Chapter II

Review of Literature
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REVIEW OF LITERATURE

Review of literature has vital relevance with any research work due to literature review the possibility of repetition of the study can be eliminated and another dimension can be selected for the study. The literature review helps researcher to remove limitations of existing work or may assist to extend prevailing study. The reviews of empirical studies explore the avenues for future and present research efforts related to the subject matter. In case of conflicting and unexpected results, the research can take the advantage of knowledge of their researchers simply through the medium of their published works. A number of research studies have been carried out on different aspects of performance appraisal by the researchers, economists and academicians in India and abroad. Different authors have analyzed the financial performance in different perspectives. A review of these analyses is important in order to develop an approach that can be employed in the context of the study of Indian pharmaceutical Industry. Therefore, the present chapter reviews the empirical studies related to different aspects of performance appraisal. The chapter has been divided into five stages.

**Stage I** - Overall financial performance and financial performance of Pharmaceutical Industry

**Stage II** - Six power analysis

**Stage III** - Du Pont Analysis

**Stage IV** - Z-Score analysis

**Stage V** - Tobin’s Q
Stage I 2.1 Reviews related to financial performance

Juma’h & Wood (2000) examined the business performance of UK firms by taking into Consideration outsourcing implications on profitability, liquidity, employment cost, return on equity, research and development expenditures and changes in equity of the company. The results showed that profitability (Operating Profit and Return on Equity) firstly decreases in the year of outsourcing (1988-1991) and tends to increase the profitability in the subsequent years i.e. after outsourcing announcements (1993-1996). However operating profit and return on equity of the sampled firms are above the average of all UK firm’s employment cost has been decreased by the outsourcing expectation while Research and Development expenditure decreases after years of outsourcing. Overall it has been analyzed that performance of firms increases after outsourcing announcements.

Aggarwal & Singla (2001) attempted to identity from among the 11 ratios, used as inputs, those ratios, which are relevant in distinguishing between profit and loss making units in the Indian Paper Industry. The study indicated the model and has correctly classified 82.14% of the units selected as profit making and loss marking. The study also showed the inventory turnover ratio, interest coverage ratio, net profit to total assets and earnings per share are the most important indicators of financial performance. The study also suggested that the results of MDA can be used as a predictor of future profitability/sickness.

Dabasish Sud (2001) in a study a comparative analysis regarding the liquidity management in Electricity generation and distribution industry has been made for the period 1987-88 to 1996-97. The study revealed that the overall liquidity should be managed in such a way that not only it should not hamper profitability but also its contribution towards an increase in profitability should be positive.
Sudha (2001) observed that all the public sector undertakings are loss making and it is better to privatize, but this is not the most appropriate conclusion. The public undertakings made good provisions to gear up against the challenges of competitions. It was concluded that despite all the charges against the performance and the growth of public sector undertakings, it maximum tried its best to make profits.

Vijayakumar (2002) has analyzed with respect to profitability, capital structure, fixed assets and working capital. The researcher’s main findings were about the mills over reliance on external funds which resulted in interest burden. It is certain that the Mill has would have better scope to function in an efficient manner if the owner’s funds were increased and the borrowings were reduced.

Sudarsana Reddy (2003) evaluated the financing methods and practices to analyze the investment pattern and utilization of fixed assets, to ascertain the working capital condition, to review the profitability performance and to suggest measures to improve profitability. The data collected have been examined through ratios, trend, common size, comparative financial statement analysis and statistical tests have been applied in the appropriate context. The main findings of the study are that the A.P paper industry needs the introduction of additional funds along with a restructuring of finance and modernization of technology for better operating performance.

Santimoy Patra (2005) analyzed the case Tata Iron & Steel Company Limited. The study of the impact of liquidity ratios on profitability showed both negative and positive association. Out of seven liquidity ratios selected for this study, four ratios namely current ratio, acid test ratio, current assets to total assets ratio and inventory turnover ratio showed negative correlation with profitability ratio. However these correlation co-efficient were not statistically significant. The remaining three ratios namely working capital turnover ratio, receivable turnover ratio and cash turnover ratio
have shown positive association with the profitability ratio and all of which are statistically significant at 5% level of significance. The result of all the correlation coefficient is as desirable except the correlation coefficient between inventory turnover ratio and ROI. However, this undesirable sign between ITR and ROI is not supported by the multiple regression analysis, which shows the positive association between these two variables. There is increasing profitability which depends upon many factors including liquidity.

Paul N. Ellinger, Valentina Hartarska, Christine Wilson, (2005) The performance, management, and risk exposure of financial institutions operating in rural and agricultural markets determine the cost of agriculture’s ongoing access to financial capital. The evolution of general banking and agricultural finance research contributions in the structure, performance, and risk management of financial institutions lending to agriculture and providing financing to rural markets is described and discussed. A summary of future research priorities in each of these areas is also provided. Ongoing regulatory change, institution consolidation, financial innovations, and the changes occurring in the agricultural sector drive research opportunities in this area. Ongoing research will be critical to maintain efficient rural financial markets that can provide consistent and competitively priced credit for rural America.

Sangeetha Arora & Shubpreet Kaur (2006) made a comparative analysis on the basis of seven key indicators namely return on assets, capital asset risk weathered ratio, non-performing assets to net advances, business per employee, net profitability ratio, non-performing asset level and off-balance sheet operations of scheduled commercial banks from the time period of 1994 to 2005. They concluded that although the performance of public sector banks have improved considerably when compared with
other sectors they are lagging in thrust areas viz, business per employee, profitability and asset quality.

Debasish Sur and kaushik Chakraborty (2006) in his study financial performance of Indian Pharmaceutical Industry: The Indian Pharmaceutical Industry has been playing a very significant role in increasing the life expectancy and in decreasing the mortality rate. It is the 5th largest in terms of volume and 14th largest in value terms in the world. In comparative analysis the financial performance of Indian pharmaceutical industry for the period 1993 to 2002 by selecting six notable companies of the industry. The comparison has been made from almost all points of view regarding financial performance using relevant statistical tools.

Sudha (2009) studies the Financial Performance of Neyveli Lignite Corporation Limited - A Public Sector Undertaking’ and stated that the liquidity position of NLC was satisfactory. The ratios have significant effect on profitability and liquidity position which is ranked based on CAGR.

Velavan (2009) in the research Financial Performance of the Sugar Mills in Tiruchirappalli District’, confined their study to issues relating to the financial performance of the selected private sector sugar mills in Tiruchirappalli District. It covered capital structure decision, fixed asset management, working capital analysis, profitability performance and analysis of the financial healthiness of the selected units. The various ratios are evaluated to capture the predictive viability of a company’s score which can be used to determine the financial performance of the company based on CAGR. The overall EID Parry’s overall financial performance is good, whereas the overall financial performance of Kothari Sugars Ltd is not satisfactory.

