CHAPTER III
FINANCIAL ANALYSIS: CONCEPTUAL FRAMEWORK OF A STUDY

3.1 INTRODUCTION

Financial analysis is the process of identifying the financial strength and weakness of the firm by properly establishing relationship between the items of the balance sheet and the profit and loss account. Financial analysis can be undertaken by management of the firm, or by parties outside the firm, viz. owners, creditors, investors and others. The nature of analysis will differ depending on the purpose of the analyst.

Trade Creditors are interested in the firm’s ability to meet their claims over a very short period of time. Their analysis will, therefore, confine to the evaluation of the firm’s liquidity position.

Suppliers of long –term debt, on the other hand, are concerned with the firm’s long – term solvency and survival. They analysis the firm’s profitability over time, its ability to generate cash to be able to pay interest and repay principal and the relationship between various sources of funds (capital structure relationship). Long- term creditors do analyze the historical financial statements, but they place more emphasis on the firm’s projected, or Performa, financial statements to make analysis about its future solvency and profitability.

Investors, who have invested their money in the firm’s shares, are most concerned about the firm’s earnings. They restore more confidence in those firms that show steady growth in earnings. As such, they concerned on the analysis of the firm’s present and future profitability. They are also interested in the firm’s financial structure to the extent it influence the firm’s financial structure to the extent it influence the firm’s earning ability and risk.

Management of the firm would be interested in every aspect of the financial analysis. It is their overall responsibility to see that the resources of the firm are used most effectively and efficiently, and that the firm’s financial condition is sound.

3.2 RATIO ANALYSIS

Ratio analysis is a powerful tool of financial analysis. The English word ratio comes directly from Latin. The Latin word has many derivatives in the English language;
among them are reason, ratio, rational and relational. Ratio is defined formally as “the indicated quotient of two mathematical expressions” and indeed, a ratio does result from the division of one number into another and as “the relationship between two or more things.”

An operational definition of a financial ratio is the relationship between two financial values. The word “relationship” implies that a financial ratio is the result of comparing mathematically two values. And this numerical comparison is important, for these ratios are used as indexed, and as indexes, they are used to make quantitative judgments about the financial health of the firm.

Analysis of the firm by financial ratios enables the finance manager, as well as interested external parties, to evaluate the firm’s financial performance and condition rapidly by making comparison of ratios obtained from the firm with ratios obtained from comparable firms. Financial ratios also present ready comparisons of a firm’s financial performance and condition over time as a way of identifying and evaluating performance trends.

Ratio analysis requires considerable judgment and direction by the analyst if it is to serve as a basis for future financial and operating decisions. Rules of thumb and other mechanical interpretations may produce disastrous decisions by those who are ill-informed about the ambiguity of information that may be contained in ratios.

3.2.1 TYPES OF RATIOS

When standard ratios are not available in published form, the analyst can prepare his own standards. In computing standard ratios, the analyst should:

1. Assemble financial statement of comparable business with each industry. The problem of determining which companies are comparable is probably the most important and difficult of the many that have to be solved in the process of computing standard ratios. In other words, it is often stated that the incomparability of the original data represents the most serious difficulty in the development of dependable standards ratios.

2. Compute selected ratios for each business within the various industries.

3. Arrange for each industry and from high to low to total assets etc.

4. Eliminate the extreme low and high ratios in order to provide a basis for determining the most representative average.
3.2.2 STANDARD OF COMPARISON

Financial and operating relationships expressed in terms of ratios or otherwise have little significance except as they are judged on the basis of appropriate standards of comparison. Therefore, in interpreting the ratios of a particular business, the analyst cannot determine whether the ratios indicate favourable or unfavourable conditions unless there are available measuring devices or standard of comparison.

In preparing standard ratios for a group of companies, the analyst is comforted with many problems. To obtain the most typical financial and operating data for an industry, the analyst must be sure that all the companies included in the summary are homogeneous. To be most meaningful and informative, i.e. reliable and representative, standard ratios should be developed for companies of an industry that:

1. Use a uniform accounting system and accounting procedures including a uniform classification of accounts and similar depreciation methods,
2. Follow a uniform accounting period preferable on a natural business year basis,
3. Follow similar asset valuation and amortization policies,
4. Represent a homogeneous group,
5. Adopt and maintain somewhat uniform managerial polities.

