, ACRONYMS AND SYMBOLS

| | |
|---|---|
| &: | And |
| B.S.: | Bikram Sambat |
| C.V.: | Coefficient of Variance |
| D.Y.: | Dividend Yield |
| DPR: | Dividend Payment Ratio |
| DPS: | Dividend per Share |
| e.g.: | example |
| EBL: | Everest Bank Limited |
| EPS: | Earning per Share |
| etc: | etcetera |
| i.e.: | that is |
| Ltd: | Limited |
| MPS: | Market Price per Share |
| MVPS: | Market Value per Share |
| NABIL: | Nepal Arab Bank Ltd. |
| NIC: | Nepal Industrial and Commercial Bank Ltd. |
| No: | Number |
| P/E: | Price Earning |
| S.D. | Standard Deviation |
| T.U: | Tribhuvan University |

# CHAPTER I

# INTRODUCTION

## *1.1 Background*

Nepal is one of the least developed countries with population of 28.02 million in 2008. The annual population growth was 2.2% between 2006 and 2008. The per capita income of Nepal is US$ 468 with wide income disparity and poor access by a large section of the population to basic social services. Nepal has very discouraging economic growth compared to its neighboring countries. Agriculture is the mainstay of the people of Nepal. About 81% of the total population is dependent on agriculture. Only 19% of the total population is engaged in other sector. The establishment of industries are lacking behind due to different factors. Nepal has a banking history of about seven decades. Nepal Bank Ltd is the first bank of the country, which was established in 1994 B.S. At present, there are more than twenty nine commercial banks in Nepal. Then Nepal Rastra Bank was the second one to be established, which is the central bank of Nepal with objectives to promote, develop and facilitate the banking sector. Later due to the favorable industrial policy provided by the government, foreign investors were also attracted. As a result, some Joint Venture banks were established among which Nepal Arab Bank is the first one.

The policy made by a company to distribute the profit to its shareholder and retention for its investment is known as dividend policy. Dividend policy is the main part of financing decision. Retained earning is the most significant internal sources of financing for the growth of the firm. Dividend policy is a major decision for the board of directors as the board has to decide either paying out to the shareholder and keep them happy in the short term or total money for investment which may be more beneficial to shareholder in the long term. Dividend policy determines the allocation of the net profit between payments to the shareholder and re-investment in the firm. In other words, dividend can be defined as dividing the earning between dividend and retention. The sharing kept as resources by the company is known as retained earnings. Retained earning is one of the most significant sources of funds required for the company growth. At the end of the fiscal year, management has to decide how much money should be kept as retention and how much should be kept as distributed to the shareholders. This is the important aspect of the dividend policy.

In our country, there is no similar way on dividend distribution. Usually dividends are paid monthly, quarterly, semi-quarterly or annually. But in Nepal, it is paid annually. Some companies may pay whole earnings within the year as dividends whereas in some companies, the dividend is not announced. Actually the usual dividends payout ratio seems to be 40%. Thus in short, the decision to keep some portion to retention and some to dividends made regarding earning is known to be "Dividend Policy."

Dividends patterns may be defined as the way of acting of corporation with regards to providing returns the investor in return to their investment in the shares. Corporate sector is small and it is early stage of growth in Nepal. This sector shows new momentum in the sense that a number of public capital market investors are investing their funds in the share of public companies encouragingly. This trend plays a significant role for the development and expansion of the capital of the market and it will continue only when dividend pattern is directed to the interest of the shareholders.

This research work analyzed all relevant factors of dividends policies of selected financial institution. Nepal has already adopted liberal economic policy. Accordingly, there are institutions which are considered as a positive sign in strengthening Nepalese Financial Banks. Among the listed companies financial institutes will be used as sample companies.

## *1.2 Focus of the Study*

Dividend refers to the portion of income of the firm that is distributed to the shareholders in the return to their investment in the share. By a dividend policy, we mean some kinds of constituent approach to the distribution of various retention decisions rather than making the decision on the purely ad-hoc basic from period to period. So, what and how much is it desirable to pay dividend, always a controversial topic because shareholders always expect higher dividend but the firms tries to issue side funds for maximizing the shareholders wealth. Investor's intention is to get more and more return but most of the corporation of banking institution is not in good condition. Hence, institution cannot pay more return. But, now-a-days, investors are attracted towards financial institutions due to the growth of saving. If funds can be raised by collecting in different ways and mobilizing it properly, then profit can be made.

In Nepal, there is no appropriate pattern of distribution. The history shows that the government was unable to receive dividends from different public enterprise in the past. Now-a-days, different Joint Venture banks have shown new trend of paying dividends to their

shareholder. In some banks, we can see the trend of paying. A small number of corporations are paying regular dividends and the other corporations are paying regular dividends and some are not paying consistently. There are still some companies not having the practice of paying dividends in their history.

## *1.3 Statement of the problems*

There is no dearth of study on dividends policy of different institution. Numerous financial literatures, abundance of theories and feelings are available relating to dividend and dividend policy. Dividend decision is pivotal as well as controversial area of financial management. However, there are ambiguities among the financial experts regarding the impact of dividends on the valuation of a firm. In fact, the financial community has no any conclusion and simple understanding. There is contradiction and confusion in relationship between the market and share price and dividends per share. This is due to the fact that some financial experts hold the view that the dividends are irrelevant. So, the amount of dividends paid has to effect on the valuation of the firm. On the other hand, other considers the dividends decisions relevant to the value of the firm. Thus, it is not easy to say whether the dividend decision affects positively or negatively.

The traditional models of dividend policy by Miller Modigliani, 1961, known to be MM approach shows that dividend have no effects on the shareholder's wealth in a world without taxes. Forror and Selwyan, 1967 and Brennon, 1970, suggest paying no dividends model which is associated with the houses of Rozeff 1981, Ross 1978, Bhattalnarya 1979, Mukesson 1982, Masuli's and Trueman 1988. As yet, none of these theories are completely satisfactory but they provide guidance and also they threw light for the complicated decision problem. Different institutions may follow different dividends policies accordingly to their suitability. Normally, there is also deep relationship between dividends and market price, but due to the undeveloped capital market like Nepal, it is not yet recognized.

In the context of Nepal, it is known that only the few companies in the financial sector have sufficient earnings and are able to pay dividends to the shareholders. But there is no any uniformity in dividend distribution. They are not distributing dividends in equal proportion. This research has tried to answer the following research questions.

- What is the dividends pattern of the commercial banks?
- Are the selected banks paying the dividends uniformly?

- What is the relationship between DPS and other financial indicator like EPS, DPR, P/E Ratio and MVPS?
- Does dividends policy affect the market price of the stock and values of the firm?
- Is the commercial bank paying the large dividends have a good financial position?

## *1.4 Objectives of the study*

The objectives of the study are as follows:

- To analyze and identify the dividends pattern.
- To identify the relationship between dividend policy and other financial indicators.
- To study whether the dividend per share affected by the earning per share, market price per share and retained earnings.
- To find out the problems and suggest for further improvement in future.
- To study the impact of dividends on its investment and shareholders.

## *1.5 Significance of the study*

In the present situation, people are investing their money in share to get more return. So, most of the commercial banks provide dividend to attract the fund to their non institution. Due to sound dividends, investor invests their money in different sector. If investor is sure to get return from any sector, they prefer to invest. So, now-a-days commercial banks are getting more opportunity to collect more investment due to their policy.

This study will be significant in the following purposes and the areas:

- This study will be useful for government to reformulate different policies for planning, controlling, monitoring and other purposes too.
- This study will provide important guidance in setting suitable dividends policy in commercial banks.
- This study will be helpful for finding out the commercial banks.

## *1.6 Organization of Study*

The study is organized into mainly five chapters. Each chapter deals some important factors of dividends pattern. The titles of each of these chapters are listed below.

Chapter one:- Introduction to the study.

Chapter two:- Review of literature.

Chapter three:- Research methodology.

Chapter four:- Presentation and Analysis of data.

Chapter five:- Summary, Conclusion and Recommendation

***Chapter one***

This is the introductory chapter of the study. This chapter includes general background, statement of the problem, objective of the study, significance of the study, limitations of the study and organization of the study.

***Chapter two***

This chapter includes the review of literature dealing with conceptual framework of the dividends policy. In this, research history of dividends policy is presented in brief. Review of major studies is also presented.

***Chapter three***

This chapter describes the research methodologies followed in the study. This chapter deals with research design, population and samples, nature and sources of data, data processing, method of analysis of the properties of portfolio formed on leverage and specialization of the variables.

***Chapter four***

This chapter analyzes the data to meet the objectives of the study. This helps getting major findings of the study related to the dividends.

***Chapter five***

This chapter summarizes the findings and draws the conclusions from the findings. This chapter further recommends the study regarding the dividends.

## *1.7 Limitations of the study*

The research work is always a challenging and difficult work. To find any kind of solution, we have to face different problems. The dividend is based on the investor, commercial banks,

government and present situation of the country. Those entire factors determine the dividends. A financial manger has to face different obstacles during managing his work.

This study has some limitations which are as follows:

- This study is based primarily on secondary data.
- This study considers only the main factors which are related to the dividends.
- The study has covered the data only for five fiscal years, from 2005/06 to 2009/10.
- This study is done based on only three commercial banks, NABIL, EBL and NIC banks.

# CHAPTER II

# REVIEW OF LITERATURE

The introduction part of this study has been presented in the first chapter. In this chapter all attempts has been made to review the various relevant literatures in relation to support the study to receive some ideas for developing a research design.

This research aims to analyze the dividends policy and practices of commercial banks viz. Nepal Arab Bank Ltd. (NABIL), Everest Bank Limited (EBL) and Nepal Industrial Commercial Banks (NIC). For this purpose, it is helpful to review related literature in this concerned area, which also helps to get clear ideas, opinion and other concepts. This chapter emphasizes on the literatures reviewed based on the books, research, newspapers and the master degree thesis on the related subjects to this research study.

## *2.1 Conceptual Framework*

Dividends policy is one of the most important decisions on financial management. It affects the financial structure, the flood of funds, corporate liquidity and investor's attitude for an existing company. There are two sources of financing: one is internal sources i.e. Retained earnings and the other are external sources i.e. issuing share, debenture. But the retained of profit is always widely affected by dividend policy. If the firm adopts sound dividend policy, then less money will be available. In the same way, if the firm adopts tight dividend policy, the excess money will be available for financing. A dividend payment is distributed to the shareholder of the something belonging to the corporation and specifically to the stock holders themselves as owned by the corporation.

The term dividend refers to distribution of earnings to the stockholders of the firm in return to their investment. In other words, dividend is periodic payment made to the stock holders to compensate them for the use of and risk their investment. "Dividend refers to that portion of a firm's net earning, which are paid out to the share holders." (Khan and Jain, 1992:543)

"Dividend policy determines the division of earnings between payments to stock holders and reinvestment in the firm. Retained earnings are one of the most significant sources of funds for financing corporate growth, But dividend constitute the cash flows that accrue to stockholders." (Weston and Copeland, 1990:657)

Dividend refers to that portion of a firm's net earning which is paid out the shareholders. The policy of company on the decision of its profit between the distribution to share holders as a dividend and retention for its opportunity investment is known as the dividend policy. Distribution of dividend to the share holder and plugging back the remaining of earning for opportunity investment is not the aim of the financial management. What and how much is desirable to pay dividends is always a controversial topic. Shareholder always expect higher dividend from corporation but corporation ensures towards setting side funds for maximizing wealth. "Financial management is therefore concerned with the activities of corporation that affects the well being of shareholders. The well being can be partially measured by the dividends received, but a more accurate measure is the market value of stock."
So, dividends policy is wise policy to maintain a balance between shareholders's interest with that the corporation growth from internally generated funds.

### 2.1.1 Major forms of Dividends

The firm can give various types of dividends to the stockholders according to the policies and their objectives. Before adopting any dividends the firms must ensure the smooth growth of the firm as well as satisfaction of the shareholders. Some of the major forms of dividends the firm can pay are discussed below:

***Cash Dividend***

The portion of earning paid in the form of cash to investor in proportion to their shareholder is known as cash dividend. When cash dividend is paid, both the total assets and net worth of the firm decreases and the market price of the share drops in most cases by amount of the cash dividends paid. For the payment of cash dividends, firm should have adequate balances of cash. In Nepal, cash dividend is widely adopted by many firms.

***Stock Dividend***

If additional share are issued to the existing shareholders in place of cash dividend is known as stock dividend. "A stock dividend represent a distribution of share in lieu of or in additional to the cash dividend to the existing shareholder." When stock holder receives stock dividend the number of shareholders increases but as it is paid to existing shareholders on the proportion of their shareholding, it doesn't affect the ownership of the company. Stock dividend increases number of shares. As a result, EPS, DPS and MPS of the company decrease.

***Bond Dividend***

Bond Dividend is a dividend that is distributed to the shareholder in the form of bond. When the company generates more profit for a long time, it is better to issue bonds. These are given, when the company firms unable to take the burden of interest of loan. In other words, corporation declares dividends in the form of its own bonds with a view to avoid cash outflows. It is issued for existing shareholders.

***Stock-split Dividend***

Stock-split is also nothing more than increasing the number of outstanding shares and reducing proportionately in per value of stock. After the splitting of shares, share holders will have larger number of shares than they have before. Stock-split has following effects:

- Increase in number of outstanding shares
- Return in per value and price of stock
- Constant in net worth and capital account
- No change in proportion ownership of the share holders

***Property Dividend***

It is also known as liquidity dividends. It involves a payment of assets/property in any form other than cash. Such forms of dividends may be followed whenever their asset that is no longer necessary in the operation of the business or in extraordinary circumstances. Company's own products and the securities of subsidiaries are the examples of property dividends.

***Scrip Dividend***

If the company has no sufficient amount of cash for dividend payment, company may issue scrip or notes promising to pay dividend within the maturity period. So, scrip dividend is those dividends which are promised to pay by the company instead of cash. This dividend may be interest bearing or non-interest bearing. When the company has sufficient cash then it is distributed to stock holders.

***Interim Dividend***

Generally, dividend is declared at the last of financial fiscal year. This is called regular dividend. But, sometimes directors can declare the dividend before the end of the financial year. This is called interim dividend.

***Share Re-Purchase***

It is a method in which a firm buys back its own stock in case of some surplus cash. Share re-purchase is often viewed as an alternative to paying dividends. A company can reduce the number of share by re-purchasing the shares. The stock price must rise after the stock re-

purchase if the price earnings ratio remains unchanged. When there is excess cash in the firm and insufficient investment opportunities to justify the use of those funds, then it is wise to distribute the funds either by stock re-purchase or increasing the dividend. Share price for the re-purchase or the equilibrium price is calculated from the following equation.

$$\text{Re-Purchase Price } (P^n) = \frac{S * P_c}{S - 4}$$

Where,

S = Total no of shares outstanding.

$P_c$ = Current Market price per share.

n = Number of shares to be represented.

## 2.1.2 Dividend Payout Scheme

**Stability of dividend**

Dividend stability refers to the consistency or lack of dividends in steam of dividends. In other words, stability of share means regularity in paying dividends even though the amount of dividends may fluctuate from year to year. Stability or regularity of dividends is considered as a desirable policy by management in most of the firms. It refers to the amount of dividends paid out regularly all other things remaining the same. Stable dividends may have a positive effect on the stock price. The major types of dividend policies established under dividends stability are:

***Constant dividend per share***

According to this form of dividend policy, the fixed amount is paid per share as dividend. The fixed dividend amount would be paid year after year, irrespective of the fluctuation in the earnings. When a company follows such dividend policy, it will pay dividends to the stock holders even when it suffers losses. But, the amount of dividend is increased when the firms maintained higher levels of earning and expects to maintain it.

***Constant Payout Ratio***

This is the payment of the certain percentage of earnings over the life of firm. This policy is favorable for that company that has uncertain income. Management may recommend this policy considering the ability of company in dividend payment.

***Stable Rupee Dividend plus Extra Dividend (or Low Regular Dividend plus Extras)***

The policy of paying a low regular dividend plus extra is a compromise between a stable dividend and a constant payout ratio. Under this policy, a sum of amount is paid regularly as

dividend to the stockholders and in the prospective period, extra dividend is paid over and above the regular dividend. As soon as normal conditions return, the firm cuts the extra dividend and pays the normal dividend per share.

***Residual Theory of dividend***

Residual theory of dividends suggest that only residual earnings should be distributed as dividend, which is left after accepting all the profitability investment opportunities which depends upon the investment policy of the firm. According to this theory, the dividends are distributed if there exist a balance of earning after paying fixed obligation and investment opportunities. If the firms have investment opportunities with higher return than required, then firm will invest the earnings to that project, and if there is only earnings left after accepting all the investment opportunities than it will be distributed to stock holders as cash dividend.

When the firm has opportunity of investment in profitability sectors at first, they prefer the internally generated fund (Retained earnings) rather than the externally generated funds which is comparatively expensive due to the flotation cost and others. So, the amount of dividends fluctuates time to time in keeping with availability of acceptable investment opportunity of the firm. "Although, the residual theory of dividend appears to make further analysis of dividend policy unnecessary, it is not clear that dividends are solely a means of disbursing excess funds." Thus, we can conclude that the company investment opportunity as well as the availability of internally generated funds determines the dividend amount of a firm.

### 2.1.3 Factors Influencing Dividend Policy

Dividends decision cannot be taken in vacant as well as in inflation. Various factors which affect the dividends policy, either directly or indirectly must be taken into consideration during taking dividends decision. There are some factors mentioned below to which financial manager must focus while taking dividend decision.

***Legal Restrictions***

All the companies are bounded by certain legal restriction for dividend payments. These constraints are:

- Company can pay dividends from the earning of current year or past year.
- Company cannot pay dividend if the liabilities of the company exceeds assets.
- Dividends cannot be paid if the amount of dividend to be distributed exceeds net profit.
- Dividends cannot be paid from the capital invested in the firm.

***Availability of cash or Liquidity***

The liquidity position of the company influences ability to pay dividend. A payment of dividend is possible only if the firm has sufficient earnings. But, if the firm invests in fixed assets from its sufficient recent earnings, cash amount is available to make dividend payments. “Indeed, a growing firm, even a very profitable are typically has pressing need for the funds.” So, the company must have to manage adequate liquidity position as well as retained earnings.

***Past Dividend***

A firm with record of past dividend payments strive to maintain the same and in the future. Dividends are habit forming. If the market does not receive its expected dosage, the stock price will suffer.

***Inflation***

In an indirect way, inflation also plays decisive role in dividend decision. Our according system is based on historical cost. Depreciation is charged on the basis of original cost at which assets were acquired. As a result, when a price rises, funds shared an account of depreciation would not be adequate to replace assets or to maintain capital intact. Consequently, the company may have to retain high percentage of earning to maintain the capital intact or replace equipment.

***Control***

If the company pays excess cash dividend, there will be the shortage of funds to finance investment opportunities which must be fulfilled by issuing new securities. This affects the control position of existing stock holders. So, they are not desirable to distribute to earnings as dividends which prevents them to lose the control position to the company.

***Legal Rules***

The legal rules constrain dividend payments on certain condition as follows.

- Capital impairment rules states that dividend should not be paid out of paid-up capital, which causes adverse effect on security of creditors and preference stockholders.
- The new profit rules states that divided must be paid from present profit and or profit-retained earnings.
- The insolvency rules states that when liabilities exceed assets, no dividend can be paid.

***Stability of Earning***

A firm that has a stable earnings trend will generally pay a larger portion of it's earnings in dividends. If earnings fluctuate significantly, a larger amount of the profits may be retained to ensure that enough money is available for investment projects when needed. Therefore, a firm has a earning or likely to pay out a higher percentage of its earning than a firm with fluctuating earnings.

***Tax position of Stockholders***

Paying dividend is not only action of company but it also should consider the preferential need of the stock holders. The share holders with high income tax brackets prefer to receive low dividend and high rate of retention whereas company owned by small investors tends towards high dividend payout.

***Investment opportunities in the company***

If the firm has future profitability investment opportunities, the firm is likely to re-invest the earnings rather than paying dividends. "The more repaid the rate at the need for financing assets expansion, the greater the future need for funds, the more likely the firm is to retain earnings rather than pay them out."