Lars Grønholdt, Anne Martensen, (2009) examines how different management practices drive key financial performance and business success in Danish companies.
Both qualitative and quantitative research is conducted to study the relationships between eight general management practices and key performance results. A survey among large companies in Denmark and the companies' key performance results from the empirical basis for the study. Two central key performance results are “increase in turnover” and “return on invested capital”. It can be argued that sustained increases in turnover and high return on invested capital at the same time indicate business success and return to shareholders in the long run.

The findings demonstrate that the eight management practices are linked to key performance results. The high-performing companies are differentiated significantly from the low-performing companies with regard to how well they perform on these management practices. All eight management practices are essential in achieving business success.

**Chandra Kumarmangalam & Govinda Samy (2010)** in their research related to, ‘Leverage – An Analysis and its Impact on Profitability with Reference to Selected Cement Companies in India’, stated that the leverage and profitability and growth are related and the leverage is having an impact on the profitability of the firm.

**Dr. Asma Salman (2010)** financial analysis is useful for every business entity to enhance their performance, competitive strength and access their financial stability and profitability of the firm. The study investigates the financial analysis of the two multinational companies, Glaxo Smith Kline (GSK). European Journal of Economics Finance and Administrative Sciences - Issue 53 (2012) and Sanofi Aventis (SA) and an attempt to compare their financial performance by using ratio analysis. Data is drawn from the pharmaceutical industry in Pakistan from financial year 2005 to 2009. Analysis statistical hypothesis test (t-Test) with independent sample characteristics was analyzed through Statistical Package for the Social Sciences (SPSS). The results comparison with
this method between two pharmaceutical companies is presented. It is revealed that the performance of both companies in the observed period has improved. The current method reflects that GlaxoSmithKline is leading Sanofi Aventis. Basically these financial ratios—solvency ratios, liquidity ratios, activity ratios, profitability ratios and marketability ratios are used extensively in this study.

**Faruk Hossan & Md Ahsan Habib (2010)** the thesis applies performance evaluation of Pharmaceutical company in Bangladesh. It means evaluating how well the company performs. The main aim is achieved through ratio analysis of two pharmaceutical (Beximco and Square pharmaceutical) companies in Bangladesh. The main data collection from the annual financial reports on Beximco and Square pharmaceutical companies in 2007 to 2008. Different financial ratio is evaluated such liquidity ratios, asset management ratios, profitability ratios, market value ratios, debt management ratios and finally measure the best performance between two companies.

**Venkanaramana & Ramakrishnaiah (2012)** studied on ‘Profitability and Financial Performance – A Case study of selected Cement companies in India’, analyzed and found out that the profitability of the selected companies has a favourable trend towards in terms of Return on Equity return on Investment ratio and Return on Capital Employed.

**Mathieu Winand, Thierry Zintz, Jeroen Scheerder, (2012)** develops a tool to manage financial performance of sport federations. It stimulates thinking about the necessity for non-profit sport organizations to develop financial performance measures and management to survive and/or to grow. Adapting the Ritchie and Kolodinsky model of factor analysis through financial ratios in the sport federation context, the study develops a framework for financial performance measurement of sport federations in Belgium in the years 2001 through 2006. Based on a principal component analysis, six
financial performance-related categories were constructed, i.e.: public funds dependence; financial balance; attraction of resources; financial budget; member services investment and elite services investment. They form the basis of a dynamic strategic management tool where financial categories are related to each other. The financial management tool can be a starting point for further organizational (performance) research. Differences and similarities between countries (e.g., sport policy priorities) and sport organizations (e.g., sport profiles) could be better investigated through this financial performance framework. The tool developed should help strategic volunteers and managers of sport federations to take strategic decisions relying on financial information in order to pilot their organization and to communicate with their stakeholders.


Financial health of a company is a matter of concern for every stakeholder of the business. It is in fact the financial position of the company that drives the decision making process of any stakeholder. The present study attempts to analyze the financial performance of three major pharmaceutical companies in India: Cipla Ltd, Ranbaxy Laboratories and Dr. Reddy's Laboratories for the period 2006-10. The study is based on fourteen parameters of the variables, Operational & Financial Ratios, Performance Ratios, Growth Ratios and Financial Stability Ratios. The study brings out the comparative efficiency of sample pharmaceutical companies.

**Reviews Related To Financial Performance of Pharmaceutical Industry in India**

**Salauddin (2001)** examined the profitability of the Pharmaceutical Companies of Bangladesh. By using ratio analysis, mean, standard deviation and co-efficient of variation he found that the profitability of the Pharmaceuticals sector was very satisfactory in terms of the standard norms of return on investment.
Keshab Das (2003) stated that most of the research is carried on some technical points as their research. These are TRIPS, WTO, Patent Regime, various national and international pharmaceutical manufactures’ association. The work of Keshab Das on TRIPS and its political implication has been referred by the researcher to get the insights into the matter.

Dharmesh Sureshbhai Raval (2006) his research is a very modest effort from the side of researcher to add to the current knowledge base in the area of Pharmaceutical Industry and its financial performance. There are several researches conducted by several researchers in and outside the country for the Indian Pharmaceutical Industry as the industry is on the threshold of a paradigm shift from process patents to product patents and several such legal international issues. In this scenario there are two major things coming out, firstly, Indian Pharmaceutical Industry is growing in output, value, volume, number of units - steadily and showing resemblance to the entire growth story of Indian Economy. Secondly, there is a major change occurring to the very basic system of pharmaceutical business in India. By issuing the patent ordinance, India met a WTO commitment to recognize foreign product patents from the 1st of January 2005, the culmination of a 10 year process. In this new scenario, the Indian Pharmaceutical manufacturers would not be able to manufacture patented drugs which they have been doing since long although by another process. This situation brought a very interesting and exciting research scope into the financial abilities of the industry. As such, the crux of any growth or decline depends largely on the financial health it is imperative for the researcher to carry out a detailed profitability analysis of the leading Pharma companies of India. Thus, a study of some selected units of Indian Pharmaceutical Industry for a period of 8 years was carried out to study their financial performance before the patent regime and make a financial situational analysis of the industry to judge their economic
standing to meet the technological and economic challenges. This has been carried out with the help of several parameters and a humble effort has been made to draw inferences out of the research work.

Debasish Sur & Kaushik Chakraborty (2006) argued that the Indian Pharmaceutical Industry', has been playing a very significant role in increasing the life expectancy and in decreasing the mortality rate. It is the 5th largest in terms of volume and the 14th largest in value terms in the world. A comparative analysis of the financial performance of Indian pharmaceutical industry for the period 1993 to 2002 was made by selecting six notable companies of the industry. The comparison has been made from almost all points of view regarding the financial performance using relevant statistical tools.

Srinivasan et al (2008) focused on the Pharma industry in the Indian scenario and examined the various measures of financial performance and analyzed their profitability position. The remainder of the study was structured as follows: 23 FDI assisted pharmaceutical units were taken and evaluated through the following ratios namely Capital Structure Ratios, Liquidity Ratios, Profitability Ratios, Du Pont Analysis and Return on Investment. The liquidity position and short-term solvency positions have improved, because of this the sales have increased and the leverage effects were not found favorable for certain units.