3.2.3 CLASSIFICATION OF RATIOS

DEBT-EQUITY RATIO

This ratio establishes relationship between the outside long-term liabilities and owners' funds. It shows the proportion of long-term External Equities and Internal Equities i.e. proportion of funds provided by long-term creditors and that provided by shareholders or proprietors. A higher ratio means that outside creditors has a larger claim than the owners of the business. The company with high-debt position will have to accept stricter conditions from the lenders while borrowing money.

\[
\text{Debt-Equity Ratio} = \frac{\text{Long Term Liabilities}}{\text{Shareholders' Funds (Net Worth)}}
\]

External Equities = All Long term liabilities + Current Liabilities

Internal Liabilities = Equity share + Preference share + Reserves & Surplus + P & L A/c- Intangible or Fictitious Assets.
CURRENT RATIO
The ratio is used to assess the firm's ability to meet its short-term liabilities on time. It is generally believe that 2:1 ratio shows a comfortable working capital position. However this rule should not be taken as a hard & fast rule, because ratio that is satisfactory for one company may not be satisfactory for other. It means that current assets of an Organization should, at least be twice of its current liabilities. The higher the ratio, the better it is.

\[
\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}
\]

Current Assets = Cash & Bank Balance + Stock + Debtors + Bills Receivable + Prepaid Expenses + Investments readily convertible into cash + Loans and Advances


FIXED ASSETS TURNOVER RATIO
This ratio is also known as the investment turnover ratio. It is based on the relationship between the cost of goods sold and assets of a firm. It define, measures the efficiency of a firm in managing and utilising its assets. The higher the turnover ratio, the more efficient is the management and utilisation of the assets while low turnover ratios are indicative of underutilisation of available resources and presence of idle capacity. In operational terms, it implies that the firm can expand its activity level without requiring additional capital investments.

RETURN ON CAPITAL EMPLOYED
The term capital employed refers to long-term funds supplied by the lenders and owners of the firm. It provides a test of profitability related to the sources of long-term funds. The higher the ratio, the more efficient is the use of capital employed. It is calculated by comparing the profit earned and the capital employed to earn it. This ratio is usually in percentage. It is also known as “Rate of Return” or “Rate on capital Employed”.

\[
\text{Return on Investment} = \frac{\text{Profit Before Interest, Tax & Dividends}}{\text{Capital Employed}} \times 100
\]
Since the capital employed includes shareholders' funds and long-term loans, interest paid on long-term loans will not be deducted from profits while calculating this ratio.


OR

Capital Employed = Fixed Assets + Working Capital. OR \([FA + (C.A-C.L)]\)

This ratio measures how efficiently the capital employed in the business is being used.

RETURN ON EQUITY

Equity shareholders of a company are more interested in knowing the earning capacity of their funds in the business. As such, this ratio measures the profitability of the funds belonging to the equity shareholders. The ratio reveals how profitably the owner’s funds have been utilized by the firm.

\[
\text{Return on Equity} = \frac{\text{Net Profit after Interest, Tax & Dividends}}{\text{Equity Shareholders’ Funds}} \times 100
\]

Equity Share holders Funds = Equity Share Capital + All Reserves & Surplus – Fictitious Assets

This ratio measures how efficiently the equity shareholder’s funds are being used in the business.

RETURN ON ASSETS

Here, the profitability ratio is measured in terms of the relationship between net profits and assets. The ROA may also be called profit-to-asset ratio. There are various possible approaches to define net profit and assets, according to the purposes and intent of the calculation of the ratio. Depending upon how these two terms are defined, many variations of ROA are possible.

The concept of net profit may be (i) net profits after taxes, (ii) net profits after taxes plus interested and fixed assets, and (iii) tangible assets.

\[
\text{Return on Assets} = \frac{\text{Net Profit after taxes}}{\text{Average total assets}} \times 100
\]
PROFITABILITY RATIOS

Profitability is an indication of the efficiency with which the operations of the business are carried on. Poor operational performance may indicate poor sales and hence poor profits. A lower profitability may arise due to the lack of control over the expenses. Bankers, financial institutions and other creditors look at the profitability ratios as an indicator whether or not the firm earns sub stability more than it pays interest for the use of borrowed funds and whether the ultimate repayment of their debts appears reasonably certain. Owners are interested to know the profitability as it indicates the return which they can get on their investments. Profit is the difference between revenues and expanses over a period of time. Profit is the ultimate output of a company and it will have no future if it fails to make sufficient profits. Therefore, the financial manager should continuously evaluate the efficiency of the company in terms of profit. The Profitability Ratios are calculated to measure the operating efficiency of the company. Generally, two major types of profitability ratios calculated