***Others***

Absence or lack of other sources of financing also makes the firm serious to retain the earning for opportunity investment and out the dividend to the share holders. An adequate cash flow should be maintained and the payment of cash dividend should not endanger the cash flow of the corporation. A high rate of assets expansion creates a need to retain funds rather than to pay dividends. Paying back the debts to the creditors also influences the availability of the cash flow to pay the dividends.

### 2.1.4 Payments procedure of Dividend

Firms usually pay dividends on a quarterly basis in accordance with the following payments procedures.

***Declaration date***

This is the day on which the board of directors declares the dividend. At this time they set the amount of the dividend to be paid, the holder of record data, and the payment date.

***Holders- of- record date***

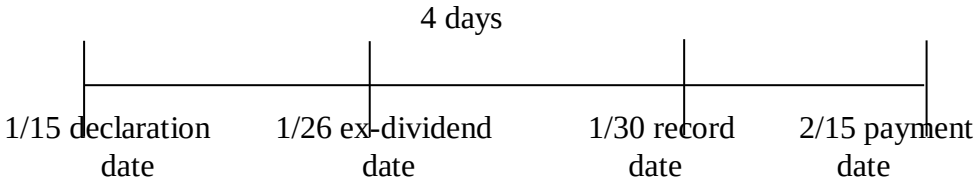
This is the date the company opens the ownership books to determine who will receive the dividends; the stock holders of record on this date receive the dividend.

***Ex- Dividend date***

This date is four days prior to the record date. Shares purchased after the ex-dividend date are not entitled to the dividends. Only investors who hold the share prior to the ex-dividend date receive the dividends.

***Payments***

This is the day when dividend checks are actually mailed to the holders of records.




### 2.1.5 Rules regarding Dividend practices in Nepal

There are no clear-cut legal provisions regarding dividend policy in Nepal. The responsibility to undertake required actions to protect shareholders interest is given to Nepal Stock Exchange which is stated on the Security Exchange Act 1983. But, this organization has not been able to protect shareholder's interest since interest and attitude of the board of directors play dominant role in management of public limited companies and they are generally in majority who are nominated by government.

According to Corporation Act, corporations must be aside a certain part of profit as reserves before the declaration of dividend. Moreover, the corporations have to separate the tax provision to dividend declaration. Likewise, Commercial Bank Act 2031 has also made same provisions for distributing dividend. Section 1(s) of this act states about the restriction of dividend's distribution. According to this section, before providing the whole expenses by bank for preliminary expenses, loss incurred in last year, capital reserve, risk borne funds, reserve fund, the bank shall not declare and distribute the dividend to the share holders.

Similarly, Company Act 1997 makes some legal provisions regarding dividends distributions, which are discussed below:

According to this act, board of directors can fix dividend payout rate but such rate should be proposed , first for the discussion and approval in the annual general meeting of share holders, the general meeting can reduce the rate determine be board of directors be can't increase.

Some other legal provisions for dividend payments are made by the Nepal Company Act 1997 are as follows.

Section (2) (m) states that bonus shares means share issued in the form of additional shares to shareholders be capitalization the surplus from the profits on the reserve funds of a company.

The form also denotes an increase in the paid up values of the shares after capitalizing surplus or reserve funds.

Section (47) has prohibited company from purchasing its own shares. This section states that no company shall purchase its own shares supply loans against the security of its own shares.

Section (137) bonus shares and sub-section (1) states that he company must inform the office before issuing bonus shares under sub- section(1);this may be done only according to a special resolution passed by the general meeting.

Section (140) dividends and sub-section of this section are as follows.

1) Except in the following circumstances, dividend shall be distributed among the shareholders within 45 days from the date of decision to distribute them.
   - In case of any law forbids the distribution of dividends.
   - In case the right to dividends is disputed.
   - In case dividends can't be distributed within the time limit mentioned above owing to circumstances beyond anyone's control without any fault on the part of the company.
2) In case, dividends are not distributed within the time limit, mentioned in sub-section (1), this shall be done by adding interest at the prescribed rate.
3) Only the persons whose name stands registered in the register of existing share holders at the time of declining the dividend shall be entitled to it.

The above points indicate that Nepalese Law prohibits re-purchase of stock, which is against the theory of finance. But, the reason for this kind of provision is still unknown. Similarly, followings are decisions regarding dividend payments by the government corporations dated June 14, 1998.

1. Dividend should be paid in profitability years. Even though there are cumulative losses, dividend is to be paid, if cash flow is sufficient to distribute dividend.
2. In case of un- audited accounts, interim dividend should be paid on the basis of provisional financial statements.
3. Dividend rate will not be less than the interest rate on fixed deposit of commercial bank of government owned. In case of insufficiency of profit amount to distribute dividend in above mentioned rate, concerned corporation should send proposal of new distribution rate to the finance ministry through liaison ministry and should do what-so-ever decision is given their off.
4. Those Corporations operating in monopoly situation should repay all amounts of profits to the government except the amount of bonus, tax and the amount needed to expand and develop the business. The amount separated for the expansion and development of

business will not be more than 20 percent of profit of the year and this amount will not be more than total paid up capital. The amount so separated should all be paid as dividend if it is not used within 3 years

5. Decision regarding distribution of annual net profit shall not be made without prior acceptance of Finance Ministry. All incentives, except those to be paid by low, shall not be distributed unless the amount of dividend is not paid to government.
6. Concerned BOD and top management will be held responsible for implementation of these dividend policies.
7. Ministry of Finance will make necessary arrangement regarding fixation of dividend percentage coordinating and concerned and ministries.

## *2.2 Review of Major Studies*

### 2.2.1 Modigliani and Miller Study (Modigliani and Miller, 1961)

In their 1961 article Modigliani and Miller, for the first time in the history of finance, advocated that dividend policy does not affect the value of the firm, i.e., dividend policy has no effect on the share prices of the firm. They argued that the value of the firm depends on the firm's earnings which depend on its investment policy. Therefore, as per MM theory, a firm's value is independent of dividend policy.

Their study of irrelevancy of dividend was based on the following critical assumptions.

- The firm operates in perfect capital market.
- There are no taxes.
- The firm has a fixed investment policy which is not subjects to change.
- Risk of uncertainty does not exist.

Modigliani and Miller provided the proof in support o their arguments in the following manner.

***Step-1***

The market price of a share in the beginning of the period is equal to the present value of divined paid of the end of the period plus the market price of the share at the end of the period.

$$P_o = \frac{D_1 + P_1}{1 + K_e}$$

Where,

Po = Market price at the beginning or at the zero periods.

$K_e$ = Cost of equity capital (assume constant)

D1 = Dividend per share to be received at the end of the period.

P1 = Market price of the shares at the end of the period.

***Step-2***

Assuming that the firm does not resort to any external financing the market value of the firm can be computed as follows.

$$np_o = \frac{n(D1 + P1)}{1 + Ke}$$

Where,

$n$ = No. of shares outstanding

***Step- 3***

If the firms internal sources of the financing its investment opportunities fall short of the funds required, and $\Delta n$ is the number of new shares issued at the end of years at price P1 , then,

$$nP_o = \frac{nD_1 + P_1 + (n + C \frown \Delta n) - \Delta nP_1}{1+Ke}$$

Where,

$n$ = No of shares at the beginning

$\Delta n$ = No of equity shares issued at the end of the period.

***Step-4***

If the firms were to finance all investment proposals, then total amount of new shares issued would be given by the following equation.

Where,

$\Delta nP_1$ = the amount obtained from the sale of new shares to finance capital budget.

I = Total amount requirement of capital budget.

E = Earning of the firm during the period.

$E - nD_1$ = Retailed Earnings.

***Step-5:***

By Substituting the value of $\Delta nP_1$ from equation of the step 4 to equation of step-3, the finding is:

$$nD_1 + P_1 (n + \Delta n) - \Delta nP_1$$

$$nP_o = \frac{}{1+Ke}$$

Or,

$$nP_o = \frac{P_1(n+\Delta n)-I+E}{1+K\,e}$$

***Step- 6:***

Conclusion: There is no role of dividend in above equation. So, Modigliani and Miller concluded that dividend policy had no effect on the share price. In this way, according to Modigliani and Miller study, it seems that under conditions or perfect capital markets, rational investors, absence of tax discrimination between dividend income and capital appreciation, given the firm's investment policy, its dividend is irrelevant is not Justified, once the assumptions is modified to consider the realities of the world. In practice, every firm follows are kind of dividend policy depends on the age and nature of the firm. (Modigliani and Miller, 1961:32)

### 2.2.2 Linter's Study

In 1996, J. Linter made an important study on corporation dividends policy in the American context. He made fifteen readily observation factors and characteristics that appeared to reflect or might be accepted to have an important bearing and dividend payment and policy. Then he reviewed the available information an over 600 listed well established companies and selected 28 for dividend investigation. The objectives or the study were,

- To identify occasions when a change in dividends might have been under active consideration even though no change was made.
- To determine the factors which existed most actively into dividend decision

Different views were collected with regard to occasion's companies' responsible officials, including president, financial vice-president, treasures, controllers and directors. He concluded that a major portion of dividend of a firm would be expressed in following equations;

$$Div*\,t = PEPS_t \ldots\ldots\ldots\ldots (1)$$

And,

$$Div - Div_{t-1} = a + b(Div*t - Div_{t-1}) + et$$

Where,

$Div^*$ = Earning

$P$ =Target Payout ratio.

*a* = Constant relating to dividend growth.
*b* = adjustment factors and new desired level of dividend work b<1.

The major findings of the study were:

- Firms think in terms of proportion of earnings to be pay out.
- Investment opportunities, liquidity, funds flow are not considered for modifying the pattern of dividend.
- Firms generally have target payout ratio in view, which determines change in dividend per share (Linter, 1956:99-113)

### 2.2.3 Gordon's Study

Myron J. Gordon conducted a study in 1962. He has concluded policy of a firm has an effect on its value of share even in a situation, were the returns on investment and required rate of return are equal. In this model, he explains that those investors are not indifferent between current dividends and retentions of earnings. His study concluded dividends more than that of future capital gains. His arguments in his model insisted that a price of dividend payout ratio leads to increase the stock price for the reason that investors consider the dividends yield is less risky than the expected capital gain, Hence there is positive relationship between amount of dividend and stock prices.

The basic assumptions of Gordon's study are as follows.

- The firm uses equity capital only.
- The firm has perpetual life.
- Retained earnings are only one source for a new investment.
- External rate of return (r) and appropriate discount rate ($K_e$) are constant.
- The corporate tax does not exist.
- The retained ratio (b) is once decided upon is constant. Thus the growth rate (g) is constant forever.
- Discount rate is greater than growth rate. K>g

Based on the above assumptions, Gordon provided the following formula to determine the market values of shares.

$$P_o = \frac{EPS(1-b)}{K-br} = \frac{DPS}{K-g}$$

Where,

P = Price Share.

| | | |
|---|---|---|
| $EPS$ | = | Earning Per Share. |
| $b$ | = | Retention Ratio = $1-D/P$ ratio. |
| 1-$b$ | = | Percentage of earnings distributed as dividends |
| $EPS(1-b\ )$ | = | dividend per share. |
| K | = | Capitalization rate or cost of capital. |
| $g$ | = | $b*r$ = growth rate |
| $r$ | = | rate of return. |

Finally, Gordon concluded that dividend and stock prices are negatively co-related in growth firms. For normal firms, Share value remains constant regardless of changes in dividend policy. It means dividend in stock prices are not co- related with other in normal firms. So, r = k, for declining firms, there is a positive correlation between dividend and stock prices (Gordon, 1962:264-272).

### 2.2.4 Walters Study

James E. Walter, (1966), conducted a study on dividend and stock prices. He proposed model for share valuation. According to him, the dividend policy of the firm affects the value of the shares. So, the dividends are relevant. He argues that the choice of dividend policies always affect the value of enterprise. His study shows clearly the importance of the relationship between internal rates of return (r) and its cost of capital (k) in determining the dividend policy. The assumptions of the Walter's Model are as follows.

- Firms finance all investment through retained earning. The external funds (i.e. debt, new equity) are not used for new investment.
- All earning on the firm's investment (r) and the cost of capital (k) are constant.
- All earnings are either distributed as dividend or reinvested internally.
- The value of EPS and DPS are assumed to remain constant forever in determining a given value.
- The firm has a perpetual or infinite life.

Based on these above assumptions, Walter has given following formula of valuation of equity share.

$$P = \frac{DPS}{Ke} + \frac{\frac{r}{Ke(EPS - DPS)}}{Ke}$$

Where,

$P$ = Market value of an equity share (Market price per share)

$DPS$ = Dividend per share

$EPS$ = Earnings per share

$r$ = Rate of return on the firm's investment

$K_e$ = Cost of capital/capitalization rate.

According to Walters Model, the optimum dividend policy depends upon the relationship between the firm's internal rate of return and its cost of capital. Walter suggested different dividend policy for different types of firms. There are three conditions, these are:

***a) Growth Firm (r > k)***

If the internal rate of return (r) is higher than the firms cost of capital (k), these firms are said to be growth firm. It will be better to remain all net profit (r) exceeds to (k) which indicates that the firm is very capable to earn more than that which the share holders could be re-invested if the earnings are paid to them. The market value per share increases by decreasing rate of the dividend in such a situation. The market value of per share will be in maximum at zero dividends. For such firm optional dividend payout ratio is zero. The correlation between dividend and stock price is negative.

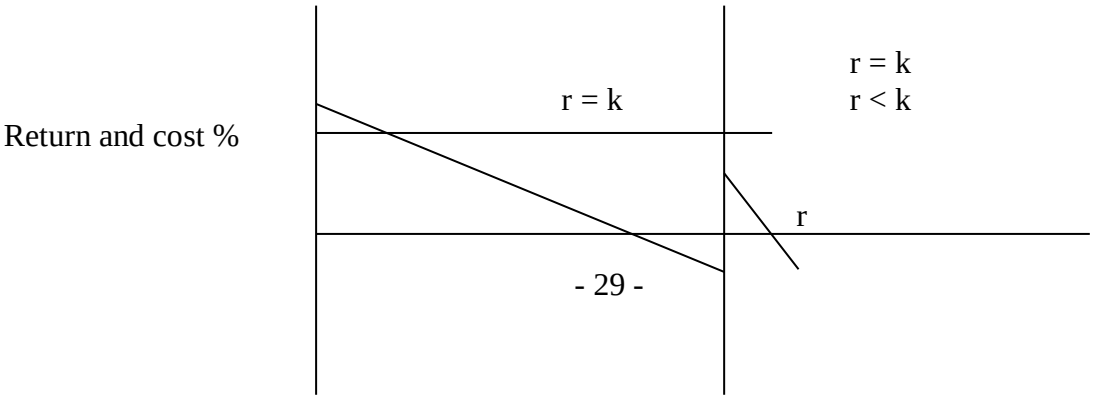
***b) Normal Firm ( r = k )***

The firm having equal internal rate of return (r) and cost of capital (K) is known as normal firm. If the internal rate of return (r) is equal to the cost of capital (k) then the dividend payout does not affect the value of shares. In such a situation, the market price of shares will remain constant for all dividend payout ratios from 0 to 100. This type of firm is called as normal firm. There is no optimum dividend policy for such a firm.

***c) Decreasing Firm (r < k)***

If the internal rate of return (r) of the firm is less than the cost of capital (k) it indicates that the share holders can earn higher return by investing elsewhere. The market value per share will increase by increasing rate of the dividend in such a situation. Such type of firm is called a declining firm. By distributing the entire earning as dividend, the value of the share will be at optimum level. This dividend payout ratio of 100% would be an optimum dividend policy.

**Figure 1: Walter's Study**



***Conclusion***

According to Walter, if the internal rate of return (r) is greater than cost of capital (k) then the dividends is negatively correlated with stock prices. When the internal rate of return (r) and cost of capital (k) of the firm is equal, than there is no relationship between dividends and stock prices i.e. Dividend is different to variation in market price of shares (Walter, 1996:29-41)

### 2.2.5 Van Horne and Ml Donald's Study

Van Horne and Ml Donald concluded a comprehensive study of 86 electric utility firms and 39 electronics and electric components industries by using cross sectional regression model in 1968 to know the combined effect of dividend policy and new equity financing decision on the market value of the firm's common stock.

From their study they concluded that the market price of shares was not affected by new equity financing in presence of cash dividend except for these in the highest new issue group and it made new equity more costly from of financing than retention of earning. They also indicated that the payment of dividend through excessive equity financing reduces the market price of shares. (Van Horne and Donalds, 1971:25-27)

### 2.2.6 Chawala and Shrinivasan's Study

This study is also focused on the impact of dividend and retention market price of stock. They estimated cross sectional relationship of 18 chemical and 13 sugar industries for the year 1963 to 1973. The basis objectives of the study are:

- To set a model, this explains the relationship between share price, dividend and retained earning.
- To test the dividend, retained earning hypothesis.
- To examine the structural changes in the estimated relations overtime.

To achieve above objectives, they used simultaneous equation model as developed by friend and Puckeet in 1964.

The unspecified form of the model in as follows.

Price Function, $P_t = F(D_t, R_t, P/E_{t-1})$

Dividend Supply Function,

$Dt = F(E_t, D_{t-1}, P/E_{t-1})$

Identity, $E_t = D_t + R_t$

Where,

P = Market price of shares

D = Dividend per share

R = Retained earning per share

E = Deviation from the sample, Average of price earning ratio.

P/E = Deviation from the sample, Average of price earning ratio.

t = Subscript for time.

They used two stage least square techniques for estimation. They found that the estimated coefficient had a correct figure and coefficient of determination of all equation was higher in case of chemical industry, which implies that the stock price and dividends paid variation can be explained by their independent variables, but in case of sugar industry the sign for retained earning in negative. From their study they concluded that both dividend and retained earnings significantly explains the variations in shares price of the industry (Chawala and Shrinivasan, 1987:14).

## *2.3 Review of Journal and Articles*

***Manohar K. Shrestha's Study***

An article, "Public enterprises; Have they divided paying ability ?" was published in 1981 by Dr. Manohar Krishna Shrestha, which gives short glimpse of the dividend performance of some public enterprises of that time in Nepal.

Dr. Shrestha has highlighted following issues in his article:

- HMG expects two things from the public enterprises:
  - ✓ They should be in a position to pay minimum dividend.
  - ✓ The public enterprises should be self supporting in financial matters in future years to come, but none of these two objectives are achieved by the public enterprises.
- One reasons for this efficiency is caused by excessive government interference in day-to-day affairs. On the other hand, high- ranking officials of the HMG appointed on directors of board do nothing but simple shows their bureaucratic personalities. Bureaucracy has been the enemy of efficiency and Lead Corporation to face losses. Losing corporation therefore not in position to pay dividend to government.
- Another reason is the lack of self criticism and self consciousness. The lack of favorable leaders is one of the biggest constrains to institution building moreover

corporate leadership comes manager of corporations have not been able to identify themselves regarding what they can contribute as manager of corporations. So, the government must be in a position to drop a financial target in corporate investment by imposing financial obligation.

- The article point out irony of government bias well that government has not allowed banks to follow an independent dividend policy and HMG is focused to have pressurized on dividend payment in case of Nepal Bank Ltd, regardless of profit. But it has let off Rastriya Banijya Bank from dividend obligation in spite of considerable profit.
- Need of criteria suggested by Dr Shrestha are :
  - ✓ Adopt a criteria- guided policy to drain resources from corporation through the medium of dividend payment.
  - ✓ Realization by managers about the cost of equity and dividend obligation.
- If HMG wants to tap resources through dividend, the following criteria should be followed:
  - ✓ Circulating the information to all the public enterprises about the minimum rate of dividend.
  - ✓ Proper evaluation of public enterprise in terms of capability of paying dividend should be made through corporation coordination committee.
  - ✓ Imposition of fixed rate of dividend by government to financially sound public enterprises.
  - ✓ Specifying performance criteria such as profit target in terms of emphasis, priorities, timing and plans. Developing a strategic plan which is not just a statement of corporation aspiration but must be done to convert the aspiration into reality.
  - ✓ Identification of corporation objectives in Corporation Act, Company Act or special character so as to clarify the public enterprises managers regarding their financial obligation to dividend to HMG.

***Radheshyam Pradhan's Study***

Radheshyam Pradhan has concluded that his study on stock market behavior in the year 1992 in his study, he collected the data of seventeen companies from the year 1986 to 1990 by the inspirations of the following objectives:.