Amalendu Bhunia & Fakir Chand (2009) analyzed the financial performance of Indian pharmaceutical industry identify the financial strengths and weaknesses of the firms by properly establishing relationships between the items of the balance sheet and profit and loss account. Thus, their study was of crucial importance to measure the firm’s liquidity, profitability and other indicators that the business is conducted in a rational and normal way, ensuring enough returns to the shareholders to maintain at least its market
value. In this context, the researcher has undertaken an analysis of the financial performance of pharmaceutical companies to understand how the management of finance plays a crucial role in the growth. The present study covers two public sector drug & pharmaceutical enterprises listed on BSE. The study has been undertaken for the period of twelve years from 1997-98 to 2008-09. In order to analyze financial performance in terms of liquidity, solvency, profitability and financial efficiency, various accounting ratios have been used. Statistical measures i.e., linear multiple regression analysis and test of hypothesis - t test have been used.

Md. Tofael Hossain Majumder & Mohammed Mizanur Rahman (2011) presented that the Pharmaceutical industry plays a vital role in the socio-economic development of Bangladesh. But the net profit of this industry has decreased in the last few years. This study is designed to review the financial performance of this industry, to test its strengths and weaknesses. The financial performance of this industry is measured in terms of Ratio (Profitability, Liquidity, Solvency and Activity ratio) Analysis and in terms of Testing Financial Soundness by using Multivariate Discriminate Analysis (MDA) as developed by Prof. Altman. For the source of the data they mainly relied on Annual Reports and official records. It was observed from the study of the financial statement of the Pharmaceutical industry that the profit earning capacity, liquidity position, financial position and the performance of the most of the Pharmaceuticals are not in sound position and it was also observed that most of the Pharmaceuticals have a lower level position of bankruptcy. The reasons behind this position of the industry are inefficient of financial management, absence of realistic goals, strict government regulation and increased cost of raw-materials, labour and overhead. The financial performance should be improved immediately. Therefore, the appropriate authority should take measures for the removal of the above problems. These studies show that the
ratio analysis and MDA are the best method to evaluate firm performance. The researcher uses these tools to measure the financial performance of 9 selected Pharmaceutical firms.

**Bhunia et al (2011)** found that Indian Public Sector Pharmaceutical Enterprises liquidity position was strong. However, financial stability of the selected companies showed a downward trend and consequently the financial stability of the selected companies has been decreasing at an intense rate.

**Asma Salman & Romella Qamar (2011)** stated that financial analysis is useful for every business entity to enhance their performance, competitive strength and access their financial stability and profitability of the firm. Their study investigated the financial analysis of the two Multinational companies, GSK (GSK) and Sanofi Aventis (SA) and an attempt to compare their financial performance by using ratio analysis. Data is drawn from the pharmaceutical industry in Pakistan from financial year 2005 to 2009. Analysis of variance (ANOVA) and statistical hypothesis test (t-Test) with independent sample characteristics were analysed through Statistical Package for the Social Sciences (SPSS). The results made a comparison between two pharmaceutical companies. It was revealed that the performance of both the companies in the observed period has improved. The current method reflects that GSK is leading Sanofi Aventis.

**Prasad Mubasheruddin Ahmed & Maheshwara Reddy (2011)** presented that the financial health of a company is a matter of concern for every stakeholder of the business. It is in fact the financial position of the company that drives the decision making process of any stakeholder. The present study attempts to analyse the financial performance of three major pharmaceutical companies in India: Cipla Ltd, Ranbaxy Laboratories and Dr. Reddy’s Laboratories for the period 2006-10. The study is based on fourteen parameters of the variables, Operational & Financial Ratios, Performance
Ratios, Growth Ratios and Financial Stability Ratios. The study brings out the comparative efficiency of some sample pharmaceutical companies.

**Vishal G Shah (2012)** stated that financial statement analysis is often divided into two sub-parts i.e. “Profitability Analysis” and “Risk Analysis”. This is a natural division since much of our thinking about any firm’s performance is influenced by our study of the relationship between risk and return in finance. The study represented an empirical study which examined the profitability from different perspectives of Pharmaceutical industries in India with a data of 10 years from 2002 to 2011 and 7 major pharmaceutical companies have been considered as sample units. For this analytical study, the researcher has used Ratio Techniques for analysis and to test the hypothesis Single Factor ANOVA (F-test) has been applied. The study revealed that GSK remained an out performing player over the last decade in the pharmaceutical industry leading in profitability from the different perspectives and Ranbaxy could not match the pace of the profitability with that of the industry average.

**Stage II 2.2 Reviews Related To Ratio Analysis**

**Debasis Sur (2001)** studied the liquidity management of four companies in Indian power sector. He has applied rank correlation coefficient analysis and this was applied to find the relationship between liquidity and profitability of Ahmedabad Electricity Corporation Limited, Bombay Sub-Urban Electric Supply Limited, Calcutta Electric supply Corporation Limited and Surat Electricity Corporation Limited. The rank correlation coefficients were positive. The influence of liquidity on profitability was significant in Bombay Sub-urban Electric Supply Limited and Calcutta Electric Supply Corporation Limited. Even though the rank correlation between liquidity and profitability was positive in Ahmedabad Electricity Corporation Limited and Surat Electricity
Corporation Limited, the influence of liquidity on profitability was very low which confirmed the inefficiency in liquidity management of these two companies.

**Voulgari-Fotini (2002)** explored the financial aspects of the manufacturing between small and medium sized enterprises (SME) and large sized enterprises (LSE). The study covered a period of nine years. The ANNOVA and MANOVA tests were used to examine whether the mean score differed significantly between the two-size groups based on selected performance measures. The research revealed that Greek SME’s have significant different performance exhibiting higher liquidity, lower profitability, inefficient inventory management and lower net profit margins when compared to the large sized enterprises.

**Mulla Mansur (2003)** focuses on the financial performance of a textile unit using ratio analysis as a tool to determine the financial and operational efficiency of the unit. It seeks to improve the financial health and viability of the undertaking using ratio analysis as a diagnostic instrument to remove the financial and operational problems of the company. The textile unit was selected because of the quite low/negative profit for the past two years. The ratio analysis highlighted that managerial incompetence accounted for most of the problems. It also suggested toning up efficiency and effectiveness of all facets of management, to put the company on a profitable footing.

**Sudarshan (2004)** examined the status of inventory holding in Chemicals and Pharmaceutical Central Public Enterprises. The analysis revealed that Chemical and Pharmaceutical Central Public Enterprises could reduce the inventory holding in terms of the number of days of consumption, cost of production and cost of sales in order to improve their working capital efficiency. Further, the enterprises did not enjoy the economics of scale in respect of inventory holding in relation to sales. However, still
there is scope for further improvement. The study suggested that proper control over inventories improves the operational efficiency and profitability of the enterprises.