- Profitability in relation to sales
- Profitability in relation to the investment

The profit is commonly measured by Profit after Tax (PAT) which is the result of the impact of all factors on the firm’s earnings. Taxes are not controllable by management. To separate the influence of taxes Profit before Tax (PBT) may be computed. If the firm’s profit has to be examined from the point of view of all the investors the appropriate measure of profit is operating profit. Operating profit is Earnings before Interest and Tax (EBIT). This measure of earnings shows earnings arising directly from the commercial operations of the business without the effect of Financing.

How it is analysis?

1. How profitable is the company? What accounting policies and practices are followed by the company? Are they stable?

2. Is the profitability of the company high/low/ average? Is it due to :
   - Profit margin
   - Assets utilization
   - Non-Operating income
- Window Dressing
- Change in accounting policy

3. Is the return on equity (ROE) high/low/average? Is it due to:
   - Return on investment
   - Financing mix
   - Capitalization of reserves?

4. What is the trend in profitability? Is it improving because of better utilization of resources or curtailment of expenses of strategic importance? What is the impact of cyclical factors on profitability trend?

For the Analysis of performance of GSRTC following ratios are used:

**OPERATING PROFIT RATIO**

This ratio measures the proportion of an enterprise’s. Cost of sales and operating expenses in comparison to its sales"

\[
\text{Operating Ratio} = \frac{\text{Cost of Goods Sold} + \text{Operating Expenses}}{\text{Net Sales}} \times 100
\]

Operating Ratio is a measurement of the efficiency and profitability of the business enterprise. The ratio indicates the extent of sales that is absorbed by the cost of goods sold and operating expenses. Lower the operating ratio, the better it is, because it will leave higher margin of profit on sales.

**NET PROFIT RATIO**

This ratio measures the rate of net profit earned on sales. It helps in determining the overall efficiency of the business operation. An increase in the ratio over the previous year shows improvement in the overall efficiency of the business. The net Profit ratio is indicative of management’s ability to operate the business with sufficient success not only to recover from revenues of the period, the cost of merchandise or services, the expenses of operating the business and the cost of the borrowed funds, but also to leave a margin of reasonable compensation to the owners for providing their capital at risk. A high net profit ratio would ensure adequate return to the owners as well as enable a firm to withstand adverse economic conditions when selling price is declining, cost of production is rising and demand for the product is falling.

\[
\text{Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Net Sales}} \times 100
\]
3.3 UTILITY OF RATIO ANALYSIS

The ratio analysis is the most powerful tool of the financial analysis. Many diverse groups of people are interested in analyzing the financial information to indicate the operating and financial efficiency, and growth of the firm. These people use ratios to determine those financial characteristics of the firm in which they are interested. With the help of ratios, one can determine:

- The ability of the firm to meet its current obligations;
- The extent to which the firm has used its long-term solvency by borrowing funds;
- The efficiency with which the firm is utilizing its assets in generating sales revenue; and
- The overall operating efficiency and performance of the firm.

3.4 DIAGNOSTIC ROLE OF RATIOS

The essence of the financial soundness of a company lies in balancing its goals, commercial strategy, product-market choices and resultant financial needs, the company should have financial capability and flexibility to pursue its commercial strategy. Ratios analysis is a very useful analytical technique to raise pertinent questions on a number of managerial issues. It provided bases or clues to investigate such issues in detail. While assessing the financial health of the company with the help of ratio analysis, answers to the following questions relating to the company’s profitability, assets utilization, liquidity, financial and strategies capability may be sought.

3.5 TESTS OF HYPOTHESIS

A hypothesis is an assumption about the population parameter to be tested on sample information. The statistical testing of hypothesis is the most important technique in statistical inference. Hypothesis tests are widely used in business and industry for making decisions. It is here that probability and sampling theory plays an ever increasing role in constructing the criteria on which business decisions are made. Very often in practice we are called upon to make decisions about population on the basis of sample information.
In attempting to reach decisions, it is useful to make assumptions or guesses about the population involved. Such assumptions, which may or may not be true, are called statistical hypothesis and in general are statements about the probability distributions of the population. The hypothesis is made about the value of some parameter, but the only facts available to estimate the true parameter are those provided by a sample. If the sample statistic differs from the hypothesis made about the population parameter, a decision must be made as to whether or not this difference is significant. If it is, the hypothesis is rejected. If not, it must be accepted. Hence, the term “Test of Hypothesis”.