- To access the stock behavior in Nepal.

- To examine the relationship of market equity, market value or book value, price earning and dividends with liquidity, leverage, assets turn over and interest coverage.

The conclusion of the study related to dividend behavior is as follows:

- Higher earning on stock leaders the larger ratio of DPS.
- Stock with larger ratio of dividend per share to market price have lower leverage ratio.
- Positive relationship between the ratios of DPS to market price and interest coverage.
- Positive relationship between dividend payout and turnover ratios.
- Positive relationship between dividend to pay out and liquidity.
- Positive relationship between dividend payout and profitability.
- DPS and MPS are positively correlated.

## *2.4 Review from the thesis*

There are few theses available which have looked into corporate divided behavior. The available thesis reviewed as follows:

***a) Nitin Niroula's Study***

Dividend Policy and Effect on stock price with reference to Commercial Banks conducted by Mr. Nitin Niroula's was carried out using the secondary data of five commercial banks in 2009.

Objectives of the study are as follows:

- To compare the various aspects of dividend policy of the selected commercial banks.
- To analyze the dividend policy and its effect on stock price changes.
- To find out the relationship between the dividends with earnings, stock price and net worth.
- To provide applicable suggestion on the basis of findings.

***Major Findings of the study***

- The average earning per share of banks did not seem satisfactory except for SCBML and NABIL. The coefficient of variation indicates that except for NSBL, other banks; EPS seem satisfactory. The CV ranges from 59.32% to 9.56%. Among the banks under the study, SCBNL had highest average EPS with highest degree of fluctuation.
- The average DPS showed that there was no consistency in payment of dividend. The C.V ranged from log.82 % to 15.21%. Among the banks under study, SCBNL had the

highest average DPS, and NSBL had the lowest. Except for SCBNL, other banks had high degree of fluctuation in dividend payment.

- The analysis of DPR also showed high degree of fluctuation for other banks except for SCBNL. The fluctuation ranged from 117.38% to 19.48%. The study shows that HBL has the lowest DPR.
- The analysis of MPS also showed that the average MPS of the MPS had quite high level of fluctuation. SCBNL had the highest average MPS followed by NABIL. Among the banks under study, NABIL had highest level of fluctuation whereas HBL and NIBL had low level of fluctuation.
- The average dividends yield of the banks ranged from 4.53% to 0.62%. Among the banks SCBNL had the highest dividend yield with low level of fluctuation. The fluctuation of dividend yield ranged from 129.17% to 49.50%
- The analysis of net worth per share should that SCBNL has the highest average NWPS and NSB L had the lowest. The C.V indicated that there was a moderate level of fluctuation in NWPS of the banks under the study.

***b. Padma Bhattarai's Study***

A comparative study of dividend pattern selected Nepalese Commercial Banks conducted by Miss Padma Bhattrai was carried by using the secondary data of four commercial banks in 2008.

Objectives of the study are as follows

- To identify what types of dividend policy being followed and find out whether the policy is appropriate or not.
- To test the relationship between EPS and DPS; EY and DY; EPS and MPS.
- To know whether there is any uniformity among EPS, DPS and DPR of the selected banks or not.

***Major Finding of the study***

- The average earning per share of related banks is satisfactory. In which SCBNL is in highest (i.e. Rs. 156) position among four banks but NIBL is in lowest (Rs 50.54) among this banks. Other had EBL (Rs 54.04) and HBL (Rs 53.26) is the middle position from the highest lowest.
- DPS is not satisfactory SCBNL paid highest (Rs 108) average dividend per share but EBL paid only- Rs 7 as dividend per share and it is followed by NBIL and EBL from

highest to lowest dividend per share to its share debt. But EBL paid only Rs 7 as dividend per share, and it is followed by NBIL and EBL from highest to lowest dividend per share to its share- holders.

- EPS and DPS of EBL have largest fluctuation and EPS and DPS of SCBNL has lowest fluctuation consistent among four banks. EPS of NBIL and HBL is followed the high fluctuation. Similarly, DPS of HBL and NIBL is followed the highest fluctuation from the highest to lowest.
- Fluctuation in dividend percentage is highest in case of EBL (164.51%) while consistent in case of 19.95% of SCBNL among concerned banks.
- Fluctuation of P/E ratio of SCBNL is 51.12 and consistent of P/E ratio of NIBL is 16.81

***c. Rishi Raj Gautam's Study***

A comparative study of dividend policy in commercial banks conducted by Rishi Raj Gautam was carried out using the secondary data of their commercial banks in 1998.

Objectives of the study are as follows

- To identify what type of dividend policy being followed and find out whether the policy followed is appropriate or not.
- To examine the impact of dividend on share prices
- To identify the relationship between DPS and other financial indicators.
- To know if there is any uniformity among DPS, EPS and DPR of three sample commercial banks.

***Major findings of the study are as follows***

- Average earning per share and dividend per share are all concerned banks are satisfactory.
- Analysis indicates that there is the largest fluctuation in EPS and DPS. On the other hand, they have relatively more consistency dividend per share in all the sample banks.
- No commercial banks seem to be guided be clearly defined dividend strategy in spite of the good earnings and potentials.
- Shares of the financial institution are actively traded and market prices are increasing.
- Commercial banks represent a robust body of the profit earning organization in comparison to the other sectors such as manufacturing trading etc.

- Once of the most striking findings of the study is that no commercial bank sample for this study has clearly defined strategy. On the other hand, there is significant relationship perceives between earnings and dividend of expansions program.

Once of most striking finding of this study is that no commercial banks sample for this study has clearly defined dividend strategy. On the other hand, there is significant relationship perceives between earnings and dividend expansion program.

It is necessary to do research about the dividend policy in joint venture commercial banks taking large number of sample and do wide spread analysis in above variables.

Through, there were above mentioned studies are related to dividend behavior in Nepalese Context. It was now become necessary to find out where their findings are still valid or not. In Nepalese context, many more changes have taken place in last few years. So, it is necessary to carry out a fresh study related to dividend pattern of Nepalese companies. In this study, it is tried to carry out the latest data for different companies for analyzing the dividends have became old and need to be updated and validated.

It is found that research has been conducted by taking the sample companies, which the researcher has selected in this research. So, it is believed that this study will be different than earlier research.

# CHAPER III

# RESEARCH METHODOLOGY

## 3.1 Introduction

Descriptive and analytic research design has been used.

## *3.2 Research Design*

The population and sample of this study is as follows:

**Population and sample**

- Nepal Bank Limited
- Rastriya Banijya Bank
- Nabil Bank Ltd.
- Nepal Investment Bank Limited
- Standard Charted Bank Limited.
- Himalayan Bank Ltd.
- Nepal SBI Bank Ltd
- Nepal Bangladesh Bank Ltd.
- Everest Bank Ltd.
- Bank of Kathmandu.
- Nepal Industrial and Commercial Bank Ltd.
- Nepal Credit and Commerce Bank Ltd.
- Lumbini Bank Ltd.
- Machhapuchhara Bank Ltd.
- Kumari Bank Ltd.
- Laxmi Bank Ltd
- Siddhartha Bank Ltd.
- Global Bank Ltd.
- Kist Bank Ltd.
- NMB Bank Ltd.
- DCBL Bank Ltd.
- Bank of Asia Nepal Ltd.

- Sunrise Bank Ltd.
- Prime Commercial Bank Ltd.
- Citizens Bank Ltd.
- Janta Bank Ltd.
- Mega Bank Ltd.
- Agricultural development Bank Ltd.
- Commerz and Trust Bank Nepal Limited.

The research has taken only three commercial banks as convenicent samples, which are as follows:

- Everest Bank Ltd.
- NABIL Bank Ltd.
- NIC Bank Ltd.

This study is based on five years financial data, which can be indicated 2005/06 to 2009/10 period.

## *3.3 Nature and Sources of Data*

The study is primarily based on secondary sources of data. The required data have been collected from financial statements of listed companies which have located at www. Nepal Stock.Com and official websites of Nepal Stock Exchange Ltd.

Different books from library, periodicals, news paper cuttings, companies, and magazines were also be used whenever required. The historical data from the NEPSE'S websites has also been used.

## *3.4 Data Processing Procedure*

The study ate mpts to present the relevant data of selected banks by calculating useful financial indicators. Data are presented and explained the in light of theoretical basis. Similarly, the collected data are arranged and presented in form of percentage, ratio and rupees etc.

## *3.5 Methods of Data Analysis*

The facts and figures collected are systematically processed with a view to reducing them to manageable proportion; so that the statistical treatment and meaningful interpretation can be

done to formulate theory or findings. Thus, the data analysis process comprises of editing, coding, categorization and tabulation and performing statistical analysis.

The data has been analyzed according to the pattern of available data. Wide verities of methodology have been applied according to the reliability and consistency of data. Before using the analytical tools to compare result, the data containing in the financial statements have been grouped and re-arranged so as to make comparison easy. For the study, the data of five years were taken as sample from 2005/06 to 2009/10. The data were analyzed financially and statistically. The results and the finding from the two types of analysis were jointly interpreted.

### 3.5.1 Financial Tools

***1. Market Price Per Share (MPS)***

It indicates the selling price of one share in the market. Here, MPS we mean the average market price per share. It is calculated as :

$$\text{MPS} = \frac{\text{Opening MPS + Closing MPS + High MPS + Low MPS}}{4}$$

***2. Earning Per Share (EPS)***

Earnings per share refers the rupee amount earned per share of common stock outstanding. It measures the return of each equity shareholders. It is also identified to measures the profitableness of the shareholders investment. The earning per share simple shows the profitability of the banks on a per share basis. The higher earning indicated the banks mobilizing their funds and vice versa. In other words, higher equity per share denotes the strength and lower earning per share indicates the weakness of the banks. Earning per share is computed to know the earning capacity and to make comparison between concerned banks. This ratio can be computed by dividing the earning available to common shareholders by the total numbers of common stock outstanding of banks. Thus,

$$\text{EPS} = \frac{\text{Total earning available to ordinary shareholders}}{\text{Number of ordinary share outstanding}}$$

***3. Dividend in Percent***

Dividend in percent indicates that the ratio of dividend per share to the paid up price per outstanding share. It is obtained by dividend per share divided by paid up capital per share.

$$\text{Dividend in Percent (\%)} = \frac{\text{Dividend per Share}}{\text{Paid up capital per share.}}$$

***4. Divided Per Share (DPS)***

The part of earning distributed to the share holders as per share basis is known as DPS. It is the amount calculated by dividing the total dividend with total numbers of shares outstanding.

$$DPS = \frac{\text{Total Dividend}}{\text{No. of common shares outstanding}}$$

***5. Dividend Payout Ratio (DPR)***

The percentage of the profit on share, which is distributed as dividend, is called dividend payout ratio (DPR). This ratio shows the percentage of profit, which is distributed as dividend and the percentage retained as reserve and surplus for the growth of the bank. It is calculated with purpose of knowing earning power and dividend policy of selected banks.

Mathematically it is calculated as;

$$\text{Dividend Payout Ratio (DPR)} = \frac{\text{Dividend per Share (DPS)}}{\text{Earning per share ( EPS)}}$$

***6. Retention Ratio***

It is the ratio of earnings not distributed to total earnings and the retention and is calculated as the followings: Retention ratio= 1- Dividend Payout Ratio

or,

$$\text{Retention ratio} = \frac{\text{Retained earning per share}}{\text{Earning per share}}$$

***7. Price Earning Ratio (P/E ratio)***

P/E Ratio expresses the amount currently paid to each rupee of currently reported by the balance sheet of company's earning per share by the market. It is calculated using following formula.

$$\text{P/E Ratio} = \frac{\text{Market Value per share (MPS)}}{\text{Earning Per share (EPS)}}$$

***8. Dividend Yield (DY)***

Dividend Yield is a percentage of dividends per share on market price per share. It measures the dividend in retain to market value per share so, the dividend yield is the dividend received by the investors as a percentage of market prices per share in the stock market.

Mathematically,

$$\text{Dividend Yield (D/Y)} = \frac{\text{Dividend Per share (DPS)}}{\text{Market Price per share (MPS)}} \times 100\%$$

## 3.5.2 Statistical Tools

The various statistical tools have been used for the analysis and interpretation of the study. In the study, the following statistical tools are used to analyze the relationship between dividend and other variables.

***1. Mean or Average( $\bar{X}$ )***

The most popular and widely used measure of central tendency is the arithmetic mean or simply the mean. Arithmetic mean is the sum of all the observations on dividend by the number of observation is called arithmetic mean. It represents the entire data by a single value. In this study, the data related to dividend are tabulated and drawn out average over different years.

Mathematically,

$$\text{Mean } (\bar{X}) = \frac{\sum x}{n}$$

Where,

$\sum x$ = The sum of observation

N = No. of observations

***2. Standard Deviation ($\sigma$)***

Standard deviation measures the dispersion. In other words, SD shows that in what extent the given value is far from the central value. Higher the value S.D indicates he greater deviation from central value and vice versa. It is absolute measurement of dispersion. The study has used this tool to know the dispersion of each financial indictor of selected bank.

Mathematically;

$$\sigma = \sqrt{\frac{\sum (X - \bar{X})}{n-1}}$$

Here,

Sigma used to denote standard deviation.

X = Set of observation

$\bar{X}$ = Arithmetic Means

N = Number of observation

**3. *Coefficient of variation (CV)***

Coefficient of variation (CV) is the most commonly used measures of relative variation. It is used in such problems where to compare the variability of two or more than two series. "The coefficient of variation (CV) is the relative based on the standard deviation and is defined as the ratio of the standard deviation to the mean expressed in percent (K.N. Shrestha, 1996:112)". The series for which the coefficient of variation is greater, is said to be more

variables or conversely less consistent, less uniform, less stable or less homogenous. On the other hand, the series for which coefficient of variation is less said to be less variables or more consistent, more uniform, more homogenous. Coefficient of variation is denoted by CV and is obtained as follows.

$$\text{Coefficient of Variation (CV)} = \frac{\delta}{\bar{x}} * 100$$

Where,

C.V = Co-efficient of variation

$\sigma$ = Standard deviation

$\overline{X}$ = Arithmetic Mean.

***4. Correlation Coefficient (r)***

Coefficient of correlation is an analytical tool for measuring co-variation between two or more variables. In other words, it measures the closeness of one variable with other variables. The relationship may be positive or negative which depends upon on their movement. If variables move to the same directions, the correlation will be positive and if the variables move to opposite directions from each other, then the correlation will be negative. It is calculated to show the relationship between MPS and DPS, MPS and EPS, Earning yield and Dividend yield, EPS and DPS, Dividend multiple and price earning ratio and market capitalization with EPS and DPS.

Mathematically;

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{N\sum X^2 - (\sum X)^2}\sqrt{N\sum Y^2 - (\sum Y)^2}}$$

Where,

r = Karl persons correlation co-efficient

N = Total number of observation

$\sum$ xy = Sum of the value of two variables multiplied.

$\sum$ x = Sum of the value of variables of ' X '

$\sum$ y = sum of the value of variable 'Y'

$\sum$ $x^2$ = sum of the squared value of variable 'X'

$\sum$ $y^2$ = sum of the squared value of variable 'Y'

$(\sum x)^2$ = squared of the value of variable of 'X'

$(\sum y)^2$ = squared of the value of variable of 'Y'

### *5. Regression Analysis*

Regression analysis helps in estimating the value of variable from the known value of another variable. This variable is mostly used in economics and business research. The variables, that are to be found out is called dependent variables and the variable whose value is known, and with the help of these value we can estimate, is called independent variables. If there is only one independent variables used in regression then it is called simple regression and if there are more than two variables then it is called multiple regression.

Simple regression can be expressed as:

$$Y = a + bx$$

Where,

Y = Value of dependent variables

*a* = intercept, that does not vary with the fluctuation in independent variable.

X = Value of independent variable.

Multiple regressions can be expressed as:

$$Y = a1+b1x1+b2x2+b3x3+\ldots\ldots b_{n+}x_n$$

Where,

b1,b2…….b3 = regression coefficient of each independent variables which estimates the change in dependent variable for each unit change in that independent variable in regression model.

### *6. T- Statistics*

It is used to test the validity of assumption of the study for small sample. It is very difficult to make clear-cut distinction between small samples and large samples. Generally, a sample is termed as small, if u < 30 from practical point of view. For applying t- distribution, the t-values are calculated first and compared with critical values at a certain level of significance for given degree of freedom. If the computed value of (t) exceeds the table value (say to 0.05), it is known that the difference is significance at 5% level of significance but if t- values are less corresponding critical values of the t- distribution, the difference in not treated as significant. T- value is calculated as follows:

$$\text{T- value (t)} = \frac{b}{S_b}$$

Where,

= Regression coefficient

= Standard Error of Beta coefficient

Note: Standard Error of Beta Coefficient ($S_b$)= $\frac{S.E.E}{\sqrt{\sum (X - \bar{X})^2}}$

***7. F-test***

The technique of analysis of variance enables us to test for the significance of the difference between more than two samples variance, we use F- test, the difference between two samples means can be studied through t- test but to examine the equality between two or more sample variable at one and same time, ANOVA is used. Here, one- way ANOVA method is used to examine the equity between sample variables.

$$F = \frac{\text{Various between samples}}{\text{Various within samples}}$$

OR,

$$F = \frac{\text{Sum of square due to row or between banks}}{\text{Sum of square due to error or within banks.}}$$

## *3.6 Test of Hypothesis*

Statements of the relationship between two or more variables is called hypothesis. Hypothesis statements should be able to show the relationship between the variables. At the same time, they should carry clean implications for testing the stated relations. The reason on the thesis topic strongly holds the hypothesis criteria. The hypothesis of the research work is as follows:

A. Null Hypothesis ( $H_o$):

There is no significant difference is MPS in sample banks.

Alternative Hypothesis ( $H_1$):

There is significant difference in MPS in sample banks.

B. Null Hypothesis ( $H_o$):

There is no significant difference in EPS in sample banks.

Alternative Hypothesis ( $H_1$):

There is significant difference in EPS in sample banks.

C. Null Hypothesis ( $H_1$):

There is no significant difference in DPS in sample banks.

Alternative hypothesis ( $H_1$):

There is significant difference in DPS in sample banks.

D. Null Hypothesis ( $H_o$):

There is no significant difference in DPR in sample banks.

Alternative Hypothesis ( $H_1$):

There is significant difference in DPR in sample banks.

E. Null Hypothesis( $H_o$):

There is no significant difference in PER in sample banks.

Alternative Hypothesis ( $H_1$):

There is significant difference in PER in sample banks.

# CHAPTER IV

# DATA PRESENTATION & ANALYSIS

This chapter consists of presentation and analysis of the data related with different variables using both financial and statistical tools explained in the third chapter. The prime objective of this chapter is to achieve the objectives, which are set in the first chapter. In order to achieve these objectives, the gathered data are presented, compared and analyzed with the help of different tools.

## *4.1 Analysis of individual commercial bank*

The study has taken a special reference of listed commercial banks. Among 29 commercial banks operating in Nepal, only 17 commercial banks are listed in NEPSE. Among those, study has taken 3 sample commercial banks. The data covers for some of the listed commercial banks for five years which has been introduced here and their dividend are analyzed.

### *1. Everest Bank Ltd. ( EBL)*

Everest Bank Ltd was established in 1994 A.D (2051 B.S) under the company act 1964 with an objective of carrying out commercial banking activities under the commercial bank act 1974. Under Bank of India Ltd with technical services agreement signed between it and Nepalese promoter managed the bank till November 1996. Later on, it handed over the management of the Punjab National Bank Ltd, India which holds 20 percent equity on the bank's share capital, 50 percent equity hold by Nepalese promoter and 30 percent hold by the

general public investors. There are 35 branch of EBL in operation in the equity and number of employees are 521. Authorized capital, issued capital and paid up capital are Rs 1000 million, Rs 840.62 million and Rs 838.821 million.

***2. Nepal Arab Bank Ltd. ( NABIL)***

NABIL Bank commenced operations 25 years ago on the 12th of July through a joint-venture with Dubai Bank Ltd marking a turning point in the banking history of Nepal. Banking has been redefined and services remodeled since then Banking hitherto suffered setbacks and the commencement of NABIL Bank introduced new philosophies and best practices to the industry. This in essence opened up a plethora of opportunities for all: entrepreneurs, industries, individual for better future commencing with a team of about 50 staff and it's 28 millions as capital. Professional banking evolved through NABIL in Nepal. Current information is given below.