Lin et al (2005) identifies that the financial ratios are the simplest tools for evaluating the financial performance of the firm. One can employ financial ratios to determine a firm’s Liquidity, Profitability, Solvency, Capital structure and Asset Turnover.

Maria Zain (2008) discussed that the return on assets is an important percentage that shows the company’s ability to use its assets to generate income. He said that a high percentage indicates that the company is doing a good utilization of the company’s assets to generate income. He noticed that the following formula is one method for calculating the return on assets percentage. Return on Assets = Net Profit/Total Assets. The net profit figures to be used is the amount of income after all expenses, including taxes. The author points out that low percentage could mean that the company may have difficulties meeting its debt obligations. He also explained about the profit margin ratio - Operating Performance. He pronounced that the profit margin ratio is expressed as a percentage that shows the relationship between sales and profits. It is sometimes called the operating performance ratio because it’s a good indication of operating efficiencies. The following is the formula for calculating the profit margin. Profit Margin = Net Profit/Net Sales.

James Clausen (2009a), Analysis of the financial statements is used to measure company performance. It also analyzed the income statement and balance sheet. Investors and lending institutions will often use ratio analyses of the financial statements to determine a company’s profitability and liquidity. If the ratios indicate poor performance, investors may be reluctant to invest. Therefore, the current ratio or working capital ratio, measures current assets against current liabilities. The current ratio measures the company’s ability to pay back its short-term debt obligations with its
current assets. He thinks that a higher ratio indicates that the company is better equipped to pay off short-term debt with current assets. Therefore, the acid test ratio or quick ratio, measures quick assets against current liabilities. Quick assets are considered assets that can be quickly converted into cash. Generally they are current assets less inventory.

**Gopinathan Thachappilly (2009)** discuss about the Financial Ratio Analysis for Performance evaluation. Its analysis is typically done to make sense of the massive amount of numbers presented in company financial statements. It helps evaluate the performance of a company, so that investors can decide whether to invest in that company. Here we are looking at the different ratio categories in separate articles on different aspects of performance such as profitability ratios, liquidity ratios, debt ratios, performance ratios, investment evaluation ratios.

**James Clausen (2009)** He state that the Profitability Ratio Analysis of Income Statement and Balance Sheet Ratio analysis of the income statement and balance sheet are used to measure company profit performance. He said the learn ratio analyses of the income statement and balance sheet. The income statement and balance sheet are two important reports that show the profit and net worth of the company. It analyses shows how the well the company is doing in terms of profits compared to sales. He also shows how well the assets are performing in terms of generating revenue. He defines the income statement shows the net profit of the company by subtracting expenses from gross profit (sales – cost of goods sold). Furthermore, the balance sheet lists the value of the assets, as well as liabilities. In simple terms, the main function of the balance sheet is to show the company’s net worth by subtracting liabilities from assets. He said that the balance sheet does not report profits, there’s an important relationship between assets and profit. The business owner normally has a lot of investment in the company’s assets.
Gopinathan Thachappilly (2009) discuss about the Profitability Ratios Measure Margins and Returns such as gross, Operating, Pretax and Net Profits, ROA ratio, ROE ratio, ROCE ratio. However, he determines the Gross profit is the surplus generated by sales over cost of goods sold. He discussed about the Gross Profit Margin = Gross Profit/Net Sales or Revenue. Moreover, Operating profits are arrived at by deducting marketing, administration and depreciation and R&D costs from the gross margin. Nonetheless, he explains about the operating profit margin. Operating Profit Margin = Operating Profit/Net Sales or Revenue. Nevertheless, pretax profits are computed by deducting non-operational expenses from operating profits and by adding non-operational revenues to it. Pretax Profit Margin = Pretax Profit/Net Sales or Revenue. Nonetheless, he also analysis about the net profit margin. Net Profit Margin = Net Profit/Net Sales or Revenue. He also explains that the returns on resources used divided into three categories such as ROA, ROE, and ROCE: At first the Return on Assets = Net Profit/ (Total Assets at the beginning of the period + Total Assets at the close of the period)/2) - The denominator is the average total assets employed during the year. Return on Equity = Net Profit/ (Shareholders’ Equity at the beginning of the year + Shareholders’ Equity at the close of the year)/2).ROCE ratio: Return on Capital Employed = Net Profit/ (Average Shareholders’ Equity + Average Debt Liabilities) - Debt Liabilities.

Maria Zain (2008) in this articles he discusses about the return on assets is an important percentage that shows the company’s ability to use its assets to generate income. He said that a high percentage indicates that company’s is doing a good utilizing the company’s assets to generate income. He notices that the following formula is one method of calculating the return on assets percentage. Return on Assets = Net Profit/Total Assets. The net profit figure that should be used is the amount of income after all expenses, including taxes. He enounce that the low percentage could mean that
the company may have difficulties meeting its debt obligations. He also short explains about the profit margin ratio – Operating Performance. He pronounces that the profit margin ratio is expressed as a percentage that shows the relationship between sales and profits. It is sometimes called the operating performance ratio because it’s a good indication of operating efficiencies. The following is the formula for calculating the profit margin. Profit Margin = Net Profit/Net Sales.

James Clausen (2009) barfly expresses about the liquidity ratio. He Pronounce that it is an analysis of the financial statements is used to measure company performance. It also analyses of the income statement and balance sheet. Investors and lending institutions will often use ratio analyses of the financial statements to determine a company’s profitability and liquidity. If the ratios indicate poor performance, investors may be reluctant to invest. Therefore, the current ratio or working capital ratio, measures current assets against current liabilities. The current ratio measures the company’s ability to pay back its short-term debt obligations with its current assets. He thinks a higher ratio indicates the company is better equipped to pay off short-term debt with current assets. Therefore, the acid test ratio or quick ratio, measures quick assets against current liabilities. Quick assets are considered assets that can be quickly converted into cash. Generally they are current assets less inventory.

Gopinathan Thachappilly (2009) states that the Liquidity Ratios help with Good Finance. A business has high profitability, it can face short-term financial problems and its funds are locked up in inventories and receivables not realizable for months. Any failure to meet these can damage its reputation and credit worthiness and in extreme cases even lead to bankruptcy. In addition to, liquidity ratios are working with cash and near-cash assets of a business on one side, and the immediate payment obligations (current liabilities) on the other side. The near-cash assets mainly include receivables
from customers and inventories of finished goods and raw materials. Coupled with, current ratio works with all the items that go into a business' working capital, and give a quick look at its short-term financial position. Current assets include Cash, Cash equivalents, Marketable securities, Receivables and Inventories. Current liabilities include Payables, Notes payable, accrued expenses and taxes, and Accrued installments of term debt). Current Ratio = Current Assets / Current Liabilities. Similarly, Quick ratio excludes the illiquid items from current assets and gives a better view of the business' ability to meet its maturing liabilities. Quick Ratio = Current Assets minus (Inventories + Prepaid expenses + Deferred income taxes + other illiquid items) / Current Liabilities. In the final ratio under this article is cash ratio .Cash ratio excludes even receivables that can take a long time to be converted into cash. Cash Ratio = (Cash + Cash equivalents + Marketable Securities) / Current Liabilities.