**Procedure of Hypothesis Testing**

The general procedure followed in testing hypothesis comprises the following steps:

1. **Set up a hypothesis**: Since Statistical hypothesis are usually assumptions about the value of some unknown parameter, the hypothesis specifies a numerical value or range of values for the parameter. The conventional approach to hypothesis testing is not to construct single hypothesis about the population parameter, but rather to set up two different hypotheses. These hypotheses are normally referred to as (i) null hypothesis denoted by $H_0$ and (ii) alternative hypothesis denoted by $H_1$.

The null hypothesis asserts that there is no true difference in the sample statistic and population parameter under consideration (hence the word “null” which means invalid, void or amounting to nothing) and that the difference found is incidental arising out of fluctuating of sampling. If the sample information leas us to reject $H_0$, then we will accept alternative hypotheses.

2. **Set up a suitable significance level**: The confidence with which an experimenter rejects or retains null hypothesis depends on the significance level adopted. The level of significance, usually denoted by “$\alpha$”, is generally specified before any samples are drawn, so that results obtained will not influence our choice. Though any level of significance can be selected, in practice, we either take 5 per cent or 1 per cent level of significance. When we take 5 per cent level of significance the there are about 5 chances out of 100 that we would reject the null hypotheses. When the null hypothesis is rejected at $\alpha = 0.5$, the test result is said to be “significant”. When the null hypothesis is rejected at $\alpha = 0.01$, the test result is said to be “highly significant”.

72
3. **Determination of a suitable test statistic:** The third step is to determine a suitable test statistic and its distribution.

\[
\text{Test Statistic} = \frac{\text{Sample Statistic} - \text{Hypothesized population parameter}}{\text{Standard error of the sample statistic}}
\]

4. **Determine the critical region:** It is important to specify, before the sample is taken, which values of the test statistic will lead to a rejection of \( H_0 \) and which lead to acceptance of \( H_0 \). The former is called the Critical region. The value of \( \alpha \), the level of significance, indicates the importance that one attaches to the consequence associated with incorrectly rejecting \( H_0 \). It can be shown that when the level of significance is \( \alpha \), the optimal critical region for a two-sided test consists of that \( \frac{\alpha}{2} \) per cent of the area in the right-hand tail of the distribution plus \( \frac{\alpha}{2} \) in the left-hand tail. Thus, establishing a critical region is similar to determining a \( 100(1-\alpha)\% \) confidence interval. In general, one uses a level of significance of \( \alpha = 0.05 \), indicating that one is willing to accept a 5 per cent chance of being wrong to reject \( H_0 \).

5. **Doing Computations:** The fifth step in testing hypothesis is the performance of various computations from a random sample of size \( n \), necessary for the test statistic obtained in step (3). Then, we need to see whether sample result falls in the critical region or in the acceptance regions.

6. **Making decisions:** Finally, we may draw statistical conclusions and the management may take decisions. A statistical decision or conclusion comprises either accepting the null hypothesis or rejecting it. The decision will depend on whether the computed value of the test criterion falls in the region of rejection or the region of acceptance. If the hypothesis is being tested at 5 per cent level of significance and the observed set of result has a probability less than 5 per cent, we reject the null hypothesis and the difference between the sample statistics and the hypothetical population parameter is considered to be significant. On the other hand, if the testing statistic falls in the region of non-rejection, the null hypothesis is accepted and the difference between the sample statistic and the hypothetical population parameter is not regarded as significant.
3.6 NON-PARAMETRIC ANALYSIS

William Beaver compared the financial ratios of 79 manufacturing firms that subsequently failed with the ratios of 79 that remained solvent. His study revealed five ratios, which could discriminate between failed and non-failed firms. These ratios are:

- Cash Flow to Total Debt
- Net Income to Total Assets
- Total Debt to Total Assets
- Working Capital to Total Assets
- Current Ratios

As expected, failed firms had more receivables as well as low current ratios. They also had fewer inventories. In the Indian context, L. C. Gupta attempted a refinement of Beaver’s method with the objective of building a forewarning system of corporate sickness. A simple non-parametric test for measuring the relative differentiating power of the various financial ratios was used. The test is based on taking a sample of sick and non-sick companies, arraying them by the magnitude of each ratio to be tested; selecting a cut-off point which will divide the array into two classes with a minimum possible number of misclassifications, and then computing the percentage classification errors. The cut-off point is determined by visual inspection. The percentage classification error is determined as number of misclassifications divided by the number in the sample. The ratio, which results into the lower percentage classification error, is the most efficient ratio.