Authorized capital Rs 1600 million
Issued Capital Rs 689.22 million
Paid up Capital Rs 689.22 million
Total no of share 9657470
Face value of Share Rs 100
No of branches 20
Central office = Kantipath Kathmandu.

***3. Nepal Industrial and Commercial Bank Ltd. (NIC)***

Nepal Industrial Bank Ltd. (NIC Bank) commenced its operation from 21st July 1998. Promoted by several prominent business house of Nepal, it is the first commercial bank in the country to be capitalized at NPR 500 million, it is one of the most widely held companies in Nepal with close to 35 thousands share holders. The percentage shareholding constitutes 51% of promoter's stake and 49% general public. The shares of the bank are actively traded in Nepal Stock Exchange with market capitalization of about NPR 12. 8 billion as at the fiscal year ended 15th July 2009. The Bank was also awarded "Bank of the year 2007" by the bankers Magazine, financial times, London. The current information if given below:

| | |
|---|---|
| Authorized Capital | Rs 1600 million |
| Issued Capital | Rs 1141 million |
| Paid up Capital | Rs 1141 million |
| Total no of shares | 975489000 |
| Face value of shares | 100 |

| | |
|---|---|
| No of branches | 20 |
| Central office | Biratnagar |

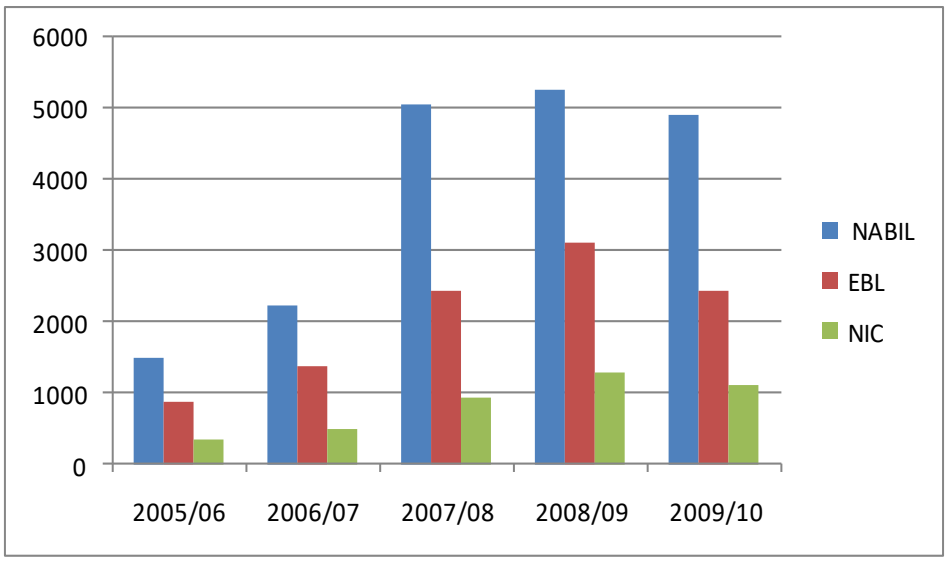
### 4.1.1 Share Price Analysis

This analysis shows the market price of share of each selected banks. So, inter-bank comparison can be made. Similarly coefficient of variation is also calculated to find out the uniformity of the given sample banks.

**Table 1: Market Price per share in Rs**

| Year | NABIL | EBL | NIC | Pooled Average |
|---|---|---|---|---|
| 2005/06 | 1505 | 870 | 366 | 913.67 |
| 2006/07 | 2240 | 1379 | 496 | 1371.67 |
| 2007/08 | 5050 | 2430 | 950 | 1443.33 |
| 2008/09 | 5275 | 3132 | 1284 | 3230.33 |
| 2009/10 | 4899 | 2455 | 1126 | 2826.67 |
| Average | 3793.80 | 2053.20 | 844.40 | 1957.134 |
| S.D. | 1590.368 | 815.075 | 356.075 | 700.2389 |
| C.V % | 41.920 | 39.6977 | 42.1689 | |

**Figure 2: Comparison of market price per share of commercial banks**




The above table 1 shows the MPS of the related banks from the year 2005/06 to 2009/10. In the year 2005/06, NABIL has 1505 MPS which is the highest whereas as NIC has the lowest share price of all i.e. Rs 366. Similarly in 2006/07 to 2008/09, MPS of every bank accordingly increased. But in 2009/10, MPS of every bank is accordingly decreased.

In the same way, standard deviation of bank is very high. Similarly coefficient of variation represents the consistency.

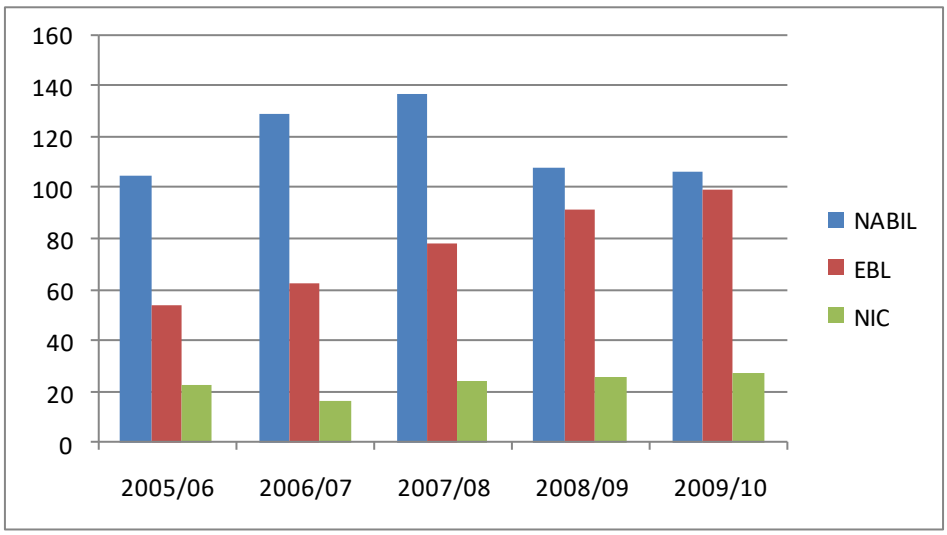
### 4.1.2 Earning Per Share (EPS)

Earning per share in an important financial indicator. This is computed by dividing net profit after tax (NPAT) by the total numbers of common stocks outstanding. It measures the profitability of shareholders investment per share basis.

**Table 2: Earning per share in Rs**

| Year | NABIL | EBL | NIC | Pooled Average |
|---|---|---|---|---|
| 2005/06 | 105.49 | 54.22 | 22.75 | 60.82 |
| 2006/07 | 129.21 | 62.78 | 16.10 | 69.36 |
| 2007/08 | 137.08 | 78.42 | 24.01 | 79.83 |
| 2008/09 | 108.31 | 91.82 | 25.75 | 75.29 |
| 2009/10 | 106.76 | 99.99 | 27.83 | 78.19 |
| Average | 117.37 | 77.446 | 23.288 | 72.70 |
| S.D. | 13.1488 | 17.14 | 3.97 | 6.92 |
| C.V % | 11.20 | 22.13 | 17.086 | 9.52% |

**Figure 3: Earning per share of Banks in Rs**




Above table 2 shows that the average earning per share of different sample banks. Among them NABIL has the highest average earning per share (i.e. Rs 117. 37) and NIC has the lowest. It means NABIL has been earning a high income among the sample banks. On the other hand NIC has been earning lower income in comparison to others.

Here, coefficient of variation of EBL is greater (i.e. 22. 13%) and that of NABIL is smaller (i.e. 11.20%) which shows that EBL has more price fluctuation and NABIL has less and EPS position of NABIL is in more consistency than other sample banks. So, it is more probable to attract investors towards their banks due to less coefficient of variation

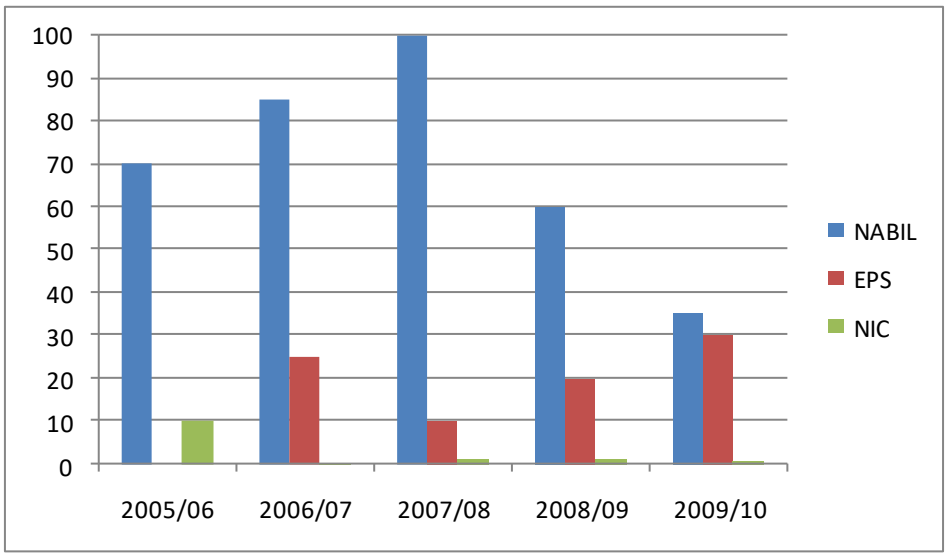
### 4.1.3 Dividend per Share of Banks

The table below shows the dividend per share of the banks.

**Table 3: Dividend per share in RS**

| Years | NABIL | EPS | NIC | Pooled Average |
|---|---|---|---|---|
| 2005/06 | 70 | - | 10 | 26.67 |
| 2006/07 | 85 | 25 | 0.53 | 36.843 |
| 2007/08 | 100 | 10 | 1.05 | 37.01 |
| 2008/09 | 60 | 20 | 1.05 | 27.01 |
| 2009/10 | 35 | 30 | 0.79 | 21.93 |
| Average | 70 | 17 | 2.684 | 29.894 |
| S.D. | 22.13 | 10.77 | 3.684 | 6.01 |
| C.V | 31.61 | 63.35 | 136.478 | 20.1043 |

**Figure 4: Dividend per share of Banks**




The table above shows the amount of dividend per share paid by the banks from the year 2005/06 to 2009/10. From above table, it is clear that the DPS of NABIL is more than other

sample banks, whereas for EBL is seems satisfactory but NIC banks are in a very weak condition. EBL have not paid dividend in 2005/06. So, NABIL have the satisfactory DPS.

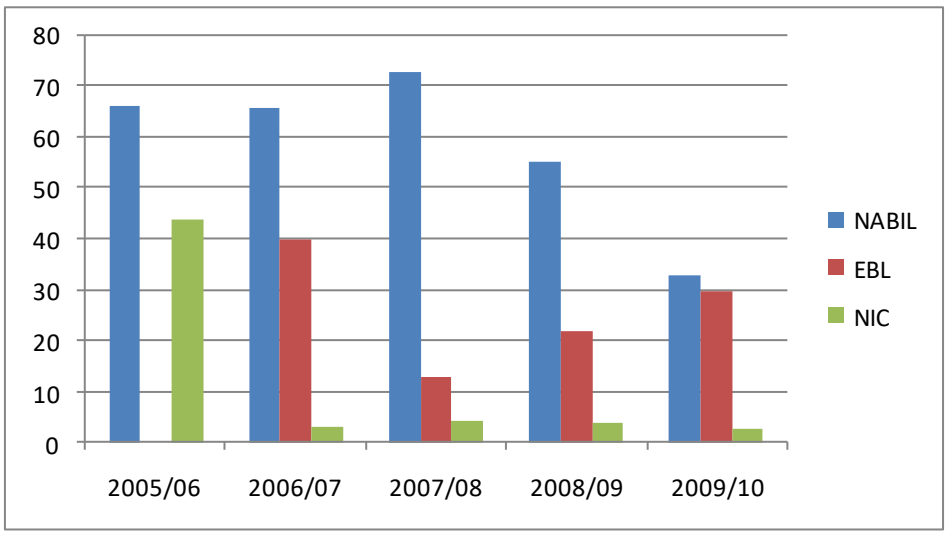
### 4.1.4 Dividend Payout Ratio Analysis

The dividend payout ratios are given in table and figure below:

**Table 4: Dividend payout ratio of the Banks**

| Year | NABIL | EBL | NIC | Pooled Average |
|---|---|---|---|---|
| 2005/06 | 66.36 | - | 43.95 | 36.77 |
| 2006/07 | 65.78 | 39.82 | 3.30 | 36.30 |
| 2007/08 | 72.95 | 12.75 | 4.38 | 30.03 |
| 2008/09 | 55.40 | 21.78 | 4.08 | 27.09 |
| 2009/10 | 32.79 | 30.00 | 2.84 | 21.88 |
| Average | 58.656 | 20.87 | 11.71 | 30.412 |
| S.D. | 14.10 | 13.746 | 16.19 | 5.64 |
| C.V % | 24.04 | 65.86 | 137.73 | 18.54 |

**Figure 5: Dividend payout ratio of the Banks**




The above table 4 shows the dividend payout ratio of three sample banks, which is the percentage of dividend paid out of the total earnings made before analyzing the DPR. We can segregate the DPR of these companies into three different categories of policy.

| Policy | DPR |
|---|---|
| Conservative dividend policy | = Less than 20 % |

Moderate dividends Policy = 20 % to 50%

Aggressive dividend Policy = More than 50%

In the year 2005/06 NABIL applied aggressive dividend policy. It has 66.36% dividend payout. EBL has conservative dividend policy and NIC has moderate dividend policy. They have 0 % and 43.95% dividend payout ratio respectively. The pooled average was 36.77% which shows the moderate dividend policy according to assumption. In the year 2006/07, NABIL, EBL and NIC has decreased dividend payout ratio. The DPR of NABIL is still in aggressive policy and EBL is still in moderate policy and also NIC is still in conservation policy. The pooled average 36.30% shows moderate policy.

In the year 2007/08, NABIL has 72.95% which shows aggressiveness in dividend policy. EBL and NIC have 12.75% and 4.38% respectively which shows conservative dividend policy. The pooled average of 30.03% shows moderate. In the year 2008/09, NABIL has 55.04% which shows aggregate dividend policy. EBL and NIC have 21.78% and 4.08% respectively which shows moderate dividend policy and conservative dividend policy. The pooled average 27.09% shows moderate dividend policy. In the year 2009/10, the NABIL and EBL have 32.79% and 30% respectively which is moderate dividend policy. NIC has 2.84% which shows conservative dividend policy. The pooled average of 21.88% shows moderate dividend policy.

The CV of the DPR suggests that the DPR of NIC is more fluctuating than other two banks. The CV of NABIL and EBL shows less fluctuation in different years. The average of CV i.e. 18.34% shows the fluctuating condition is in average.

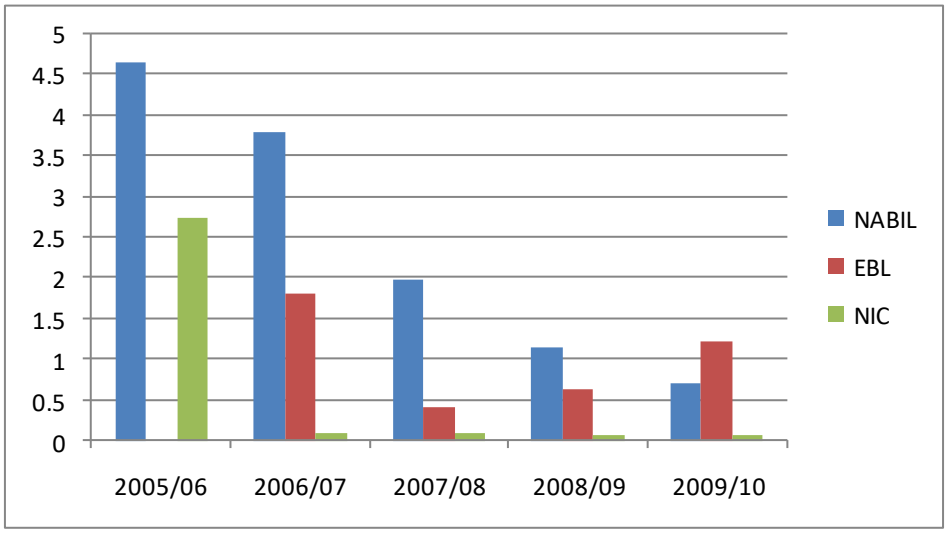
### 4.1.5 Dividend Yield Analysis

The dividend yields of the selected banks are shown in the table and figure below:

**Table 5: Dividend yield of Banks**

| Year | NABIL | EBL | NIC | Pooled Average |
|---|---|---|---|---|
| 2005/06 | 4.65 | - | 2.74 | 2.47 |
| 2006/07 | 3.79 | 1.81 | 0.10 | 1.9 |
| 2007/08 | 1.98 | 0.41 | 0.11 | 0.83 |
| 2008/09 | 1.14 | 0.63 | 0.081 | 0.617 |
| 2009/10 | 0.71 | 1.22 | 0.070 | 0.67 |
| Average | 2.454 | 0.814 | 0.6202 | 1.30 |
| S.D. | 1.52 | 0.63 | 1.059 | 0.75 |
| C.V % | 61.93 | 77.39 | 170.75% | 57.69% |

**Figure 6: Dividend yields of selected Banks**




Above table 5 shows the dividend yield analysis of three sample banks for the years 2005/06 to 2009/10. In the year 2005/06, NABIL has the highest dividend yield (4.65) and EBL has no dividend yield. The NIC has (2.74) dividend yield. The pooled average in this year is 2.47. In the year 2006/07, the dividend yields of all banks are decreased. The pooled average is 1.90 in this year. In the year 2007/08, the dividend yield of all three banks decreased. The pooled average is 0.83. Also in the year 2008/09, the dividend yield of all three banks decreased. The pooled average is also decreased. In the year 2009/10, the dividend yield of EBL is increased and other two banks are decreased.

On average, NABIL has the highest dividend yield (2.454) and the dividend yield of EBL and NIC is lowest. On observation, the coefficient of variation the dividend yield of NABIL is more consistent than others.

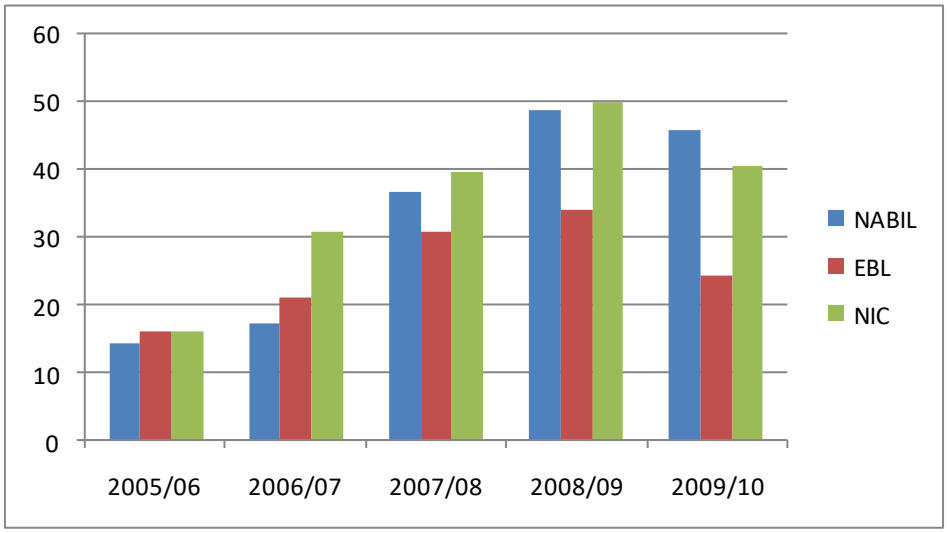
### 4.1.6 Analysis of P/E Ratio

**Table 6: P/E Ration of the selected Banks**

| Year | NABIL | EBL | NIC | Pooled Average |
|---|---|---|---|---|
| 2005/06 | 14.27 | 16.04 | 16.09 | 15.46 |
| 2006/07 | 17.34 | 21.04 | 30.81 | 23.36 |
| 2007/08 | 36.84 | 30.99 | 39.56 | 35.80 |

| | | | | |
|---|---|---|---|---|
| 2008/09 | 48.70 | 34.11 | 49.86 | 44.23 |
| 2009/10 | 45.89 | 24.55 | 40.46 | 36.97 |
| Average | 32.608 | 25.524 | 35.356 | 31.17 |
| S.d. | 14.30 | 6.44 | 11.36 | 10.32 |
| C.V % | 43.85% | 25.23% | 32.13% | 33.13% |

**Figure 7: P/E Ration of Banks**




Above table 6 shows the P/E Ratio of sample Banks. This ratio describes the relationship between EPS and MPS. In the year 2005/06, the P/E ratio of NABIL, EBL and NIC is 14.27, 16.04 and 16.09 respectively, where NIC has the highest P/E ratio among these three banks and NABIL has the lowest P/E ratio. The pooled average is 15.46. In 2007/08, the P/E ratios of all three banks are increased. NIC has the highest P/E ratio 39.56. The polled average is 35.80. In year 2008/09, the increasing pattern follows again. In this year, NIC stands first with 49.86. In the year 2009/10, the NABIL has increasing pattern and another two banks have decreasing pattern. The pooled average in this year is 36.97.