Jo Nelgadde (2010) briefs about the asset management ratio. It’s divided into different types of categories. He states that about the used to analyze accounts receivable and other working capital figures to identify significant changes in the company’s operations and financial accounts. He said that there are two categories about this ratio such as account receivable turnover and average age of account receive. He measured the ratio as, Accounts receivable turnover = Sales / Average Accounts receivable. Average age of accounts receivable/ collection period = 365 days / Accounts receivable Turnover.

Jo Nelgadde (2009) learns how to perform inventory analysis and inventory turnover analysis to better understand a business as well as to identify effective inventory management. He analyzing a company’s financial performance definitely includes performing inventory analysis. He knows that there are three types of business inventory: Raw Materials (RM), Work-In-Progress (WIP), and Finished Goods (FG). He gives idea
two types formula of ratio such as Inventory Turnover = Cost of Goods Sold / Average Inventory, Average age of Inventory = 360 days / Inventory Turnover.

James Clausen (2009) denotes about the total asset ratio. The calculation uses two factors, total revenue and average assets determine the turnover ratio. When calculating for a particular year, the total revenue for that year is used. Instead of using the year ending asset total from the balance sheet, a more accurate picture would be to use the total average assets for the year. Once the average assets are determined for the same time period that revenue is compared, the formula for calculating the asset turnover ratio is. Total Revenue / Average Assets = Asset Turnover Ratio.

Munya Mtetwa (2010) proposes that about the fixed asset. He defines that fixed assets are assets that are used in the production or supply of goods or services and they are to be used within the business for more than one financial year. Consequently, fixed assets represent the company's long term income generating assets and they can either be tangible or non tangible. It includes land and buildings, plant and equipment, golf courses, casinos, football players, machinery and hotels depending on the nature of the business under consideration. Fixed asset turnover = Sales / Net fixed asset.

Diane White (2008) refers that the accounts receivable is an important analytical tool for measuring the efficiency of receivables operations is the accounts receivable turnover ratio. Many companies sell goods or services on account. This means that a customer purchases goods or services from a company but does not pay for them at the time of purchase. Payment is usually due within a short period of time, ranging from a few days to a year. These transactions appear on the balance sheet as accounts receivable.

Lucia Jenkins (2009) understands the use of various financial ratios and techniques can help in gaining a more complete picture of a company's financial outlook. He thinks the most important thing is fixed cost and variable cost. Fixed costs are those
costs that are always present, regardless of how much or how little is sold. Some examples of fixed costs include rent, insurance and salaries. Variable costs are the costs that increase or decrease in ratio proportion to sales.

**Gopinathan Thachappilly (2009)** express about debt management. He mentions that the Ratio of Debt to Equity has Implications for return on equity debt ratios check the financial structure of the business by comparing debt against total capital, against total assets and against owners' funds. The ratios help check how "leveraged" a company is, and also the financial maneuverability of the company in difficult times. The concepts of leverage and other issues are examined below. The Debt Ratios formula is that Debt Ratio = Total Liabilities / Total Assets (Total liabilities include even non-interest-bearing operational liabilities) and Debt to Equity Ratio (Debt Capital Ratio) = Total Liabilities / Shareholders' Equity. Capitalization (Term Debt Ratio) = Long-term Debt / (Long-Term Debt + Shareholders' Equity). Interest Coverage Ratio = Profit before Interest and Taxes (PBIT) / Interest Expense. Simultaneously, debt ratios and the related interest coverage ratio check the soundness of a company's financing policy. On the one hand, use of debt funds can enhance returns to owners. On the other hand, high debt can mean that the company will find it difficult to raise funds during long periods of business.

**James Hutchinson (2010)** realizes that about the long term debt to equity ratio of a Business. The ratio of these numbers tells a lot about the business. It is calculated by taking the debt owed by the company and divided by the owner’s equity, also known as capital. The debt number may include all liabilities, or just long term debt.

**Jo Nelgadde (2010)** debt collection and debt recovery tools companies guide to using debt solution tools for effective debt collection: credit insurance, a solicitor or debt attorney or a debt collection agency. Moreover, collection of accounts receivable, debt collection or debt recovery is an important source of a company’s cash flow and business
finance. As such, learning about credit management and debt recovery can prove vital for entrepreneurs.

Gopinathan Thachappilly (2009) he shows that the EPS is computed by dividing the company's earnings for the period by the average number of shares outstanding during the period. He discusses that Stock analysts regularly estimate future EPS for listed companies and this estimate is one major factor that determines the share's price. Price/Earnings (PE) Ratio = Stock Price per Share / Earnings per Share (EPS). Hence, many investors prefer the Price/Sales ratio because the sales value is less prone to manipulation. Price/Sales (PS) Ratio = Stock Price per Share / Net Sales per Share. The Dividend Yield, The dividend yield ratio analyzes the latest quarterly dividend declared by the company Dividend Yield = Annualized Dividend per Share / Stock Price per Share.

Amalendu Bhunia et al (2011) in their article titled, ‘The Financial Strengths and Weaknesses of the Indian Public Sector Pharmaceutical Enterprises’, presented by properly establishing the relationships between items of the balance sheet and profit and loss account. The study covers two public sector drug and pharmaceutical enterprises listed on BSE. The study has been undertaken for the period of twelve years from 1997-98 to 2008-09 and the necessary data have been obtained from CMIE database. The liquidity position was strong in case of both the selected companies thereby reflecting the ability of the companies to pay short-term obligations on due dates and they relied more on external funds in terms of long-term borrowings thereby providing a lower degree of protection to the creditors. Financial stability of both the selected companies has shown a downward trend and consequently the financial stability of selected pharmaceutical companies has been decreasing at an intense rate. The study exclusively depends on the public sectors’ published financial data and it does not compare the private sector with
the pharmaceutical enterprises. This is a major limitation of the research. The study is of crucial importance to measure the firm’s liquidity, solvency, profitability, stability and other indicators that the business is conducted in a rational and normal way; ensuring enough returns to the shareholders to maintain at least its market value. The study will help investors to identify the nature of Indian pharmaceutical industry and will also help to take decision regarding investment.