Gupta’s study, unlike that of Beaver, is not based on the technique of paired sample but on broadly matching group of sick and non-sick companies. In all 56 ratios for the 13-years period, 1962-74, for the textile and non-textile groups of industries were selected for testing. The number of array’s for the textile sample was 728 (i.e. the number of years multiplies by the number of years). In the case of the textile sample the two best ratios were:

- Earning before depreciation, interest and taxes to sales.
- Operating cash flow to sales.
- EBDIT/Total assets including accumulated depreciation.
- OCF/Total assets including accumulated depreciation.
• EBDIT/(Interest + 0.25 Debt). This ratio measures the extent of the firm’s estimated debt servicing ability.

These five ratios have a high degree of predictive power, as reflected in low percentage classification error, at least 2-3 years before a near-bankruptcy by the sample sick textile companies. The EBIT ratios were found to be inferior to both EBDIT and OCF measures. The worst performers were those related to net worth, i.e. PBT/Net worth and PAT/Net Worth.

Among the balance sheet ratios, only two ratios were found to have some power of predicting possible sickness. They were:

• Net Worth/debt, including both short and long-term debt
• All outside liabilities/tangible assets.

It is thus indicated that incidence of sickness and inadequacy of equity base are associated. Surprisingly, all liquidity ratios give very poor results.

Combining the ratios can reduce the percentage error of classification. A combination of four to five profitability ratios minimizes misclassification of sick companies.

3.7 PARAMETRIC TESTS

The statistical method for testing the null hypothesis that the means of several populations are equal is analysis of variance (ANOVA). It uses a single-factor, fixed-effects model to compare the effects of one treatment of factor (brands of coffee, varieties of residential housing, types of retail stores) on a continuous dependent variable (Coffee consumption, hours of TV viewing, shopping expenditure). In a fixed effects model, the level of the factor are established in advance and the result are not generalized to other levels of treatment.

To use ANOVA, certain conditions must be met. The samples must be randomly selected from normal populations, and the populations should have equal variances. In addition, the distance from one value to its group’s mean should be independent of the distances of other values to that mean (independence of error). ANOVA is reasonably robust, and minor variations from normality and equal variance are tolerable.

Analysis of Variance, as the name implies, breaks down or partitions total variability into component parts. Unlike the t-test, which uses sample standard deviations? ANOVA uses squared deviations of the variance so that computation of distances of
the individual data points from their own mean or from the grand mean can be summed. In an ANOVA model, each group has its own mean and values that deviate from that mean. Similarly, all the data points from the entire group produce an overall grand mean. The total deviation is the sum of the squared differences between each data point and the overall grand mean.

The total deviation of any particular data point may be partitioned into between-group variance and within-group variance. The between-groups variance represents the effect of the treatment, or factor. The differences of between-group mean simply that each group was treated differently, and the treatment will appear as deviations of the sample means from the grand mean. Even if this were not so, there would still be some natural variability among subjects and some variability attributable to sampling. The within-groups variance describes the deviations of the data points within each group from the sample mean. This result from variability among subjects and from random variation, it is often called error.

Intuitively, we might conclude that when the variability of the null hypothesis exceeds the variability arising from error and random fluctuation, the viability of the null hypothesis begins to diminish. And this is exactly the way the test statistics for analysis of variance work.

The test statistic for ANOVA is the F ratio. It compares the variance from the last two sources:

\[
F = \frac{\text{Between-group variation}}{\text{Within-group variance}} = \frac{\text{mean square between}}{\text{mean square within}}
\]

Where,

\[
\text{Mean square between} = \frac{\text{Sum of square between}}{\text{Degree of freedom between}}
\]

\[
\text{Mean square within} = \frac{\text{Sum of square within}}{\text{Degree of freedom within}}
\]

To compute the F- ratio, the sum of the squared deviations for the numerators and denominators are divided by their respective degree of freedom. By dividing, we are computing the variance as an average or mean, thus the term mean square. The degree of freedom for the numerator, the mean square between groups, are one group, are the total number of observations minus the number of group (n-k).
If the null hypothesis is true, there should be no difference between the population means, and the ratio should be close to 1. If the population means are not equal, the numerator should manifest this difference, and the F ratio should be close to 1. The F distribution determines the size of ratio necessary to reject the null hypothesis for a particular sample size and level of significance.