On average, NIC has the highest P/E ratio with 35.356. EBL and NABIL has P/E ratio of 25.524 and 32.608 respectively. The CV analysis shows that EBL is more consistent than others and P/E ratio of NABIL is highly fluctuating in this five year.

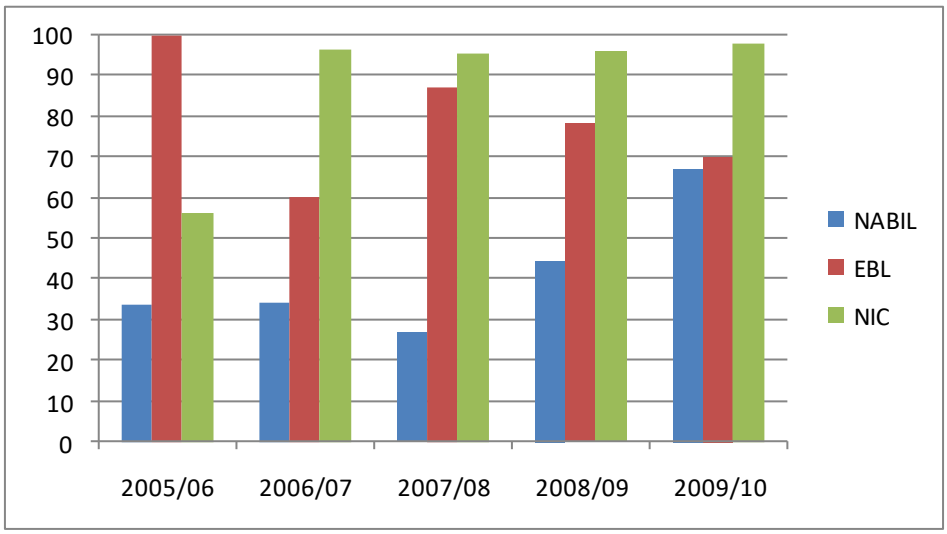
### 4.1.7 Retention Ratio

**Table 7: Retention ratios of selected Banks**

| Year | NABIL | EBL | NIC | Pooled Average |
|---|---|---|---|---|
| 2005/06 | 33.64 | 100 | 56.05 | 63.23 |
| 2006/07 | 34.22 | 60.18 | 96.70 | 63.70 |
| 2007/08 | 27.05 | 87.25 | 95.62 | 69.97 |

| | | | | |
|---|---|---|---|---|
| 2008/09 | 44.60 | 78.22 | 95.92 | 72.91 |
| 2009/10 | 67.21 | 70 | 97.92 | 78.12 |
| Average | 41.344 | 79.13 | 88.29 | 6.588 |
| S.D. | 14.10 | 13.74 | 16.12 | 5.64 |
| C.V % | 34.10 | 17.36 | 18.25 | 8.10 |

**Figure 8: Retention ratio of Banks**




Above table 7 shows the retention ratio analysis of three sample banks for the years 2005/06 to 2009/10. In the year 2005/06, EBL has the highest retention ratio (100) and NABIL has the lowest (33.64). The pooled average in this year is 63.23. In the year 2006/07, the retention ratio of NABIL and NIC has increased and EBL has decreased. The pooled average is 63.70. In the year 2007/08, the Retention Ratio of NABIL has been decreased and EBL has been increased. The pooled average is 69.97. In the year 2008/09, the Retention Ratio of NABIL and NIC have been increased and other banks (EBL) has been decreased. The pooled average is 72.91. In the year 2009/10, the Retention Ratio of NABIL and NIC have also been increased and EBL has been decreased. The pooled average is 78.12.

On average NIC has the highest Retention Ratio (88.29) and the Retention Ratio of NABIL is lowest. On observing the coefficient of variation, the Retention Ratio of EBL is more consistent than others.

## *4.2 Correlation Analysis*

Correlation analysis helps to determine the strength of the linear relationship between two variables. In other words, it helps to show how strongly the two variables are correlated. It helps to determine whether a positive or negative relationship exists between two variables and the relationship is significant or not.

In this study, the correlation analysis is preferred to identify the relationship between DPS and other variables like MPS, EPS and the relationship is significant or not.

### 4.2.1 Correlation between EPS and DPS

The correlation analysis has been done and the results are presented below:

**Table 8: Correlation between EPS and DPS**

| Bank | r | Relationship | $r^2$ | Probable Error | Sign/in sign |
|---|---|---|---|---|---|
| NABIL | 0.84 | Positive | 0.7056 | 0.0888 | Significant |
| EBL | 0.66 | Positive | 0.4356 | 0.1702438 | Significant |
| NIC | -0.03098 | Negative | 0.000597 | 0.301355 | Insignificant |

Above table 8 shows the relationship between EPS and DPS of sample banks. It is observed that the correlation of NABIL and EBL is positive. It can be said that EPS and DPS of these banks are strongly correlated with each other. But in case of NIC, they have negative correlation, which indicates that EPS and DPS are negatively correlated with each other. The relationship between EPS and DPS whether they are significant or not can be measured by calculating the probable error of the correlated coefficient. In case of NABIL, it is greater than 6PE. For NABIL, EPS is the key factor to determine DPS due to significant relationship between EPS and DPS

The coefficient of determination is more precise measure of the relationship between two variables and it can be presented as a proportion or as a percentage. The coefficient of determination between EPS and DPS of NABIL is 0.7056, which means that the change in EPS has a significant effect on the variation of DPS. In case of EBL and NIC, it is 43.56%, 0.09597% respectively.

### 4.2.2 Correlation between EPS and MPS

The correlation analysis between EPS and MPS has been done. The detail calculations are given in annex. The results are shown in the table below:

**Table 9: Correlation between EPS and MPS**

| Bank | $\nu$ | Relationship | $\nu^2$ | Probable error | Significant/insignificant |
|---|---|---|---|---|---|
| NABIL | 0.0804060 | Positive | 0.006465 | 0.29969384 | Insignificant |
| EBL | 0.89111 | Positive | 0.7940 | 0.0621153 | significant |
| NIC | 0.7339 | Positive | 0.5386 | 0.139179 | significant |

Above table 9 shows the relationship between EPS and MPS of three sample banks. It is observed that the correlation coefficient of all banks is positive. So, it is concluded that there

is positive relationship between EPS and MPS of NABIL, EBL and NIC and since correlation coefficient of EBL is higher than 6PE there is significant relationship between EPS and MPS. It means that the market price of the stock of the banks is affected by dividends.

## *4.3 Regression Analysis*

Regression analysis is a very powerful tool in the field of statistical analysis in predicting the value of one variable, given the value of another variable, when these two variables are related to each other. It describes about the effect to the dependent variable due to change in independent variable. The regression analysis is either a simple regression or multiple. In simple regression analysis, only one independent variable is taken for the prediction of the value of dependent variable. But, multiple regression analysis involves two or more independent variables forming the basis of estimating the values of dependent variable. In this research, simple regression analysis is used to establish relationship between the dependent variable and single independent variable on individual sample company where the multiple regression analysis is used to show the combined relationship of dependent variable to other independent variable of all sample companies.

### 4.3.1 Simple Regression Analysis

When we take only one independent variable to predict the value of the dependent variable through the appropriate regression line the analysis is known as simple regression analysis.

#### *4.3.1.1 Simple Regression Analysis between DPS and EPS*

The major outcome of simple regression analysis between DPS and EPS of the sample banks based on the data are shown as follows.

**Table 10: Regression analysis between DPS and EPS**

| Banks | No. of Years | Constant(a) | Regression Coefficient(b) | S.E.E | $S\beta$ | T-Value |
|---|---|---|---|---|---|---|
| NABIL | 5 | - 96.9179 | 1.423 | 14.8732 | 0.52586 | 2.8130 |
| EBL | 5 | - 14.91539 | 0.41212 | 10.49 | 0.2735 | 1.5068 |
| NIC | 5 | 3.348276 | -0.0285244 | 4.72674 | 0.53123 | -0.05369 |

The table 10 helps us to find out the mathematical equation that relates to dependent variable (DPS) with the independent variable (EPS). The simple regression equation between DPS and EPS calculated in the annex 2 is:

$$Y= a+ bx$$

Let the dependent variable DPS is denoted by y and independent variable EPS is denoted by x, then the equation is:

$$DPS = a + b\ EPS$$

Now,

$$DPS_{NABIL} = -96.91539 + 1.423\ DPS_{NABIL}$$

$$DPS_{EBL} = -14.91539 + 0.41212 EPS_{EBL}$$

$$DPS_{NIC} = 3.348276 - 0.0285244 EPS_{NIC}$$

From the above table10, the beta (regression) coefficient of NIC is –0.0285244, which indicates that one rupee increase in independent variable (EPS) leads to decrease by an average of Rs 0.0285244 in dependent variable DPS, if the constant (a) 3.348276 remains same. Since calculated T- value of NIC (-0.05369) is less than the tabulated T- Value (2.78) at 5% level of significance and 4 degree of freedom, the result is statically not significant.

In the case of EBL, the beta (regression) coefficient is 0.41212, which indicates that one rupee increase in independent variable (EPS) leads to increase by an average of Rs 0.41212 in dependent variable (DPS) if the constant (a) – 14.9153 remains same. Since calculated T-value of EBL 1.5068 is higher than the tabulated T- value (2.78) at 5% level of significant and 4 degree of freedom, the result in statistically significant.

NABIL has the beta (regression) coefficient of 1.423, which indicates that one rupee increase in independent variable (EPS) leads to increase by an average of Rs 1.423 in dependent variable (DPS), if the constant (a) remains same at -96.179. Since calculated T- value of NABIL (2.8130) is higher than the tabulated T- value (2.78) at 5% level of significant and 4 degree of freedom, the result is statically significant.

#### *4.3.1.2 Simple Regression Analysis between MPS and EPS*

The major outcomes of simple regression analysis between MPS and EPS of the sample banks based on the data are shown as follow:

**Table 11: Regression analysis between MPS and EPS**

| Banks | No. of years | Constant(a) | Regression Coefficient (b) | S.E.E | $S\beta$ | T- Value |
|---|---|---|---|---|---|---|
| NABIL | 5 | 2652.25938 | 9.7260 | 2046.5079 | 69.6050 | 0.139731 |
| EBL | 5 | -1223.447 | 42.310655 | 477.5001 | 12.4527 | 3.3977 |
| NIC | 5 | -684.9788 | 65.6724 | 312.249 | 35.093 | 1.8713 |

The table 11 helps us to find out the mathematical equation that relates to dependent variable MPS with the independent variable EPS. The simple regression equation between MPS and EPS calculated in the annex 2 is:

$$Y = a + bx$$

Let the dependent variable MPS is denoted by y and independent variable EPS is denoted by X, then the equation is:

$$MPS = a + bEPS$$

Now,

$$MPS_{NABIL} = 2652.25938+9.7260EPS$$

$$MPS_{EBL} = -1223.4217+42.310655EPS$$

$$MPS_{NIC} = -684.9788+65.6724EPS$$

According to the above table 11, the beta (regression) coefficient of NABIL is 9.7260, which indicates that one rupee increase in independent variable (EPS) leads to increase by an average of Rs 9.7260 in dependent variable (MPS) if the constant (a) remains same at 2652.25938. Since calculated T-value of NABIL (0.139731) is higher than the tabulated T-value (2.78) at 5% level of significance and 4 degree of freedom, the result is statistically significant.

In the case of EBL, the beta (regression) coefficient is 42.310655, which indicates that one rupee increase in independent variable (EPS) leads to increase by an average of Rs. 42.31 in dependent variable MPS, if the constant (a) remains same at –1223.42. Since calculated T-value of EBL (3.3977) is higher than the tabulated T- value (2.78) at 5% level of significance and 4 degree of freedom, the result is statically significant.

Likewise, NIC has the beta (regression) coefficient of 65.6724, which indicates that one rupee increase in independent variable EPS leads to an average of Rs 65.6724 increment of independent variable MPS, if the constant (a) remains same at –684.9788. Since calculated T-value of NIC (1.8713) is higher than the tabulated T-value (2.78) at 5% level of significance and 4 degree of freedom, the result is statistically significant.

### 4.3.2 Multiple Regression Analysis

The simple regression coefficient simply tells that the effect on one variable (dependent) of the other variable (independent). It doesn't tells the whole story that how much other independent variables affect the dependent variable. So, multiple regression analysis is used to avoid the weakness of the simple regression analysis. In this section, MPS (dependent variable) is regressed against the EPS and DPS (Independent variables).

### *4.3.2.1 Multiple Regression Analysis between MPS on EPS and DPS*

The major outcome of multiple regression analysis between MPS on EPS and DPS of the sample banks based on the data are shown as follows:

**Table 12: Regression analysis between MPS on EPS and DPS**

| Banks | No. of year | constant | Regression coefficient(b) | | S.E.E | F-value |
|---|---|---|---|---|---|---|
| | | | EPS(b1) | DPS(b2) | | |
| NABIL | 5 | -15669.212 | 114 | 86.8976 | 2242.54 | 21.6488 |
| EBL | 5 | -1463.2034 | 48.85 | -15.6961 | 447.51 | 14.29 |
| NIC | 5 | -483.90 | 63.96 | -60.0572 | 132.015 | -41.18 |

The table 12 helps us to find out the mathematical equation that relates to dependent variable (MPS) with the independent variables (EPS and DPS). The multiple regression equation between MPS on EPS and DPS calculated in the annex 2 is:

$$X_1 = a + b_1 x_1 + b_2 x_2$$

Let, the dependent variable MPS is denoted by $X_1$, independent variable EPS is denoted by $x_1$ and DPS is denoted by $x_2$, than the equation is:

$$MPS = a + b_1 EPS + b_2 DP$$

Now,

$$MPS_{NABIL} = 2652.25938 + 9.7260EPS$$

$$MPS_{EBL} = -1223.4217 + 42.310655EPS$$

$$MPS_{NIC} = -684.9788 + 65.6724EPS$$

According to the above table 12, the multiple regression line of MPS on EPS and DPS states that the beta (regression) coefficient of EPS (114) is positive and DPS (86.8976) is also positive for NABIL, which clearly indicates that a percent increase in EPS impacts to MPS (dependent variable) increasing by 114 times and also impacts DPS to increase by 15.6961 times, if the constant (a) is –15669.212 and remains same. Since the calculated F-value of NABIL (21.6488) is greater than tabulated F-Value (3.89) at 5% level of significance for 2.12 degree of freedom, the null hypothesis (Ho) is rejected and alternative hypothesis (H1) is accepted. Therefore, we can conclude that the regression equation given above is significant. In other words, there is a linear relationship between dependent variable MPS and two independent variables EPS and DPS.

Likewise, the multiple regression line of MPS on EPS and DPS shows that the regression coefficient of EPS (48.85) is positive and DPS (-15.6961) is negative for EBL, which clearly indicates that a percent increase in EPS impact to MPS (dependent variable) increasing by 48.85 times but DPS impacts to decrease by 15.6961 times, if the constant (a) is -1463.2034 and remains same. Since the calculated F-value (3.89) at 5% level of significance for 2.12 degree of freedom, the null hypothesis (Ho) is rejected and alternative hypothesis (H1) is accepted. Therefore, we can conclude that the regression equation given above is significant. In other words, there is linear relationship between dependent variable MPS and two independent variables EPS and DPS.

However, the multiple regression line of MPS on EPS and DPS states that the regression coefficient of EPS (63.96) is positive and DPS (-60.0572) is negative for EBL, which clearly indicates that a percent increase in EPS impact to MPS (dependent variable) increasing by 63.96 time but DPS impacts to decrease by 60.0572 times, if the constant (a) is -483.90 and remain same. Since the calculated F-value (3.89) at 5% level of significance for 2.12 degree of freedom, the null hypothesis (Ho) is accepted and alternative hypothesis (H1) is rejected. The regression equation is not significant.

## *4.4 Major Findings*

Major findings obtained from the data analysis are stated as follows.

- The analysis of MPS shows that MPS of all three sample banks are in increasing trend but in the last year, it is decreasing. It also shows that the average MPS of NABIL is highest and average MPS of NIC is lowest. NIC has the highest CV and EBL has lowest CV among the sample banks. It indicates that NIC has greater variability in MPS and its capital's increment rate is higher than others. But EBL has less variability in MPS.
- The average earning per share of banks is satisfactory. NABIL lies in top position followed by EBL and NIC respectively. Among the sample banks, the CV of EBL is greater than other sample banks and the CV of NABIL is lowest. It means common stock of EBL is riskier as compared to other sample bank. The common stock of NABIL is less risky as compared to other sample banks because it has lowest CV than others.
- The DPS analysis shows that the DPS of NABIL is greater and NIC is lower among sample banks. Higher dividend per share creates positive attitude of the shareholders

towards the company, which consequently helps to increase the market value of shares. It shows that CV of DPS of NIC is greater and EBL is lowest. It indicates that among the sample banks, EBL has the highest consistency in paying dividend whereas the DPS of NIC is highly fluctuating.

- The dividend payout ratio of NABIL is higher and NIC has lowest among all, which indicates that NABIL is following aggressive dividend policy and it has the ability to pay the dividend strongly than others and NIC has weak ability to pay dividend. The CV of DPR of NABIL indicates that the NABIL's D/P Ratio to common shareholders are much better than other sample banks.
- Dividend yield of NABIL is higher and NIC has lowest among all sample banks. It indicates that the share of NABIL is worth buying. The CV of DY is highest of NIC and lowest of NABIL which indicates that NABIL has the highest consistency followed by EBL whereas DY of NIC is highly fluctuating than other banks.
- The P/E Ratio of NABIL, EBL and NIC are almost close to each other.
- The average retained earning per share of NIC is highest than other sample banks, which means there are more chance to gain profit from future investment opportunities.
- The correlation between EPS and DPS is positive for NABIL and EBL which has the significant relationship at 5% level of significance. Whereas NIC have the negative correlation between EPS and DPS.
- The correlation between EPS and MPS is positive for all three sample banks and has the significant relationship at 5% level of significance. It means the EPS and MPS of these banks are strongly correlated with each other.
- The regression line of DPS and EPS shows that beta coefficient is positive in all sample banks. It might be able to pay higher DPS.
- The T-value between DPS and EPS clearly shows that the results are statistically significant for all sample banks except NIC.
- The regression line of MPS and EPS shows that the beta coefficient is positive for all banks, which gives directly positive impact to market value of shares.
- The T- value between MPS and EPS clearly shows that the results are statistically significant for all sample banks.

- The F-value between MPS on EPS and DPS states that there is linear relationship between MPS, EPS and DPS or the regressive equation of MPS on EPS and DPS is significant for all the sample banks except NIC.

# CHAPTER V

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

The chapter focuses on summarizing the study held by the researcher. Also, this chapter includes conclusion of the study based on major findings. The next attempt in this chapter is made for the recommendations on the basis of findings and conclusion. For these purposes, the chapter is sub-divided into summary and conclusion of the research, which are followed by some recommendations.