**Dhanabhakyam & Pongiannan (2011)** in their article titled, ‘A Comparative Study on Financial Performance of it Companies’, have reiterated that India has emerged as the fastest growing IT hub in the world, its growth dominated by IT software and services. The study focuses on the financial performance of IT companies. For this study there are 10 top software companies in India were selected. The Secondary data is used for the mode of collection of data from the capital line financial database. The period ranging from 1997-98 to 2006-07 was chosen for the study. Selected ratios have been chosen for the study as the reason considered an important tool for analysing the profitable performance of the IT company. The present analysis uses the technique of mean score and One-way ANOVA to examine and compare 21 most critical profitability ratios of the selected companies. The appropriateness of the profit is studied by using correlation. The need to identify the key profitability ratio of the selected IT firms provides a scientific and middle empirically tested framework to measure it. The result of the study is, the Mean Ratio of the profitability of two companies has registered a high ratio in the period and then declines. When growth in percentage of operating income from both the companies compared, operating income of Infosys Technologies is going higher than Wipro. Hence Wipro Technologies should give emphasis on their operating income by minimizing their operating expenses. As per the growth in percentage of total Assets, Infosys performed well, on the total assets than the Wipro. Hence Wipro should
increase the level of total assets by investing various types of Assets. Infosys continues to command higher rates because of its better marketing. Finally the overall findings from the data show that Infosys is more focused on cost than Wipro. Infosys is more regimented than Wipro, and programmed better to implement projects on time.

Qasim Saleem & Ramiz Ur Rehman (2011) their present study aimed to reveal the relationship between liquidity and profitability so that every firm has to maintain this relationship while in conducting day to day operations. The results show that there is a significant impact of only liquid ratio on ROA while insignificant on ROE and ROI; the results also showed that ROE is no significant effected by three ratios current ratio, quick ratio and liquid ratio while ROI is greatly affected by current ratios, quick ratios and liquid ratio. The main results of the study demonstrated that each ratio (variable) has a significant effect on the financial positions of enterprises with differing amounts and that along with the liquidity ratios in the first place. Profitability ratios also play an important role in the financial positions of enterprises. Every stakeholder has an interest in the liquidity position of a company. Suppliers of goods will check the liquidity of the company before selling goods on credit. Employees should also be concerned about the company’s liquidity to know whether the company can meet its employee related obligations–salary, pension, provident fund, etc. Thus, a company needs to maintain adequate liquidity so that liquidity greatly affects the profits of which some portion that will be divided by shareholders. Liquidity and profitability are closely related because one increases the other decreases.

Stage III 2.3 Review Related To Du Pont Analysis

For any business in the private sector, there are numerous of models to describe how well the business is running. Among these the DuPont model was created in the early 1900s which is still a model valid to be used for assessment of the profitability.
Using the DuPont model for risk analysis is not very common but if a risk analysis specialist wants to talk the language of business, it can be valuable.

The model was created by F. Donaldson Brown who came up with the model when he was assigned to clean up the finances in General Motors and has ever since been an important model for financial analysis. Remarkably it has not been used in the security community for risk prioritization or impact analysis. The original DuPont method of financial ratio analysis was developed in 1918 by an engineer at DuPont who was charged with understanding the finances of a company that DuPont was acquiring. He noticed that the product of two often-computed ratios, net profit margin and total asset turnover, equals return on assets (ROA).

Liesz (2002) explained the elegance of ROA being affected by a profitability measure and an efficiency measure led to the DuPont method becoming a widely-used tool of financial analysis. In the 1970’s, emphasis on financial analysis shifted from ROA to return on equity (ROE), and the DuPont model was modified to include the ratio of total assets to equity.

Before discussing the mechanics and usefulness of Du Pont, it may be of some interest to learn about its development. The maturity of the Du Pont model parallels the progress made in the field of financial analysis itself. Three distinct versions of Du Pont have been created and used to help unravel the underlying drivers of profitability and return over time, beginning nearly 90 years ago.

In 1918, four years after he was hired by the E. I. DuPont Corporation of Wilmington, Delaware, to work in its treasury department, electrical engineer F. Donaldson Brown was given the task of untangling the finances of a company of which Du Pont had just purchased 23% of its stock. (This company was General Motors) Brown recognized a mathematical relationship that existed between the two commonly
computed ratios, namely net profit margin (obviously a profitability measure) and total asset turnover (an efficiency measure), and ROA. The product of the net profit margin and the total asset turnover equals ROA, and this was the original Du Pont model, ROA (net income / sales) x (sales / total assets) = (net income / total assets).

Brigham & Houston (2001) explained how the modified Du Pont model (also commonly known as the “Du Pont identity”) became a standard in all financial management textbooks and a staple of introductory and advanced courses alike as students encountered statements such as: “Ultimately, the most important, or “bottom line” accounting ratio is the ratio of net income to common equity (ROE)”. The modified model was a powerful tool to illustrate the interconnectedness of a firm’s income statement and its balance sheet and to develop straightforward strategies for improving the firm’s ROE. The Du Pont identity provides an excellent way to get a quick snapshot view of the overall performance of a firm in three critical areas of ratio analysis.

However, as Gitman (2000) pointed out that not many firms used preferred stock to raise capital and the leveraging effect of preferred stock is usually small. For small businesses in particular, the use of preferred stock is very unlikely.

Hawawini & Viallet restructured the traditional balance sheet into a “managerial balance sheet” which is “a more appropriate tool for assessing the contribution of operating decisions to the firm’s financial performance.”This restructured balance sheet uses the concept of “invested capital” in place of total assets, and the concept of “capital employed” in place of total liabilities and owner’s equity found on the traditional balance sheet. The primary difference is in the treatment of the short-term “working capital” accounts. The managerial balance sheet uses a net figure called “working capital requirement” (determined as: [accounts receivable + inventories + prepaid expenses] – [accounts payable + accrued expenses]) as a part of investing capital. These accounts
then individually drop out of the managerial balance sheet. A more detailed explanation of the managerial balance sheet is beyond the scope. The “really” modified Du Pont model is

\[
\text{ROE} = \left( \frac{\text{EBIT}}{\text{sales}} \right) \times \left( \frac{\text{sales}}{\text{invested capital}} \right) \times \left( \frac{\text{EBT}}{\text{EBIT}} \right) \times \left( \frac{\text{Invested capital}}{\text{equity}} \right) \times \left( \frac{\text{EAT}}{\text{EBT}} \right)
\]

Where: invested capital = cash + working capital requirement + net fixed assets.

This “really” modified model still maintains the importance of the impact of operating decisions (i.e. profitability and efficiency) and financing decisions (leverage) upon ROE, but uses a total of five ratios to uncover what drives ROE and gives insight into how to improve this important ratio.

The firm’s operating decisions are those that involve the acquisition and disposal of fixed assets and the management of the firm’s operating assets (mostly inventories and accounts receivable) and operating liabilities (accounts payable and accruals). These are captured in the first two ratios of the “real” modified Du Pont model. These are:

1. Operating Profit Margin = (Earnings before Interest & Taxes or EBIT / sales)
2. Capital Turnover = (sales / invested capital)

The firms’ financing decisions are those that determine the mix of debt and equity used to fund the firm’s operating decisions. These are captured in the third and fourth ratios of the “real” modified model. These are:

3. Financial Cost Ratio = (Earnings Before Taxes or EBT / EBIT)
4. Financial Structure Ratio = (invested capital / equity)

The final determinant of a firm’s ROE is the incidence of business taxation. The higher the tax rate applied to a firm’s EBT, the lower its ROE. This is captured in the fifth ratio of the “real” modified model.