3.8 COEFFICIENT OF CORRELATION

The statistical tool with the help of which the relationship between two or more than two variables is studied is called correlation. The measure of correlation called the coefficient of correlation summarizes in one figure the direction and degree of correlation. Thus correlation analysis refers to the techniques used in measuring the closeness of the relationship between the variables. An analysis of the co-variation of two or more variables is usually called correlation.

The problem of analyzing the relation between different series should be broken down into three steps:

- Determining whether a relation exists and, if it does, measuring it;
- Testing whether it is significant;
- Establishing the cause and effect relations, if any.

Interpreting the Coefficient of Correlation

The coefficient of correlation measures the degree of relationship between two sets of figures. As the reliability of estimates depends upon the closeness of the relationship it is imperative that utmost care be taken while interoperating the value of coefficient of correlation otherwise fallacious conclusions be drawn. The following general guidelines are given which would help in interpreting the value of \( r \).

- When \( r = +1 \), it means there is perfect positive correlation between the variables.
- When \( r = -1 \), it means there is perfect negative correlation between the variables.
- When \( r = 0 \), it means there is no correlation between the variables.

3.9 BUS TRANSPORT COST ASSESSMENT

Efficient cost control is essential for any organization. A bus transport corporation is certainly no exception to this. The need for an efficient cost system stems from the complex cost implication of changes in service variable pertinent to bus transport
organization and characteristics features of the serviced to be provided to bus users. These services, particularly of bus transportation, are time-specific as well as location-specific. This means that the service has to be provided at a particular location and at a particular time according to demand patterns.

There are also certain characteristics features of the different components of the transport organization which affect cost outlays; some components are immediately consumed when a bus is operated (like fuel and oil) while other have a more durable life. Tyres and batteries may be used up over several months, while the vehicle itself may have a life of many years. Accounting procedures for measuring the consumption of these durables items are not always adequate for management information and planning purposes. Accounting costs measures stock changes which may be functionally related in a complex and lagged way to actual consumption of components.

3.9.1 COST CONCEPT

1. Opportunity Costs: It indicates the sacrificed gain of particular resources in utilizing it for a particular purpose. This sacrificed gain indicates the sacrifice of the next best use of the resources in question. For instance if a bus plying on route “C” is diverted to route “D” it may bring a revenue of Rs XYZ per day.

2. Explicit Costs: The costs which are explicitly recorder in the books of account are termed as explicit costs. It consists of all payments to outside agencies.

3. Implicit Costs: There are certain opportunity costs incurred by an organization which are not recorder in the books of accounts. These are describes as implicit costs. For example, the rent of the building owned by the organization and the interest on the loan taken.

4. Total Cost: This refers to total expenditure incurred for the production of certain quantities of outputs. In the case of a bus organization, it is the total expenses incurred to provide the service to passengers. It included the cost of fuel, wages and salaries, interest, rent, depreciation, tax payment etc.

5. Fixed Costs: The costs which do not vary with changes in output are fixed costs. In bus operations the interest cost of the vehicle investment is an illustration of the fixed cost component.
6. Variable Costs: The variable costs of a bus company are those which change according to the change in units of outputs. Fuel is a variable cost since its consumption varies directly with the kilometers of output. Crew wages will vary both with the hours of bus operation and kilometers of output.

7. Marginal Costs: This is the additional cost due to the production of one extra unit of output. Suppose a bus incurred a total cost of Rs. 30 for 20 kms operated and Rs. 31 for 21 kms operated. The marginal cost of the additional kms is Rs. 1.

3.9.2 COST FUNCTIONS

There is natural tendency in most of the State Transport Undertaking to estimate the average cost per kms. General term in CPKM is to ascertain the level of the cost in the organization and also to have comparison of efficient pertinent to cost as compared to other State Transport Undertakings. This particular approach is very simple and no doubt partly of operational use. Cost functions indicate the relationship between the rates at which cost changes. For STUs operations, it is better to relate the cost behavior pertinent to changes in kms and number of vehicles owned by the organization.