## *5.1 Summary*

Dividend refers to distributed earnings to the shareholders of the company in return to their investment. Dividend decision is a major financial management decision because the firm has to choose between distributing the profit to the shareholders or re-investing it to finance the business.

The dividend may be affected by different factors such as earning of the firm, liquidity position of firm, net worth etc. These factors indicate the financial position of the company. If a firm has good performance in terms of these factors, it will be able to provide return in the form of dividend.

This study is mainly focused to assess the dividend practices of different banks. It covers some specific objectives mainly to find out the relationship between other financial indicators and also to find out the appropriate dividend policies of different banks.

This study is mainly based on the data of three commercial banks. The study covers a period of five years from 2005/06 to 2009/10. To make the research reliable, many more analysis are conducted to find out the appropriate relationship between dividend and other variables, which affects the dividend. The consistency of dividend distribution of different companies is also analyzed by using statistical tools. The relationship is also statistically tested at 5% level of significant.

## *5.2 Conclusions*

From the analysis of various financial indictors and statistical tools for all the sample banks, following conclusion are drawn.

- Above mentioned major findings led this study concludes that the earning of banks is said to be satisfactory in Nepalese context. Among sample banks, NABIL is in leading position in terms of earning followed by EBL and NIC respectively.

- It is found from the study that there is no consistency found in dividend distribution in all sample banks. The research shows that none of these banks have well defined and appropriate policy regarding dividend payment. NABIL is paying higher dividend than other sample banks.

- It is also found from the study that there is positive and significant relationship between market price of share and earning per share for all sample banks. It means that there is positive effect of earning to the market price of stock in Nepalese Commercial Banks.

- From the analysis, it is found that the market price of stock is affected by other variables which indicate about the rational behavior of investors.

- Most of the companies don't seem to follow the optimum dividend policy of paying regular dividends as per shareholder's expectation. It might cause uncertainty among stockholders.

- The major findings have also led to conclude that the companies are neglecting the major factors like earning position of the firm, liquidity position while paying dividend.

- The study deals with only examining and analyzing the dividend practices of three sample banks for a period covering 5 years from 2005/06 to 2009/10 due to limited

time period. If a large sample is taken for the whole population, the result might vary and be more accurate and absolute. So, dividend policy might be subject of further study with large samples.

## *5.3 Recommendations*

This study has come up with the following recommendations.

- Commercial banks should formulate their dividend policy according to the Nepalese context. The banks should give more priority to the share holder's interest.

- The policy and practices of dividend payment procedure adopted by the commercial banks are not stable because in some cases, small amount of dividend is distributed without considering future. Dividend is not paid in upward trend. It is in fluctuation. So, banks should have done the study about it to correct the fluctation.

- Most of the sample banks have great fluctuations in terms of coefficient of variation (CV), EPS, DPS, DY and MPS. Such fluctuation increases the risk factors among the investors. Therefore, it is recommended to take necessary steps towards bringing consistency in these factors.

- Formulation of dividend policy will clearly guide the way of how to follow dividend distribution strategy. Hence, the policy makers need to be farsighted and make appropriate policy in terms of dividend distribution. Likewise, the banks should follow a systematic way of the distribution of dividend.

- The value of constant 'a' is relatively high in the study of each financial tool. It means that there are many factors which affect EPS, DPS, MPS, DPR etc. Besides them, there are many other non-financial factors like public awareness, high liquidity, expectation of bonus share, good governanance, government policy and political instability as well. So, it is recommended to take account of such factors during the distribution of strategy and follow the corrective measures to reduce the negative effects of such factors in the dividend policy of the banks.

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# ANNEXES

## Annex 1: Analysis of the Banks

### Annex 1.1: Analysis of share price

**For NABIL**

$$\delta = \sqrt{\frac{\sum (x-\bar{x})^2}{N}}$$

$$= \sqrt{\frac{\sum (1505-3793)^2 + (2240-3793.80)^2 + (5050-3793.80)^2 + 5275-3793.80)^2 + (4899-3793.80)^2}{5}}$$

$$= \sqrt{2529271.76}$$

$$= 1590.3684$$

**For EBL**

$$\delta = \sqrt{\frac{\sum (870-2053.20)^2 + (1379-2053.20)^2 + (24302053.20)^2 + (3132-2053.20)^2 + (2455-2053.20)^2}{5}}$$

$$= 815.075$$

**For NIC**

$$\delta = \sqrt{\frac{\sum (366-844.40)^2 + (496-844.40)^2 + (950-8444.40)^2 + 1248-844.40)^2 + (1126-844.40)^2}{5}}$$

$$= 356.075$$

$$\text{CV} = \frac{\delta}{\chi} X\ 100\%$$

**For NABIL**

$$\text{CV} = \frac{1590.3684}{3793.80} X\ 100$$

$$= 41.920\%$$

**For NIC**

$$\text{CV} = \frac{356.075}{844.40} X 100$$

$$= 42.1689\%$$

**For EBL**

$$\text{CV} = \frac{815.075}{2053.20} X 100$$

$$= 39.6977\%$$

### Annex 1.2: Analysis of earning per share

**For NABIL**

$$\delta = \sqrt{\frac{\sum (105.49-117.37)^2 + (129.21-117.37)^2 + (137.08-117.37)^2 + 108.31-117.37)^2 + (106.76-117.37)^2}{5}}$$

$= 13.1488$

$$CV = \frac{13.1488}{117.37} X100$$

$= 11.2028\%$

**For EBL**

$$\delta = \sqrt{\frac{\sum (54.22-77.446)^2 + (62.78-77.446)^2 + (78.42-77.446)^2 + (91.82-77.446)^2 + (99.99-77.446)^2}{5}}$$

$=17.14$

$$CV = \frac{1714}{77.446} X100$$

$= 22.13\%$

**For NIC**

$$\delta = \sqrt{\frac{\sum (22.75-23.288)^2 + 16.10-23.288)^2 + (24.01-23.288)^2 + (25.75-23.288)^2 + (27.83-23.288)^2}{5}}$$

$= 3.97$

$$CV = \frac{3.97}{23.288} X100$$

$=17.086\%$

**For poled average**

$$\delta = \sqrt{\frac{(60.85-72.70)^2 + (69.36-72.70)^2 +)79.83-72.70)^2 + (75.29-72.70)^2 + (78.19-72.70)^2}{5}}$$

$= 6.92$

$$CV = \frac{6.92}{72.70} X100$$

$= 9.52\%$

## Annex 1.3: Analysis of dividend per share

**For NABIL**

$$\delta = \sqrt{\frac{(70-70)^2 + (85-70)^2 + (100-70)^2 + (60-70)^2 + (35-70)^2}{5}}$$

$= 22.13$

$$CV = \frac{22.13}{70} X\ 100\ \%$$

**For EBL**

$$\delta = \sqrt{\frac{(0-17)^2 + (25-17)^2 + (10-17)^2 + (20-17)^2 + (30-17)^2}{5}}$$

$= 10.77$

$$CV = \frac{10.77}{17} X\ 100$$

$= 63.35\%$

**For NIC**

$$\delta = \sqrt{\frac{(10-2.684)^2 + (0.53-2.684)^2 + (1.05-2.684)^2 + (1.05-2.684)^2 + (0.79-2.684)^2}{5}}$$

$= 3.663$

$$CV = \frac{3.663}{2.684} X\ 136.478$$

**For pooled average**

$$\delta = \sqrt{\frac{(26.67-29.894)^2 + (36.843-29.894)^2 + (37.01-29.894)^2 + (27.01-29.894)^2 + (21.93-29.894)^2}{5}}$$

$= 6.01$

$$CV = \frac{6.01}{29.894} X 100$$

$= 20.1043$

## Annex 1.4: Dividend payout ratio analysis

**For NABIL**

$$\delta = \sqrt{\frac{\left[\sum (66.36-58.656)^2 + (65.78-58.656)^{23} + (72.95-58.656)^2 + (55.40-58.656)^2 + (32.79-58.656)^2\right]}{5}}$$

$= 14.10$

$$CV = \frac{14.10}{58.656} X\ 100$$

$= 65.86$

**For NIC**

$$\delta = \sqrt{\frac{\left[\sum (43.95-11.71)^2 + (3.30-11.71)^2 + (4.38-11.71)^2 + (4.08-11.71)^2 + (2.84-11.71)^2\right]}{5}}$$

$= 16.129$

$$CV = \frac{16.129}{11.71} X\ 100$$

$= 137.73$

**For pooled average**

$$\delta = \sqrt{\frac{\left[\sum (36.77-30.412)^2 + (36.30-412)^2 + (30.03-30.412)^2 + (27.09-30.412)^2 + (21.88-30.412^2\right]}{5}}$$

$= 5.64$

$$CV = \frac{5.64}{30.412} X 100$$

$= 18.54$

## Annex 1.5: Dividend yield analysis

**For NABIL**

$$\delta = \sqrt{\frac{\left[\sum (4.65-2.454)^2 + (3.79-2.454)^2 + (1.98-2.454)^2 + (1.14-2.454)^2 + (0.71-2.454)^2\right]}{5}}$$

$= 1.52$

$$CV = \frac{1.52}{2.454} X 100$$

$= 61.993\ \%$

**For EBL**

$$\delta = \sqrt{\frac{\left[\sum (0-0.814)^2 + (1.81-0.814)^2 + (0.41-0.814)^2 + (0.63-0.814)^2 + (1.22-0.814)^2\right]}{5}}$$

$= 0.63$

$$CV = \frac{0.63}{0.814} X\ 100$$

$= 77.39\%$

**For NIC**

$$\delta = \sqrt{\frac{\left[\sum (2.74-0.6202)^2 + (0.10-0.6202)^2 + (0.11-0.6202)^2 + (0.081-0.6202)^2 + (1.22-0.6202)^2\right]}{5}}$$

$= 1.059$

$$\text{CV} = \frac{1.059}{0.6202} X100$$

$= 170.75\%$

**For pooled average**

$$\delta = \sqrt{\frac{\left[\sum (2.471.30)^2 + (1.9-1.30)^2 + (0.83-1.30)^2 + (0.617-1.30)^2 + (0.67-1.30)^2\right]}{5}}$$

$= 0.75$

$$\text{CV} = \frac{0.75}{1.30} X100$$

$= 57.69\%$

## Annex 1.6: Analysis of P/E ratio

**For NABIL**

$$\delta = \sqrt{\frac{\left[\sum (14.27-32.608)^2 + (17.34-608)^2 + (36.84-32.608)^2 + (48.70-32.608)^2 + (45.89-32.608)^2\right]}{5}}$$

$=14.30$

$$\text{CV} = \frac{14.30}{32.608} X100$$

$= 43.85$

**For EBL**

$$\delta = \sqrt{\frac{\left[\sum (16.04-25.524)^2 + (21.93-25.524)^2 + (30.99-25.524)^2 + (34.11-25.524)^2 + (25.55-25.524)^2\right]}{5}}$$

$= 6.44$

$$\text{CV} = \frac{6.44}{25.524} X100$$

$= 25.23\%$

**For NIC**

$$\delta = \sqrt{\frac{\left[\sum (16.09-35.356)^2 + (30.81-35.356)^2 + (39.56-35.356)^2 + (49.86-35.356)^2 + (40.46-35.356)^2\right]}{5}}$$

$= 11.36$

$$\text{CV} = \frac{11.36}{35.356} X 100$$

$= 32.13\%$

**For pooled average**

$$\delta = \sqrt{\left[\frac{\sum (15.46-31.17)^2 + (23.36-31.17)^2 + (35.80-31.17)^2 + (44.23-31.17)^2 + (36.97-31.17)^2}{5}\right]}$$

$=10.32$

$$\text{CV} = \frac{10.32}{31.17} X 100$$

$= 33.13\%$

## Annex 1.7: Retention ratio

**For NABIL**

$$\delta = \sqrt{\frac{\left[\sum \begin{matrix}(33.64-41.344)^2 + (34.22-41.344)^2 + (27.05-41.344)^2 \\ + (44.60-41.344)^2 + (67.21-41.344)^2\end{matrix}\right]}{5}}$$

$= 14.10$

$$\text{CV} = \frac{14.10}{41.344} X 100$$

$= 34.10$

**For EBL**

$$\delta = \sqrt{\frac{\left[\sum (100-79.13)^2 + (60.18-79.13)^2 + (87.25-79.13)^2 + (78.22-79.13)^2 + (70.79.13)^2\right]}{5}}$$

$= 13.74$

$$\text{CV} = \frac{13.74}{79.13} X 100$$

$= 17.36$

**For NIC**

$$\delta = \sqrt{\frac{\left[\sum (56.05-88.29)^2 + (96.70-88.29)^2 + (95.62-88.29)^2 + (95.92-88.29)^2 + (97.16-88.29)^2\right]}{5}}$$

= 16.129

$$\text{CV} = \frac{16.129}{88.29} X 100$$

= 18.25

**For pooled average**

$$\delta = \sqrt{\frac{\left[\sum 63.23-69.588)^2 + (63.70-69.588)^2 + (69.97-69.588)^2 + (72.91-69.588)^2 + (78.12-69.588)^2\right]}{5}}$$

= 5.64

$$\text{CV} = \frac{5.64}{69.588} X 100$$

= 8.10%

## Annex 2: Correlation & Regression Analysis

### Annex 2.1: Correlation & Regression between EPS and DPS

**For NABIL Bank**

| EPS(X) | DPS(Y) | $x^2$ | $y^2$ | xy | $(x-\bar{x})^2$ |
|---|---|---|---|---|---|
| 105.49 | 70 | 11128.1401 | 4900 | 738.30 | 141.1344 |
| 129.21 | 85 | 16695.2241 | 75225 | 10982.85 | 140.1856 |
| 137.08 | 100 | 18790.9264 | 10000 | 13708 | 388.4841 |
| 108.31 | 60 | 11731.0561 | 3600 | 3498.60 | 82.0836 |
| 106.76 | 35 | 11397.6976 | 1225 | 3736.60 | 112.5721 |
| $\sum x = 586.85$ | $\sum y = 350$ | $\sum x^2 = 69{,}743.0443$ | $\sum y^2 = 26950$ | $\sum xy = 42310.35$ | $\sum (x-\bar{x})^2 = 864.4598$ |

Regression of Y on X, Y=a+bx

Where,

a=regression constant $\bar{X} = \frac{\sum x}{n} = \frac{586.85}{5} = 117.37$

$$\bar{Y} = \frac{\sum y}{n} = \frac{350}{5} = 70$$

Coefficient of correlation $(\nu) = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2}\ \sqrt{n\sum y^2 - (\sum y)^2}}$

$$= \frac{5*42310.35 - 586.85*350}{\sqrt{5*69743.0443 - (586.85)^2}\ \sqrt{5*26950 - (350)^2}}$$

$$= \frac{6154.25}{65.75*110.68}$$

$$= 0.84$$

Coefficient of determination $(\nu) = (0.84)^2$

$$= 0.7.56$$

Standard error of correlation $(\nu) = \frac{1-\nu^2}{\sqrt{n}}$

$$= \frac{1-0.7056}{\sqrt{3}}$$

$$= 0.1316$$

Probable error of correlation coefficient P.E. $(\nu) = 0.674*\frac{1-\nu^2}{\sqrt{n}}$

$$= 0.674*0.1316$$

$$= 0.0888$$

b = regression coefficient (slope of the regression line)

According to the principle of least square two normal equation for estimation numerical constant a and b is given by $\sum Y = na + b\sum X \text{ and } \sum XY = a\sum X + b\sum X^2$

Solving two normal equations, we get.

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

$$= \frac{5*42310.35 - 586.85*350}{5*69743.0443 - (586.85)^2}$$

$$= \frac{6154.25}{4322.299} = 1.423$$

$a = \bar{Y} - b\bar{X}$

= 70-1.423*117.37

= -96.9179

Hence the required simple regression equating as follows.

Y = -96.9179+1.423X

Standard error of estimates (S.E.E)= $\sqrt{\frac{\sum y^2 - a\sum Y - b\sum xy}{n-2}}$

$= \sqrt{\frac{26950 - (-96.9179 * 350 - 1.423 * 42310.35}{5-2}}$

=14.8732

Standard error of Beta coefficient ($S_b$) = $\frac{S.E.E}{\sqrt{\sum (x-\bar{x})^2}}$

$= \frac{14.8732}{\sqrt{864.4598}}$

= 0.50586

T value (t) = $\frac{b}{Sb}$

$= \frac{1.423}{0.50586}$

= 2.8130

**For EBL**

| EPS(X) | DPS(Y) | $x^2$ | $y^2$ | xy | $(x-\bar{x})^2$ |
|---|---|---|---|---|---|
| 54.22 | - | 2939.8084 | - | - | 539.27 |
| 62.78 | 25 | 3941.3284 | 625 | 1569.50 | 214.98 |
| 78.42 | 10 | 6149.6964 | 100 | 784.20 | 0.956484 |
| 91.82 | 20 | 8430.9124 | 400 | 1836.40 | 206.726884 |
| 99.99 | 30 | 9998.00 | 900 | 2999.70 | 508.412304 |
| $\sum x = 387.21$ | $\sum y = 85$ | $\sum x^2 = 31459.7456$ | $\sum y^2 = 2025$ | $\sum xy = 7189.80$ | $\sum (x-\bar{x})^2 = 1470.345672$ |

$\bar{X} = \frac{\sum x}{n} = \frac{387.21}{5} = 77.442$

$\bar{Y} = \frac{\sum y}{n} = \frac{85}{5} = 17$

Coefficient of correlation $(\nu) = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2} \quad \sqrt{n\sum y^2 - (\sum y^{2)}}}$

$$= \frac{5*7189.80 - 387.21*85}{\sqrt{5*31459.7456 - (387.21)^2}\ \sqrt{5*2025 - (85)^2}}$$

$$= \frac{3.36.15}{85.84*33.86} = 0.66$$

Coefficient of determination $(\nu^2) = (0.66)^2$

$$= 0.4356$$

Standard error of correlation coefficient, $\text{S.E}(\nu) = \frac{1-\nu^2}{\sqrt{n}}$

$$= \frac{1-0.4356}{\sqrt{5}}$$

$$= 0.2524$$

Probable error of correlation coefficient $\text{P.E.}(\nu) = 0.6745 * \frac{1-\nu^2}{\sqrt{n}}$

$$= 0.6745*0.2524$$

$$= 0.1702438$$

Regression equation of X and Y, Y=a + bx

Where,

a = regression constant

b = regression coefficient (slope of the regression line)

According to the principle of least square, two normal equation for estimating numerical constant a and b are given by:

$$\sum y = na + b\sum x \; and \sum xy = a\sum x + b\sum x^2$$

Solving two normal equations, we get

$$\text{b} = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2} = \frac{5*7189.80 - 387.21*85}{5*31459.7456 - (387.21)^2}$$

$$= \frac{3036.15}{7367.1439} = 0.4212$$

$$\text{a} = \bar{Y} - b\bar{X}$$

$$= 17\text{-}0.14212*77.442$$

$$= \text{-}14.91539$$

Hence,

the required simple regression equation as follows,

Y = -14.91539+0.41212X

Standard error of estimate (S.E.E)= $\sqrt{\frac{\sum y^2 - a\sum Y - b\sum xy}{n-2}}$

$= \sqrt{\frac{2025-(-14.91539)*85-0.41212*7189.80}{5-2}}$

= 10.49

Standard error of beta coefficient ($S_b$) = $\frac{S.E.E}{\sqrt{\sum (x-\bar{x})^2}}$

$= \frac{10.49}{\sqrt{1470.345672}}$

= 0.2735

T-value (t) = $\frac{b}{Sb}$

$= \frac{0.4121}{0.2735} = 1.5068$

**For NIC**

| EPS(X) | DPS(Y) | $x^2$ | $y^2$ | xy | $(x-\bar{x})^2$ |
|---|---|---|---|---|---|
| 22.75 | 10 | 517.5625 | 100 | 227.50 | 0.289444 |
| 16.10 | 0.53 | 259.21 | 0.2809 | 8.599 | 51.667344 |
| 24.01 | 1.05 | 576.4801 | 1.1025 | 25.2102 | 0.521284 |
| 25.75 | 1.05 | 663.0625 | 1.1025 | 27.0375 | 6.061444 |
| 27.83 | 0.79 | 774.5089 | 0.6241 | 21.9857 | 20.629764 |
| $\sum x = 116.44$ | $\sum y = 13.42$ | $\sum x^2 = 2790.824$ | $\sum y^2 = 103.11$ | $\sum xy = 310.2667$ | $\sum (x-\bar{x})^2 = 79.16928$ |