5. Tax effect ratio = (Earnings After Taxes or EAT / EBT)
The relationship that ties these five ratios together is that ROE is equal to their combined product. As with Little et al (2009), the modified DuPont model of financial ratio analysis is used to identify the drivers of financial success under alternative business strategies. Firms in the industry are categorized according to their high/low relative net operating income to sales and operating asset turnover ratios. Firms with higher relative net operating income to sales and low relative operating asset turnover are assumed to be pursuing a differentiation strategy and those with high relative operating asset turnover and low relative net operating income to sales are assumed to be pursuing a cost leadership strategy. The performance variable used is returned on net operating assets.

**Thorpe & Holloway (2008)** argued that the financial objectives of a for-profit business primarily concern the needs of the external suppliers of debt and equity capital. The economic returns to shareholders comprise dividends and capital gains on the market value of their shares. As earnings determine what can be paid out as dividend in the long run, shareholders are primarily concerned with the financial measures like earnings, ROS, ROA, ROE, ROI.

**Soliman (2008)** presented that Du Pont analysis takes into account three indicators to measure firm profitability: ROA, ROE and ROI.

**Ross et al (2008)** offered a different take on management effectiveness and revealed how much profit a company earns for every dollar of its assets. Assets include things like cash in the bank, accounts receivable, property, equipment, inventory and furniture. Only a few professional money managers will consider stocks with an ROA of less than 5%. \( \text{ROA} = \frac{\text{Total Assets}}{\text{Net income}} \).

**De Wet & Du Toit (2007)** showed how ROE is calculated by taking the profit after tax and preference dividends of a given year and dividing it by the book value of equity (ordinary shares) at the beginning of the year. Average equity can also be used.
Equity would consist of the issued ordinary share capital plus the share premium and reserves.

**McClure (2008)** Return on Investment - ROI. The return on investment is the return earned from the investment made by the firm. This gives the actual position of the firm. ROI shows whether the management is in profitable position or not. It measures the earnings of the firm. It multiplies profits margin and the Asset Turnover.

\[
\text{ROI} = \text{Assets Turnover} \times (\text{Operating Income} \times \text{Total Assets}) \times \text{Profit Margin} (\text{EBIT} \times \text{Operating Income})
\]

**Prendergast (2006)** presented examples of using Du Pont analysis in both a business and classroom settings. The author illustrates how a ‘modified Du Pont approach to ratio analysis can be used to drill down to the true cause of financial performance problems’ in a small manufacturing business.

**Milbourn & Haight (2005)** provide students with an Overview of Financial Statements Using the Du Pont Analysis Approach’, Du Pont Analysis as a teaching aid to equip students with an understanding of how management decisions influence the bottom line. Unfortunately, Milbourn & Haight were concerned exclusively only with the original Du Pont model, i.e. it showed the drivers of no more than Return on Assets. They have shown the impact and value of the Du Pont model drivers on Return on Equity.

**Vanniarajan & Samuel Joseph (2007)** argued that the liberalization of the finance sector in India is exposing Indian banks to a new economic environment which is characterized by increased competition and new regulatory requirements. Indian and foreign banks are exploring growth opportunities in India by introducing new products for different customer segments. Many of which were not conventionally viewed as a customer for the Banks have, in the last ten years, witnessed new shareholders. All banks are in a position to evaluate their performance compared to others. In general, the
performance of the banks may be viewed in three dimensions namely structural, operational and efficiency factors suggested by the Indian Banking Association.

Mihaela Herciu et al (2011) attempted to demonstrate that in most cases the most profitable companies are not the most attractive for investors – through Du Pont Analysis method. In order to do this, they took into account the top 20 most profitable companies in the world in 2009 (according to Fortune). By using Du Pont analysis they arrived at the results that ranking is not preserved when indicators (ratios) such as ROA (return on assets) or ROI (return on Investment), ROE (return on equity) or ROS (return on sales) are taken into consideration.

Ahmed Arif Almazari (2012) attempted basically to measure the financial performance of the Jordanian Arab commercial bank for the period 2000-2009 by using the DuPont system of financial analysis which is based on the analysis of return on equity model and return on investment model. The return on equity model disaggregates performance into three components: net profit margin, total asset turnover, and the equity multiplier. Arab bank is one of the largest financial institutions in the Middle East and is ranked amongst the largest international financial institutions. The bank witnessed a continuation of the challenges brought in by the global financial crisis. It was found that the financial performance of Arab Bank is relatively steady and reflects minimal volatility in the return on equity. Net profit margin and total asset turnover exhibit relative stability in the period from 2001 to 2009. The equity multiplier also showed almost stable indicators for the period from 2001-2005 and the ratios declined from 2006-2009 which indicated that the Arab bank had less financial leverage in the recent years, which means that the bank is relying less on debt to finance its assets.

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**Stage IV  2.4 Review of Studies Related To Z-Score Analysis**

A common statistical way of standardizing data on one scale so that a comparison can take place is using a Z-score. The Z-score is like a common yardstick for all types of data. Each Z-score corresponds to a point in a normal distribution and as such is sometimes called a normal deviate since a Z-score will describe how much a point deviates from a mean or specification point. Z-score means statistical measure that quantifies the distance a data point is from the mean of a data set. In a more financial sense, Z-score is the output from a credit-strength test that gauges the likelihood of bankruptcy. The formula may be used to predict the probability that a firm will go into bankruptcy within two years. Z-scores are used to predict corporate defaults and an easy-to-calculate control measure for the financial distress status of companies in academic studies. The Z-score uses multiple corporate income and balance sheet values to measure the financial health of a company.
The Z-score represents a point in time. As such, the Z-scores should be examined over time. Consistently low scores each year are more of a concern than a one time low score. The Z score has proven successful in the real world. It correctly predicted 72% of bankruptcies two years prior to the event. Z score profiles for failing businesses often indicate a consistent downward trend as they approach bankruptcy.

**Estimation of the Formula**

Altman developed a Z-score model which is the most renowned model which uses a multiple discriminate analysis based on business failures. Altman Z-score model is used for detecting bankruptcy early by analysts, rating agencies, investment firms, traders and academics. The Z-score uses a combination of five financial ratios that predict the final score as no single ratio can provide a complete picture of a company’s financial position. The Z score for a company is the weighted average of financial ratios which has the following formula.

\[
Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5
\]

Where

- \( Z \) = weighted average of five ratios
- \( X_1 \) = working capital / total assets
- \( X_2 \) = retained earnings / total assets
- \( X_3 \) = profit before interest and tax / total assets
- \( X_4 \) = market capitalization / book value of debts
- \( X_5 \) = Revenue / total assets as per

Altman's model companies that have a Z-score of > 2.9 are considered as successful companies comparable to those which have a Z-score of < 1.8 which may have potential serious problems and have a high probability of failure or bankruptcy. For a company whose Z-score falls between 2.9 and 1.8, the company is in a grey zone and
should be under careful watch. With the help of this model, the overall financial soundness of Steel Industry during the sample period is monitored and measured.