For operational decisions, the total cost can be classified according to three categories based on degree of adaptability and nature of operation:

1. Kms dependent cost: The kms operated by the fleet is very important component affecting level of total cost. According to the planning for scheduling and routing, the quantum of the kms to be operated by the organization is determined. Regular kms by the organization or depot is having maximum degree of maneuverability and adaptability. The kms dependent cost as variable cost is pertinent to expenditure on fuel, cost owing to tear and wear of tyres, vehicle depreciation according to use. Kms dependent cost is highly pertinent to economic of the route planning. This cost is also an important component of route economics of given routes, as it indicates the marginal cost of additional kms.

2. Vehicles Dependent Cost: It has been observed that there are certain costs which are highly sensitive to number of vehicles owned organization. Changes into the number of vehicles influences the cost as certain costs are directly pertinent to vehicles. For instance, when one additional vehicle is to be added, M. V. Tax is
to be paid. Interest on investment in Vehicle is to be taken into consideration, if there are no surplus persons in crew, additional driver and conductor is to be employed. Thus, the linear total cost function would be directly shifted upwards as a result of additional vehicle.

3. Overheads: This includes the general administrative expenditure, interest cost on other non-vehicular assets.

3.9.3 CONTROLLABLE COST AND NON-CONTROLLABLE COSTS

Cost on personnel-The cost on personnel depends upon two important factors-wage level and productivity per employee. The wage levels are different for different undertakings. Therefore, productivity is the criteria to judge effectiveness. One of the reasons for high productivity is high fleet productivity.

Cost on Materials: The productivity of fuel, oil and tyres.

Non-controllable costs consist of depreciation, interest and other cost. As 80 % of the capital is in buses, the depreciation and interest are more related to the number of vehicles than the kms operated by the vehicles.

3.10 BUS TRANSPORT REVENUE ASSESSMENT

The revenue is very much vital for healthy growth of the organization. If the fare is very low, the revenue function is very important for the very survival of the organization. Revenue is mostly dependent on the planning of route pattern and scheduling of bus services. Generally, it is taken for granted that as kms increase total revenue increases by earning per km which is the average of total revenue and total kms operated by the depot or organization. This approach may be simple but it lacks realism. If we observe keenly we may find that the increase in revenue as a result of increase in kms may not be with same rate. In most of the cases, for route revenue is there is increase in kms, by adding more trips or by increasing effective kms of already planned trips, total revenue increases but with diminishing rate. As price of inputs like fuel, spares, tyre are rising, the problem of increasing the level of revenue to meet the rising cost of operation is challenging one. It would be necessary to know what are the different factors which may affect the revenue of the organization so that a desirable policy for increasing revenue would be devised.
3.10.1 BUS FARE

The level of fare is very important factor affecting the level of revenue. From economic point of view, to have desirable level of revenue to nullify the effect of increasing cost of operation upward flexibility in fare is highly essential. Owing to legal constraints and administrative rigidity change in fare based on changes in cost of operation is not as flexible as it should be. This creates the lags between the actual increases in fare to meet the increase in cost of operations. Thus, there is a possibility of losses owing to the lag. To avoid this type of lag in increase in cost and increase in fare based on forecasted fare to avoid losses or to attain the desirable level of rate of return would be possibly achieved. This required forecasting of cost and probable level of revenue after taking into consideration the trend in traffic, in terms of passenger kms in near future.

Besides, the significant increase in fare may have dampening impact on passenger travel. While anticipating increase in revenue as result of rise in fare should not be over estimated.

3.10.2 FLEET PRODUCTIVITY

In case of three –tier management system, Depot and Division are jointly responsible for fleet productivity. The availability of vehicle is also the responsibility of divisional workshop and traffic operating plan for the depot is drafted by the divisional management. Such type of shared responsibility does not produce the desired results.

In case of two-tier management system, depot is committed to its own operational plan. It has to manage its operations by improving the availability of fleet which is its sole responsibility. There is no divisional workshop to help the depot or divisional management which can interface with its operational plan. Therefore the fleet productivity is better than that of the three-tier system.

3.11 TREND IN TRAFFIC AND REVENUE LEVEL

The rising trend in travel demand is a hopeful counter balancing force which would act as an important leverage against the increasing losses as a result of increase in cost of operations and low fare, increase in travel demand as a result of increase in economic activities, population, urbanization tends to increase the population ratio if the level of operation on the route is same. Route planning is very important
operational strategy to enhance the revenue level upward with negligible increase in cost of operations. It appears that this particular potential field of operation is not fully exploited by the operators. This requires demand analysis and route rationalization including optimal scheduling of the given bus fleet based on statistical data collected by conducting scientific surveys.