$\bar{X} = \frac{\sum x}{n} = \frac{116.44}{5} = 23.288$

$\bar{Y} = \frac{\sum y}{n} = \frac{13.42}{5} = 2.684$

Coefficient of correlation $(\nu) = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2}\ \sqrt{n\sum y^2 - (\sum y)^2}}$

$$= \frac{5*310.2667 - 116*13.42}{\sqrt{5*2790.824 - (116.44)^2}\ \sqrt{5*103.11 - (13.42)^2}}$$

$$= \frac{-11.2913}{19.8958*18} X 18.3153$$

= -0.03098

Coefficient of determination $(\nu^2) = (-0.03098)^2$

= 0.0009597604

Standard error of correlation coefficient, S.E $(\nu) = \frac{1-\nu^2}{\sqrt{n}}$

$$= \frac{1 - 0.0009597604}{\sqrt{5}}$$

= 0.446784

Probable error of correlation coefficient P.E. $(\nu) = 0.6745 * \frac{1-\nu^2}{\sqrt{n}}$

= 0.6745*0.446784

= 0.301355808

Regression equation of X and Y, Y=a + bx

Where,

a = regression constant

b = regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by:

$\sum y = na + b\sum x$ and $\sum xy = a\sum x + b\sum x^2$

Solving two normal equations, we get

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

$$= \frac{5*310.2667 - 116.44*13.42}{5*2790.824 - (16.44)^2}$$

= -0.0285244

a = $\overline{Y} - b\overline{X}$

= 2.684-(-0.0285244)*23.288

= 3.348276

Hence, the required simple regression equation is given as follows:

Y= 3.348276+(-0.0285244)X

Standard error of estimates (SEE)= $\sqrt{\frac{\sum y^2 - a\sum Y - b\sum xy}{n-2}}$

$= \sqrt{\frac{103.11 - 3.348276*13.42 - (-0.0285844)*310.2677}{5-2}}$

= 4.72674

Standard error of beta coefficient ($S_b$) = $\frac{S.E.E}{\sqrt{\sum (x-\bar{x})^2}}$

$= \frac{4.72674}{\sqrt{79.16928}}$

= 0.53123

T-value (t) = $\frac{b}{Sb}$

$= \frac{-0.0285244}{0.53123}$

= -0.05369

## Annex 2.2: Correlation & Regression between EPS and MPS

**For NABIL**

| EPS(X) | MPS(Y) | $x^2$ | $y^2$ | xy | $(x-\bar{x})^2$ |
|---|---|---|---|---|---|
| 105.49 | 1505 | 11128.1401 | 2266025 | 158762.45 | 141.1344 |
| 129.21 | 2240 | 16695.2241 | 5017600 | 289430.40 | 140.1856 |
| 137.08 | 5050 | 17890.9264 | 25502500 | 692254 | 388.4841 |
| 108.31 | 5275 | 1137.0567 | 27825625 | 571335.25 | 82.0236 |
| 106.76 | 4899 | 11397.6976 | 24000201 | 523017.24 | 112.5721 |
| $\sum x = 586.85$ | $\sum y = 18969$ | $\sum x^2 = 69743.0443$ | $\sum y^2 = 84610951$ | $\sum xy = 2234799.34$ | $\sum (x-\bar{x})^2 = 864.4598$ |

$\bar{X} = \frac{\sum x}{n} = \frac{586.85}{5} = 117.37$

$\bar{Y} = \frac{\sum y}{n} = \frac{18969}{5} = 3793.80$

Coefficient of correlation $(\nu) = \dfrac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2}\ \sqrt{n\sum y^2 - (\sum y)^2}}$

$$= \frac{5*2234799.34 - 586.85*18969}{\sqrt{5*69743.0443 - (586.85)^2}\ \sqrt{5*84610954 - (18969)^2}}$$

$$= \frac{42039.05}{65.75*7951.85}$$

$$= 0.0804060$$

Coefficient of determination $(\nu^2) = (0.084060)^2$

$$= 0.00646512$$

Standard error of correlation coefficient, $\text{S.E}(\nu) = \dfrac{1-\nu^2}{\sqrt{n}}$

$$= \frac{1 - 0.00064512}{\sqrt{5}}$$

$$= 0.44432$$

Probable error of correlation coefficient $\text{P.E.}(\nu) = 0.6745 * \dfrac{1-\nu^2}{\sqrt{n}}$

$$= 0.6745*0.44432$$

$$= 0.29969384$$

Regression equation of X and Y, Y=a + bx

Where,

a = regression constant

b = regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by:

$$\sum y = na + b\sum x \text{ and } \sum xy = a\sum x + b\sum x^2$$

Solving two normal equations, we get

$$\text{b} = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

$$= \frac{5*2234799.34 - 586.85*18969}{5*69743.0443 - (586.85)^2}$$

$$= \frac{42039.05}{4322.299}$$

= 9.7260

a = $\overline{Y} - b\overline{X}$

= 2.684-(-0.0285244)*23.288

= 3.348276

Hence, the required simple regression equation is as follows

Y = 2652.25938+9.7260X

Standard error of estimates (S.E.E) = $\sqrt{\frac{\sum y^2 - a\sum Y - b\sum xy}{n-2}}$

$= \sqrt{\frac{84610951 - 2652.25938*18969 - 9.7260*2234799.34}{5-2}}$

= 2046.5079

Standard error of beta coefficient ($S_b$) = $\frac{S.E.E}{\sqrt{\sum (x-\bar{x})^2}}$

$= \frac{2046.5079}{\sqrt{864.4597}}$

= 69.6050

T-value (t) = $\frac{b}{S_b}$

$= \frac{9.7260}{69.6050}$

= 0.139731

**For EBL**

| EPS(X) | DPS(Y) | $x^2$ | $y^2$ | xy | $(x-\bar{x})^2$ |
|---|---|---|---|---|---|
| 54.22 | 870 | 2939.8084 | 756900 | 47171.40 | 539.27 |
| 62.78 | 1379 | 3941.3284 | 1901641 | 86573.62 | 214.98 |
| 78.42 | 2430 | 6149.6964 | 5904900 | 190560.60 | 0.956484 |
| 91.82 | 3132 | 8430.9124 | 9809424 | 287580.24 | 206.726884 |
| 99.99 | 2455 | 9998.00 | 6027025 | 245475.45 | 508.412304 |
| $\sum x = 387.21$ | $\sum y = 10266$ | $\sum x^2 = 31459.7456$ | $\sum y^2 = 24399890$ | $\sum xy = 85736.31$ | $\sum (x-\bar{x})^2 = 1470.345672$ |

$$\bar{X} = \frac{\sum x}{n} = \frac{387.21}{5} = 77.442$$

$$\bar{Y} = \frac{\sum y}{n} = \frac{10266}{5} = 2053.20$$

Coefficient of correlation $(\nu) = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2} \quad \sqrt{n\sum y^2 - (\sum y^{2)}}}$

$$= \frac{5*857361.31 - 387.21*10266}{\sqrt{5*31459.7456 - (387.21)^2}\ \sqrt{5*24399890 - (10266)^2}}$$

$$= \frac{311708.69}{85.8320*4075.3756}$$

$$= 0.89111$$

Coefficient of determination $(\nu^2) = (0.89111)^2$

$$= 0.794077$$

Standard error of correlation coefficient, S.E $(\nu) = \frac{1-\nu^2}{\sqrt{n}}$

$$= \frac{1-0794077}{\sqrt{5}}$$

$$= 0.092091$$

Probable error of correlation coefficient P.E. $(\nu) = 0.6745*\frac{1-\nu^2}{\sqrt{n}}$

$$= 0.6745*0.092091$$

$$= 0.0621153$$

Regression equation of X and Y, Y= a + bx

Where,

a = regression constant

b = regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by:

$$\sum y = na + b\sum x \; and \; \sum xy = a\sum x + b\sum x^2$$

Solving two normal equations, we get

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2} = \frac{5*857361.31 - 387.21*10266}{5*31459.7456 - (387.21)^2}$$

$$= \frac{311708.69}{7367.1439} = 42.310655$$

$$a = \bar{Y} - b\bar{X}$$

$$= 2053.20\text{-}42.310655*77.442*77.442 = -14.91539$$

Hence,

The required simple regression equation is as follows,

$$Y = -1223.421745+42.310655X$$

Standard error of estimate (S.E.E) = $\sqrt{\frac{\sum y^2 - a\sum Y - b\sum xy}{n-2}}$

$$= \sqrt{\frac{24399890 - (-1223.421745*10266 - 42.31.655*875361.31}{5-2}}$$

$$= 477.5001$$

Standard error of beta coefficient ($S_b$) = $\frac{S.E.E}{\sqrt{\sum (x-\bar{x})^2}}$

$$= \frac{477.5001}{\sqrt{1470.345672}}$$

$$= 12.4527$$

T-value (t) = $\frac{b}{S_b}$

$$= \frac{42.310655}{12.4527} = 3.3977$$

**For NIC**

| EPS(X) | MPS(Y) | $x^2$ | $y^2$ | xy | $(x-\bar{x})^2$ |
|---|---|---|---|---|---|
| 22.75 | 366 | 517.5625 | 133956 | 8326.50 | 0.289444 |
| 16.10 | 496 | 259.21 | 246016 | 7985.60 | 51.667344 |
| 24.01 | 350 | 576.4801 | 902500 | 22809.50 | 0.521284 |
| 25.75 | 1284 | 663.0625 | 1648656 | 33063 | 6.061444 |
| 27.83 | 1126 | 774.5089 | 1267876 | 31336.58 | 20.629764 |
| $\sum x = 116.44$ | $\sum y = 4222$ | $\sum x^2 = 2790.824$ | $\sum y^2 = 4199004$ | $\sum xy = 103521.18$ | $\sum (x-\bar{x})^2 = 79.16928$ |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

$$\bar{X} = \frac{\sum x}{n} = \frac{116.44}{5} = 23.288$$

$$\bar{Y} = \frac{\sum y}{n} = \frac{4222}{5} = 844.40$$

$$\text{Coefficient of correlation } (\nu) = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2}\ \sqrt{n\sum y^2 - (\sum y)^2}}$$

$$= \frac{5*103521.18 - 116.44*4222}{\sqrt{5*2790.824 - (116.44)^2}\ \sqrt{5*103.11 - (13.42)^2}}$$

$$= \frac{25996.22}{19.8958*1780.375}$$

$$= -0.03098$$

$$\text{Coefficient of determination } (\nu^2) = (0.7339)^2$$

$$= 0.5386$$

$$\text{Standard error of correlation coefficient, S.E}(\nu) = \frac{1-\nu^2}{\sqrt{n}}$$

$$= \frac{1-0.5386}{\sqrt{5}} = 0.206344$$

$$\text{Probable error of correlation coefficient P.E.}(\nu) = 0.6745 * \frac{1-\nu^2}{\sqrt{n}}$$

$$= 0.6745*0.206344$$

$$= 0.139179$$

Regression equation of X and Y, Y = a + bx

Where,

a = regression constant

b = regression coefficient (slope of the regression line)

According to the principle of least square, two normal equations for estimating numerical constant a and b are given by:

$$\sum y = na + b\sum x \text{ and } \sum xy = a\sum x + b\sum x^2$$

Solving two normal equations, we get

$$b = \frac{n\sum xy - \sum x \sum y^2}{n\sum x^2 - (\sum x)^2}$$

$$= \frac{5*103521.18 - 116.44*4222}{5*2790.824 - (16.44)^2}$$

$$= \frac{25966.22}{395.8464} = 65.6424$$

$a = \bar{Y} - b\bar{X}$

= 844.40-65.6724*23.288

= -684.9788

Hence, the required simple regression equation is as follows:

Y = -684.9788+65.6724X

Standard error of estimates (S.E.E) $= \sqrt{\frac{\sum y^2 - a\sum Y - b\sum xy}{n-2}}$

$$= \sqrt{\frac{4199004 - (-684.978)*4222 - 65.6724*103521.18}{5-2}}$$

= 312.249

Standard error of beta coefficient ($S_b$) $= \frac{S.E.E}{\sqrt{\sum (x-\bar{x})^2}}$

$$= \frac{312.249}{\sqrt{79.16928}}$$

= 35.09328

T-value (t) $= \frac{b}{Sb}$

$$= \frac{65.6724}{35.09328}$$

=1.8713

## Annex 2.3: Multiple Regression analysis between MPS on EPS and DPS

MPS, EPS and DPS of NABIL

| MPS($x_1$) | EPS($x_2$) | DPS($x_3$) | $X_1^2$ | $X_2^2$ | $X_3^2$ | $X_1X_2$ |
|---|---|---|---|---|---|---|
| 1505 | 105.49 | 70 | 2265025 | 11128.14 | 4900 | 158762.45 |
| 2240 | 128.21 | 85 | 5017600 | 16669.23 | 7225 | 289430.40 |
| 5050 | 137.08 | 100 | 25502500 | 18790.93 | 10000 | 692254 |
| 5275 | 108.31 | 60 | 27825625 | 11731.06 | 3600 | 571335.25 |
| 4899 | 106.31 | 35 | 24000201 | 11397.701 | 1125 | 523017.24 |
| $\sum x_1 = 18969$ | $\sum x_2 = 586.85$ | $\sum x_3 = 350$ | $\sum x_1^2 = 84610951$ | $\sum x_2^2 = 69743.06$ | $\sum x_3^2 = 26950$ | $\sum x_1 x_2 = 22347799.34$ |

| $X_1X_3$ | $X_2X_3$ |
|---|---|
| 105350 | 7384.30 |
| 190400 | 10982.85 |
| 505000 | 137.08 |
| 316500 | 6498.60 |
| 171465 | 3736.60 |
| $\sum X_1X_3 = 1288715$ | $\sum X_1X_3 = 42310.35$ |

$$\bar{X}_1 = \frac{\sum x}{n} = \frac{18969}{5} = 3793.80$$

$$\bar{X}_2 = \frac{\sum x_2}{n} = \frac{586.85}{5} = 117.37$$

$$\bar{X}_3 = \frac{\sum x_3}{n} = \frac{350}{5} = 70$$

$$\text{Coefficient of correlation } (\nu_{12}) = \frac{n\sum x_1 x_2 - \sum x_1 \sum x_2}{\sqrt{n\sum {x_1}^2 - (\sum x_1)^2}\ \sqrt{n\sum {x_2}^2 - (\sum x_2)^2}}$$

$$= \frac{5 * 2234799.34 - 18969 * 586.85}{\sqrt{5 * 84610951 - (18969)^2}\ \sqrt{5 * 69743.06 - (586.85)^2}}$$

$$= \frac{42039.05}{7951.8421 * 65.75}$$

$$= 0.0804060$$

$$\text{Coefficient of correlation } (\nu_{23}) = \frac{n\sum x_2 x_3 - \sum x_2 \sum x_3}{\sqrt{n\sum {x_2}^2 - (\sum x_2)^2}\ \sqrt{n\sum {x_3}^2 - (\sum x_3)^2}}$$

$$= \frac{5 * 42310.35 - 586.85 * 350}{\sqrt{5 * 69743.06 - (18969)^2}\ \sqrt{5 * 26950 - (350)^2}}$$

$$= \frac{6154.25}{65.75 * 110.68}$$

$$= 0.8456$$

$$\text{Coefficient of correlation } (\nu_{13}) = \frac{n\sum x_1 x_3 - \sum x_1 \sum x_3}{\sqrt{n\sum {x_1}^2 - (\sum x_1)^2}\ \sqrt{n\sum {x_3}^2 - (\sum x_3)^2}}$$

$$= \frac{5 * 1288715 - 18969 * 350}{\sqrt{5 * 84610951 - (18690)^2}\ \sqrt{5 * 26950 - (350)^2}}$$

$$= \frac{-195575}{7951.85 * 110.68}$$

$$= 0.2222$$

Now, calculation of multiple correlation coefficients:

Multiple correlation coefficient $(R_{123}) = \sqrt{\frac{(\nu_{12})^2 + (\nu_{13})^2 - 2\nu_{12}\nu_{23}\nu_{13}}{1-(\nu_{23})^2}}$

$$= \sqrt{\frac{(0.0804060)^2 + (-0.2222)^2 - 2*0.0804060*0.8456*(-0.8456)^2}{1-(0.8456)^2}}$$

$$= \frac{0.0860533}{0.28496064} = 0.5495$$

Multiple coefficient of determination $(R_{123})^2 = 0.5495^2$

$$= 0.30195025$$

Standard error of calculation of coefficient, S.E. $(\nu) = \frac{1-(R_{123})^2}{\sqrt{n}}$

$$= \frac{1-0.30195025}{\sqrt{5}}$$

$$= 03121$$

Probable error of correlation coefficient PE $(\nu) = 0.6745 * \frac{1-(R_{123})^2}{\sqrt{n}}$

$$= 06745*0.3121$$

$$= 0.2151145$$

Regression equation of $x_1$ on $x_2$ and $x_3$

$X_1=a+b_1*b_2+b_2*b_3$

Dependent variable = $x_1$ (MPS)

Independent variable = $x_2$ (EPS) and $x_3$ (DPS)

The general formula of multiple regression equation is given by:

$X_1=a+b_1*b_2+b_2*b_3$……(i)

Where,

a = regression constant

$b_1$ and $b_2$= regression coefficient (slope of the regression line)

Required normal equation to find the value a1, b1 and b2 can be written as under:

$\sum x_1 = na + b \sum x_2 + b_2 \sum x_3$ ……(ii)

$\sum x_1 x_2 = a\sum x_2 + b_1\sum x_2^{\ 2} + b_2\sum x_2 x_3$ ……(iii)

$\sum x_1 x_3 = a\sum x_3 + b_1\sum x_2 x_3 + b_2\sum x_3 x^2$ …….(iv)

Substituting the corresponding values in equation (ii) , (iii) and (iv), we get:

18969 = 5a+586.85$b_1$+350$b_2$…….(v)

2234799.34 = 586.85a+69743.06$b_1$+42310.35$b_2$…….(vi)

1288715 = 350a+42310.35$b_1$+26950$b_2$……(vii)

Now,

Solving equation (v), (vi) and (vii)

Equation (v) is multiplying by 117.37 and subtracting from equation (v) from equation (vi)

2234799.34=586.85a+69743.06$b_1$+42310.35$b_2$

2226391.53=588.85a+688878.5845$b_1$+4179.50$b_2$

\- - - -

8407.81 = 864.4755$b_1$+1236.85$b_2$ ..……(viii)

Again,

Equation (vii) is multiplied by 1.676714286 and subtracting from equation (viii)

2234799.34=586.85a+69743.06$b_1$+42310.35$b_2$

2160806.851=586.85a+70942.3682$b_1$+45187.45001$b_2$

\- - - -

73992.489 = -1199.30829$b_1$-287710001$b_2$……(ix)

Again,

Equation (viii) is multiplying by 2.3374903749036 and adding (viii) to equation (ix)

19653.17482 = 2020.703148$b_1$+2877.10001$b_2$

73992.489 = -1199.30829$b_1$-2877.10001$b_2$

\- = + +

93645.66382 = 821.394858$b_1$

$$b_1 = \frac{93645.66382}{821.394858} = 114.00$$

Putting the value in equation (viii)

$8407.81 = 864.4755b_1+1236.85b_2$

$8407.81 = 864.4755*114+1230.85b_2$

$$b_2 = \frac{106958.017}{1230.85} = 86.8976$$

Again,

Putting the value in equation (v)

$18969 = 5a+586.85b_1+350b_2$

$18969 = 5a+586.85*114+380*86.8976$

$$a = \frac{-78346.06}{5} = -15669.212$$

Hence the required multiple regression equation is as follows:

$x1 = -15669.212+114x_2+86.8976x_3$

Standard error of estimated is $x_1$ on $x_2$ and $x_3$ is given by:

$$S.E.E_{123} = \sqrt{\frac{\sum x_1^2 - a\sum x_1 - b_1\sum x_1x_2 - b_2\sum x_1x_2}{n-2}}$$

$$= \sqrt{\frac{84610951-(-15699.212*18969)-114*2234799.34-86.8976*1288715}{5-2}}$$

$$= 2242.54$$

Now,

Calculation of F value "F-ratio"

$$\text{F-Ratio} = \frac{mean\ sum\ of\ \ square\ between s\ samples}{mean\ sum\ of\ \ square\ within\ samples}$$