3.12 Z-SCORE FINANCIAL ANALYSIS TOOL

The Z-score formula for predicting bankruptcy was developed in 1968 by Edward I. Altman, a financial economist and professor at the Leonard N. Stern School of Business at New York University. The Z-score is a multivariate formula that measures the financial health of a company and predicts the probability of bankruptcy within two years.

Studies measuring the effectiveness of the Z-score have shown the model to be accurate with >70% reliability (Eidleman). The Z-score combines four or five common business ratios using a weighting system calculated by Altman to determine the likelihood of bankruptcy. The weighting system was originally based on data from publicly held manufacturers, but has since been modified for private manufacturing, non-manufacturing and service companies.

3.12.1 FORMULA OF Z-SCORE

Original Z-score Component Definitions Variable Definition Weighting Factor

\[ X_1 = \frac{Working \ Capital}{Total \ Assets} \]

\[ X_2 = \frac{Retained \ Earnings}{Total \ Assets} \]

\[ X_3 = \frac{Earnings \ before \ Interest \ and \ Taxes}{Total \ Assets} \]

\[ X_4 = \frac{Market \ Value \ of \ Equity}{Book \ Value \ of \ Total \ Liabilities} \]

\[ X_5 = \frac{Sales}{Total \ Assets} \]

Z score Bankruptcy Model:

\[ Z = 1.2 \times X_1 + 1.4 \times X_2 + 3.3 \times X_3 + .6 \times X_4 + .999 \times X_5 \]

Zones of Discrimination:

\[ Z > 2.99 \ - “Safe” \ Zone \]

\[ 1.8 < Z < 2.99 \ - “Grey” \ Zone \]
Z < 1.80 - ‘Distress’ Zone

**Z’-score Component Definitions Variable Definition Weighting Factor for Private Firms**

X₁ = (Current Assets - Current Liabilities) / Total Assets

X₂ = Retained Earnings / Total Assets

X₃ = Earnings before Interest and Taxes / Total Assets

X₄ = Book Value of Equity / Total Liabilities

X₅ = Sales / Total Assets

**Z’ Score Bankruptcy Model:**

Z' = 0.717 X₁ + 0.847 X₂ + 3.107 X₃ + 0.420 X₄ + 0.998 X₅

**Zones of Discrimination:**

Z’ > 2.9 - ‘Safe’ Zone

1.23 < Z’ < 2.9 - ‘Grey’ Zone

Z’ < 1.23 - ‘Distress’ Zone

**Z-score Component Definitions Variable Definition Weighting Factor for Manufacturers, Non-Manufacturer Industrials, & Emerging Market Credits**

X₁ = (Current Assets - Current Liabilities) / Total Assets

X₂ = Retained Earnings / Total Assets

X₃ = Earnings before Interest and Taxes / Total Assets

X₄ = Book Value of Equity / Total Liabilities

**Z-Score Bankruptcy Model:**

Z = 6.56 X₁ + 3.26 X₂ + 6.72 X₃ + 1.05 X₄

**Zones of Discrimination:**

Z > 2.6 - ‘Safe’ Zone

1.1 < Z < 2.6 - ‘Grey’ Zone

< 1.1 - ‘Distress’ Zone
3.12.2 USERS OF THE Z-SCORE ANALYSIS

Financial statement users can employ the Z-Score for a variety of applications.

1. Credit Evaluation - For loan officers and credit managers in accepting or rejecting loan applications.
2. Private Investment Analyst – For stockbrokers and individual investors to evaluate the relative safety of a proposed investment.
3. M & A Analysis - To consider an entity’s viability both before and after a corporate reorganization.
4. Turnaround Management - To develop emergency action plans and turnaround strategies to quickly correct a deteriorating situation.
5. Insurance Underwriting - To evaluate the potential credit risk of the proposed insured including risk sharing and self-insured retentions.
6. Corporate Governance - Board of Directors and Audit Committee analysis of going concern capability, consideration of corporate risk, and analysis of merger and acquisition scenarios.
REFERENCES:
4. Correspondence Courses in Transport Management, Central Institute of Road Transport, Poone.