(i) Grand total (T) $= \sum x_1 + \sum x_2 + \sum x_3$

$= 18969+586.85+350$

$= 19905.85$

(ii) Correlation factor (C.F.) $= \frac{T^2}{N}$

$$= \frac{(19905.85)^2}{15} = 26416190.95$$

(iii) Total sum of square (T.S.S) $= \sum x_1^2 \sum x_2^2 \sum x_3^2 - C.F$

= 84610951+69743.06+26950-26416190.95

= 58291453.11

(iv) Sum of square between samples (S.S.E)

$$= \frac{(\sum x_1)^2}{n_1} + \frac{(\sum x_2)^2}{n_2} + \frac{(\sum x_3)^2}{n_3} - C.F$$

$$= \frac{(18969)^2}{5} + \frac{(586.85)^2}{5} + \frac{(350)^2}{5} - 26416190.95$$

= 456.41779.83

(v) Sum of square within samples (S.S.W)

= T.S.S-S.S.C

= 58291453.11-45641779.83

= 12649673.28

**One way ANOVA Table**

| Source of variation | Sum of square | Degree of freedom | Mean sum of square | F-ratio |
|---|---|---|---|---|
| Between sample | 45641779.83 | 3-1=2 | 45641779.83/2 =22820889.92 | 22820889.92 1054139.44 |
| Within samples | 12649673.28 | 12 | 12649673.28/12 =1054139.44 | =21.6488 |
| Total | 858291453.11 | 15-1=14 | | |

| $x_1x_2$ | $x_2x_3$ | $x_1x_3$ |
|---|---|---|
| 47171.40 | - | - |
| 86573.62 | 1569.20 | 34475 |
| 190560.60 | 784.20 | 24300 |
| 287580.24 | 1836.40 | 62640 |
| 245475.45 | 2999.70 | 73650 |
| $\sum x_1x_2 = 857361.45$ | $\sum X_2x_3 = 7189.80$ | $\sum X_1X_3 = 195065$ |

**MPS on EPS and DPS of EBL**

$$\overline{X} = \frac{\sum x_1}{N} = \frac{10266}{5} = 2053.20$$

$$\overline{X}_2 = \frac{\sum x_2}{N} = \frac{387.23}{5} = 77.446$$

$$\overline{X}_3 = \frac{\sum x_3}{N} = \frac{85}{5} = 17$$

$$\text{Coefficient of correlation } (\nu_{12}) = \frac{n\sum x_1 x_2 - \sum x_1 \sum x_2}{\sqrt{n\sum {x_1}^2 - (\sum x_1)^2}\ \sqrt{n\sum {x_2}^2 - (\sum x_2)^2}}$$

$$= \frac{5*857361.31 - 10266*387.23}{\sqrt{5*24399890 - (10266)^2}\ \sqrt{5*31459.457 - (387.23)^2}}$$

$$= \frac{311503.37}{4075.38*85.741} = 0.8914$$

$$\text{Coefficient of correlation } (\nu_{23}) = \frac{n\sum x_2 x_3 - \sum x_2 \sum x_3}{\sqrt{n\sum {x_2}^2 - (\sum x_2)^2}\ \sqrt{n\sum {x_3}^2 - (\sum x_3)^2}}$$

| MPS($x_1$) | EPS($x_2$) | DPS($x_3$) | $X_1^2$ | $X_2^2$ | $X_3^2$ |
|---|---|---|---|---|---|
| 870 | 54.22 | - | 756900 | 2939.8084 | - |
| 1379 | 62.78 | 25 | 1901641 | 3941.3284 | 625 |
| 2430 | 78.42 | 10 | 5904900 | 6149.6964 | 100 |
| 3132 | 91.82 | 20 | 9809424 | 8430.9124 | 400 |
| 2455 | 99.99 | 30 | 6027025 | 9998.000 | 900 |
| $\sum x_1 = 10266$ | $\sum x_2 = 38723$ | $\sum x_3 = 85$ | $\sum {x_1}^2 = 24399890$ | $\sum {x_2}^2 = 31459.7457$ | $\sum {x_3}^2 = 2025$ |

$$= \frac{5*7189.80 - 387.23*850}{\sqrt{5*31459.7457 - (387.23)^2}\ \sqrt{5*2025 - (85)^2}}$$

$$= \frac{3034.45}{85.741*53.86} = 0.657$$

Coefficient of correlation $(\nu_{13}) = \dfrac{n\sum x_1 x_3 - \sum x_1 \sum x_3}{\sqrt{n\sum x_1^{\,2} - (\sum x_1)^2}\ \sqrt{n\sum x_3^{\,2} - (\sum x_3)^2}}$

$$= \frac{5*195065 - 10266*85}{\sqrt{5*24399890 - (10266)^2}\ \sqrt{5*2025 - (85)^2}}$$

$$= \frac{102715}{7951.84075.38*53.86} = 0.4679$$

Now,

Calculation of multiple correlation coefficients:

Multiple correlation coefficients $(R_{123}) = \sqrt{\dfrac{(\nu_{12})^2 + (\nu_{13})^2 - 2\nu_{12}\nu_{23}\nu_{13}}{1 - (\nu_{23})^2}}$

$$= \sqrt{\frac{0.8914)^2 + (0.4679)^2 - 2*0.8914*0.657*0.4679}{1 - (0.657)^2}}$$

$$= 0.9049$$

Multiple coefficient of determination $(R_{123})^2 = 0.81898$

Standard error calculation, S.E. $(\nu) = \dfrac{1 - (R_{123})^2}{\sqrt{n}}$

$$= \frac{1 - 0.81898}{\sqrt{5}}$$

$$= 0.08095$$

Probable error of correlation coefficient PE $(\nu) = 0.6745 * \dfrac{1 - (R_{123})^2}{\sqrt{n}}$

$$= 0.6745*0.08095$$

$$= 0.05460$$

Regression equation of x1 on x2 and x3

X1=a+b1*b2+b2*b3

Dependent variable =$x_1$ (MPS)

Independent variable = $x_2$ (EPS) and $x_3$ (DPS)

The general formula of multiple regression equation is given by:

$X_1=a+b_1*b2+b_2*b_3$……(i)

Where,

a = regression constant

b1 and b2 = regression coefficient (slope of the regression line)

Required normal equation to find the value a1, b1 and b2 can be written as under:

$$\sum x_1 = na + b \sum x_2 + b_2 \sum x_3 \text{ ……(ii)}$$

$$\sum x_1 x_2 = a\sum x_2 + b_1 \sum x_2^{\,2} + b_2 \sum x_2 x_3 \text{ ……(iii)}$$

$$\sum x_1 x_3 = a\sum x_3 + b_1 \sum x_2 x_3 + b_2 \sum x_3 x^2 \text{ ……(iv)}$$

Substituting the corresponding values in equation (ii), (iii) and (iv), we get:

$10266 = 5a+387.23b_1+85b_2$……..(v)

$857361.31 = 387.239+31459.7457b_1+7189.80b_2$……(vi)

$195065 = 85a+7189.80b_1+2025b_2$……..(vii)

Solving these above equation (v), (vi) and (vii), equation (v) is multiplying by 77.446 and subtracting equation (v) from equation (vi)

$857361.31=387.23a+31459.7457b_1+7189.80b_2$

$795060.636=387.23a+29989.41458b_1+6582.91b_2$

\- - - -

62300.674 = $1470.33112b_1+606.89b_2$……(viii)

Again, Equation (vii) is multiplying by 4.555647059 and subtracting from equation (vi)

$857361.31 = 387.239+31459.7457b_1+7189.80b_2$

$888647.2936=387.239+32754.19122b_1+9225.1852943b_2$

\- - - -

$-31285.9836 = -1294.44552b_1+2035.385294b_2$……(ix)

Again equation (viii) is multiplying by 3.3537966065 and adding to equation (ix)

$-31285.9836=-1294.44552b_1+2035.385294b_2$

$208943.7553=4931.190725b_1+2053.385294b_2$

\- - -

$177657.7717 = 3636.745205b_1$

$$b_1 = \frac{177657.7717}{3636.745205} = 48.85$$

Putting the value in equation (ix)

$-31285.9836 = -1294.44552b_1-2035.385294b_2$

or, $-31285.9836 = 1294.445558*48.85-2035.385294b_2$

or, $-31285.9836+63233.66365 = -2035.385294b_2$

$$b2 = \frac{31947.68005}{-2035.38529} - 15.6961$$

Again, putting the value in equation (v)

$10226 = 5a+38723b1+85b2$

or, $10266 = 5Xa*387.23*48.85+85*(-15.6961)$

or, $a = \frac{-7316.017}{5} = -1463.2034$

Hence, the required multiple regression equations are as follows:

$x_1 = -1463.2034+48.85x_2+(-15.6961)x_3$

Standard error of estimated is $x_1$ on $x_2$ and $x_3$ is given by

$$S.E.E_{123} = \sqrt{\frac{\sum x_1^2 - a\sum x_1 - b_1\sum x_1x_2 - b_2\sum x_1x_2}{n-2}}$$

$$= \sqrt{\frac{24399890-(-1463.2034)*10266-48.85*857361.31-(-15.6961)*195065}{5-2}}$$

$$= 447.51$$

Now,

Calculation of F value "F-ratio"

$$\text{F-Ratio} = \frac{mean\ sum\ of\ \ square\ betweens\ samples}{mean\ sum\ of\ \ square\ within\ samples}$$

(i) Grand total (T) $= \sum x_1 + \sum x_2 + \sum x_3$

$= 10266+387.23+85$

$= 10738.23$

(ii) Correlation factor (CF) $= \frac{T^2}{N}$

$$= \frac{(10738.23)^2}{15} = 7687305.569$$

(iii) Total sum of square (T.S.S) $= \sum x_1^{\,2} \sum x_2^{\,2} \sum x_3^{\,2} - C.F$

| For MPS($x_1$) | EPS($x_2$) | DPS($x_3$) | $X_1^2$ | $X_2^2$ | $X_3^2$ |
|---|---|---|---|---|---|

= 34399890+31459.7457+2025-7687305.569

= 19058763.61

(iv) Sum of square between samples (S.S.E)

$$= \frac{(\sum x_1)^2}{n_1} + \frac{(\sum x_2)^2}{n_2} + \frac{(\sum x_3)^2}{n_3} - C.F$$

$$= \frac{(10266)^2}{5} + \frac{(387.23)^2}{5} + \frac{(85)^2}{5} - 7687305.569$$

= 13422280.05

(v) Sum of square within samples (S.S.W)

= T.S.S-S.S.C

= 58291453.11-45641779.83

= 12649673.28

**One way ANOVA Table**

| Source of variation | Sum of square | Degree of freedom | Mean sum of square | F-ratio |
|---|---|---|---|---|
| Between sample | 13422280.05 | 3-1=2 | 13422280.05/2<br>6711140.025 | 6711140.025 |
| Within samples | 563456.56 | 12 | 5636456.56/12<br>469704.7133 | 469704.713 |
| Total | 19058739.61 | 15-1=14 | | =14.29 |

**For NIC**

| | | | | | |
|---|---|---|---|---|---|
| 366 | 22.75 | 10 | 133956 | 517.5625 | 100 |
| 496 | 16.10 | 0.53 | 246016 | 259.21 | 0.2809 |
| 950 | 24.01 | 1.05 | 902500 | 576.4801 | 1.1025 |
| 1284 | 25.75 | 1.05 | 164865 | 663.0625 | 1.1025 |
| 1126 | 27.83 | 0.79 | 1267876 | 774.5089 | 0.6241 |
| $\sum x_1 = 4222$ | $\sum x_2 = 116.44$ | $\sum x_3 = 13.42$ | $\sum {x_1}^2 = 4199004$ | $\sum {x_2}^2 = 32790.824$ | $\sum {x_3}^2 = 103.11$ |

| $x_1x_2$ | $x_2x_3$ | $x_1x_3$ |
|---|---|---|
| 8326.50 | 227.50 | 3660 |
| 7985.60 | 8.533 | 262.88 |
| 22809.50 | 25.2105 | 997.50 |
| 33063 | 27.0375 | 1348.2 |
| 31336.58 | 21.9857 | 889.54 |
| $\sum x1x2 = 103521.11$ | $\sum x2x3 = 310.2667$ | $\sum x1x3 = 7158.12$ |

$$\bar{X} = \frac{\sum x_1}{N} = \frac{10266}{5} = 2053.20$$

$$\bar{X}_2 = \frac{\sum x_2}{N} = \frac{387.23}{5} = 77.446$$

$$\bar{X}_3 = \frac{\sum x_3}{N} = \frac{85}{5} = 17$$

$$\text{Coefficient of correlation } (\nu_{12}) = \frac{n\sum x_1x_2 - \sum x_1 \sum x_2}{\sqrt{n\sum {x_1}^2 - (\sum x_1)^2}\ \sqrt{n\sum {x_2}^2 - (\sum x_2)^2}}$$

$$= \frac{5*103521.18 - 4222*116.44}{\sqrt{5*24399890 - (10266)^2}\ \sqrt{5*31459.457 - (387.23)^2}}$$

$$= \frac{25996.22}{1780.38*19.90} = 0.733$$

$$\text{Coefficient of correlation } (\nu_{23}) = \frac{n\sum x_2x_3 - \sum x_2 \sum x_3}{\sqrt{n\sum {x_2}^2 - (\sum x_2)^2}\ \sqrt{n\sum {x_3}^2 - (\sum x_3)^2}}$$

$$= \frac{5*310.2667 - 116.44*13.42}{\sqrt{5*2790.824 - (116.44)^2}\sqrt{5*103.11 - (13.42)^2}}$$

$$= \frac{-11.2913}{19.90*18.32} = -0.03097$$

Coefficient of correlation $(\nu_{13}) = \frac{n\sum x_1 x_3 - \sum x_1 \sum x_3}{\sqrt{n\sum x_1^2 - (\sum x_1)^2}\sqrt{n\sum x_3^2 - (\sum x_3)^2}}$

$$= \frac{5*7158.12 - 4222*13.42}{\sqrt{5*419004 - (4222)^2}\sqrt{5*103.11 - (13.42)^2}}$$

$$= \frac{-20868.64}{1780.38*18.32} = -0.64$$

Now,

Calculation of multiple correlation coefficients:

Multiple correlation coefficient $(R_{123}) = \sqrt{\frac{(\nu_{12})^2 + (\nu_{13})^2 - 2\nu_{12}\nu_{23}\nu_{13}}{1 - (\nu_{23})^2}}$

$$= \sqrt{\frac{0.8914)^2 + (0.4679)^2 - 2*0.8914*0.657*0.4679}{1 - (0.657)^2}}$$

$$= -0.64$$

Multiple coefficient of determination $(R_{123})^2 = 0.844$

Standard error, S.E. $(\nu) = \frac{1 - (R_{123})^2}{\sqrt{n}}$

$$= \frac{1 - 0.844}{\sqrt{5}}$$

$$= 0.06976$$

Probable error of correlation coefficient PE $(\nu) = 0.6745 * \frac{1 - (R_{123})^2}{\sqrt{n}}$

$$= 0.6745*0.06976$$

$$= 0.047056$$

Regression equation of x1 on x2 and x3

X1 = a+b1*b2+b2*b3

Dependent variable = $x_1$ (MPS)

Independent variable = $x_2$ (EPS) and $x_3$ (DPS)

The general formula of multiple regression equation is give by case is:

$X_1$=a+$b_1$*b2+$b_2$*$b_3$……(i)

Where,

a = regression constant

b1 and b2 = regression coefficient (slope of the regression line)

Required normal equation to find the value a1 , b1 and b2 can be written as under:

$\sum x_1 = na + b \sum x_2 + b_2 \sum x_3$ ……(ii)

$\sum x_1 x_2 = a\sum x_2 + b_1 \sum x_2^{\ 2} + b_2 \sum x_2 x_3$ ……(iii)

$\sum x_1 x_3 = a\sum x_3 + b_1 \sum x_2 x_3 + b_2 \sum x_3 x^2$ …….(iv)

Substituting the corresponding values in equation (ii), (iii) and (iv), we get:

4222 = 5a+116.44$b_1$+13.42$b_2$……(v)

103521.18 = 116.44a+2790.824$b_1$+310.2667$b_2$……(vi)

7158.12 = 13.42a+310.2667$b_1$+103.11$b_2$……..(vii)

Solving thee above equation (v), (vi) and (vii), by multiplying equation (v) by 23.288 and subtracting from equation (vi)

98321.936=116.44a+2711.65472$b_1$+312.52496$b_2$

103521.18=116.44a+2790.824$b_1$+310.2667$b_2$

\- - - -

-5199.244 = -79.1628$b_1$+2.25826$b_2$……..(viii)

Again,

Equation (vii) is multiplying by 4.555647059 and subtracting from equation (vi)

103521.18 = 116.44a+2790.824$b_1$+310.2667$b_2$

62108.15893 = 116.44a+2692.060696$b_1$+894.6444411$b_2$

\- - - -

41413.02107 = 98.763304$b_1$-584.3777411$b_2$……(ix)

Again equation (viii) is multiplying by 3.3537966065 and adding to equation (ix)

-31285.9836=-1294.44552$b_1$+2035.385294$b_2$

208943.7553=4931.190725$b_1$+2053.385294$b_2$

- - -

177657.7717 = 3636.745205$b_1$

$$b_1 = \frac{177657.7717}{3636.745205} = 63.96$$

Putting the value in equation (ix)

-31285.9836 = -1294.44552$b_1$-2035.385294$b_2$

or, -31285.9836 = 1294.445558*48.85-2035.385294$b_2$

or, -31285.9836+63233.66365 = -2035.385294$b_2$

$$\therefore\ b2 = \frac{31947.68005}{-2035.38529} = -60.0572$$

Again, putting the value in equation (v)

10226 = 5a+38723b1+85b2

or, 10266 = 5Xa*387.23*48.85+85*(-15.6961)

or, $a = \frac{-7316.017}{5} = -483.90$

Hence, the required multiple regression equation is as follows:

$x_1$=-1463.2034+48.85$x_2$+(-15.6961)$x_3$

Standard error is estimated by:

$$S.E.E_{123} = \sqrt{\frac{\sum x_1^2 - a\sum x_1 - b_1\sum x_1x_2 - b_2\sum x_1x_2}{n-2}}$$

$$= \sqrt{\frac{24399890-(-1463.2034)*10266-48.85*857361.31-(-15.6961)*195065}{5-2}}$$

$$= 130.015$$

Now, Calculation of F value "F-ratio"

$$\text{F-Ratio} = \frac{mean\ sum\ of\ \ square\ betweens\ samples}{mean\ sum\ of\ \ square\ within\ samples}$$

(i) Grand total (T) $= \sum x_1 + \sum x_2 + \sum x_3$

= 4222+116.44+13.42

= 4351.86

(ii) Correlation factor (C.F.) $= \frac{T^2}{N}$

$= \frac{(10738.23)^2}{15} = 126279.031$

(iii) Total sum of square (T.S.S) $= \sum x_1^{\,2} \sum x_2^{\,2} \sum x_3^{\,2} - C.F$

= 34399890+31459.7457+2025-7687305.569

= 2939318.903

(iv) Sum of square between samples (S.S.E)

$= \frac{(\sum x_1)^2}{n_1} + \frac{(\sum x_2)^2}{n_2} + \frac{(\sum x_3)^2}{n_3} - C.F$

$= \frac{(10266)^2}{5} + \frac{(387.23)^2}{5} + \frac{(85)^2}{5} - 7687305.569$

= 3441225.443

(v) Sum of square within samples (S.S.W)

= T.S.S-S.S.C

= 2939318.903-344122.443

= -501906.54

**One way ANOVA Table**

| Source of variation | Sum of square | Degree of freedom | Mean sum of square | F-ratio |
|---|---|---|---|---|
| Between sample | 3441225.443 | 3-1=2 | 3441225.443/2 1720612.722 | 1720612.722 |
| Within samples | -501906.54 | 12 | -501906.54/12 =-41825.545 | -41825.545 |
| Total | 2939318.903 | 15-1=14 | | =-41.18 |