Ben Mc Clure (2004) suggested investors to check the Z score of their companies regularly. In the Indian context, Gupta, LC (1979) attempted a refinement of Beaver’s method with the objective of building a forewarning system of corporate sickness.

Selvam (2004) predicted the financial health and viability of India cements Ltd. They concluded that the cement company under the study was just on the range of financial collapse. Further, they added that the financial health of cement companies has been subject to empirical investigation.

Krishna Chaitanya (2005) measured the financial distress of IDBI with the help of Altman’s Z score model and predicted that IDBI is not in the health zone and is likely to be insolvent in the near future.

Khannadhasan (2007) ascertained the financial health of the Wendt India Ltd Company by using ‘Z’ score model. He concluded that the company’s overall financial health was good.

Dheenadhayalan & Devianabrasi (2007) observed that the ‘Z’ score of the sample units remained below the grey area since 1997-2007 but in the year 2001-2002 the ‘Z’ Score was -0.29. After 2001-2002, the decreases in the score indicated that the sample unit is not financially sound and healthy. The sample units need to put in efforts to increase the score. This will help the sample unit to avoid any damage to its liquidity and solvency positions thereby avoiding financial distress and bankruptcy.

Gepp & Kumar (2008) incorporated the time ‘bias’ factor in the classic business failure prediction model. Using Altman (1968) and Ohlson’s (1980) models to a matched sample of failed and non-failed firms from 1980’s, they found that the predictive
accuracy of Altman’s model declined when applied against the 1980’s data. The findings explained the importance of incorporating the time factor in the traditional failure prediction models.

Dheenadhyan (2008) adopted Z score to predict the corporate failure of steel authority of India Limited. The Z score of the SAIL showed a rising trend throughout the study period and it was concluded that the financial health of SAIL was good.

Nikolaos Gerantonis et al (2009) presented the success of the Altman model in predicting financial distress was proved by researchers in the past So in this study this model is applied to Indian Pharmaceutical industry to monitor the performance.

Alkhatib & Bzour (2011) have proved that Altman's model has the ability to predict bankruptcy with a 93.8 percent prediction of five years prior to liquidation. Beaver (1966) in his research adopted Univarient Discriminate Analysis (UDA) and concluded that financial ratios of failing firms differ from those of non-failed firms. William H. Beaver (1967) selected five ratios out of thirty financial ratios to study the financial health of 79 successful units and 79 unsuccessful units. The ratios were (i) cash flow to total debt (ii) net income to total assets (iii) total debt to total assets (iv) net working capital to total assets and (v) current assets to current liabilities as expected. Failed firms had more debt and lower return on assets. They had less cash but more receivables as well as low current ratios. They also had fewer inventories”.

Thomas Ng et al (2011) used the financial ratios and the Altman Z-score modeling methodology to evaluate the performance of the construction contractors in China. The model combined seven financial ratios, covering a company's profitability, solvency and cash flow. A two-step procedure was used for model development whereby contractors were first classified into solvent and potentially insolvent groups through cluster analysis while the best discriminating variables are determined by multivariate
discriminant analysis. The Z-score model developed has consistent predictability based on a three-year window of data.

S. Poongavanam, Suresh Babu (2012) says financial health of the company is foremost important in the global competition. If the company fails to maintain the financial position in the long run it cannot survive in the market. This study analyzes the financial health of the company with the help of a Z score model. Sever studies has shown that the Altman model has predicted the business failures in time, it will be very helpful for the management to take corrective action.

Roli Pradhan (2014) from traditional times the Z score values have been constantly used for prediction of Bankruptcy. This has been vital to both the lenders and investors whose returns are based on solvency estimates. The terms of credit have gone a U turn from the traditional times to the modern scenario today. The basic concern of prediction is to evaluate the terms of credit and ensure repayment safely. Z score has been used as a tool to evaluate the credibility of the firms. The study provides the Z score value for the public sector banks. This value is useful when these banks demand loans from the RBI or any other funding agency. The usage of back propagation neural network is to forecast the internal parameters of Z score and then use these internal parameters to forecast the Z score value up to 2020. Thus, emphasizing the use of BPNN for prediction of bankruptcy for public sector banks in India.

The Z-score is a discriminatory and prediction model developed by Edward Altman in 1968 to measure the distance to default of manufacturing companies. The model consists of five ratios selected to be the Z-score model variables. Their function is to address the prediction ability of corporate bankruptcy; in this regard, certain weights are assigned to each variable. The (5 ratio (sale/total assets) has been omitted in the currently proposed version of the model, and the adjusted formula appears to be
providing equally valid predictive results. The reason for this change is that the fifth ratio gives a high value for non-manufacturing companies. The new modified Z-score model is believed to be more appropriate for non-manufacturing companies, minimizing the potential of industry effect and better suiting the EM. In this modified model the book value of equity is used in the (4 variable and a new weight is re-assigned for all four variables. It is assumed that a Z-score below 1.10 indicates a distress condition (Altman, 2002). Abidali and Harris took 11 failed and 20 non-failed companies and used a modified Z-score to predict the failure. In their findings they stated that balance sheet information was insufficient to predict failure; however, they identified common management characteristics of failed companies as including: autocratic chief executive or preservation of a position of sole authority; the same person as both chief executive and chairman; non-arbitrate members on the company board; lack of engineering skills; lack of strong financial directors sharing responsibility for financial decision making; defective managerial skills; lack of financial control; poor personal skills; inadequate marketing or legal skills; incomplete accountancy system and cash flow plan; poor budgetary control system; defective bedding system; and poor marketing skills. They summarized that the acknowledgement of past management action is highly critical; all the failing companies exhibited negative Z-scores for several years prior to failure. Thus, the lower the Z-score for the company, and the more years the company is classed as at risk, the more likely it is that the company will fail. Thus, the Z-score can be used to rank the company in terms of their solvency.

Saudin and Proporato’s (2007) study aimed to predict the bankruptcy of a number of companies listed in the Buenos Aires stock exchange in 1990. They examined 11 healthy companies and 11 bankrupt companies. Saudin and Proporato followed Altman (2002) in using four steps in the development of bankruptcy prediction models:
(1) Analyze failed and non-failed firms to identify most dissimilar financial characteristics between the groups prior to bankruptcy;

(2) Re-classify the original sample using the financial characteristics;

(3) Test the model’s predictive ability in a holdout sample; and

(4) Use the model to predict failure bankruptcy.

The study concluded that the Z-score ratio is the most highly recommended as the key prediction of bankruptcy in an emerging economy. It also saw the prediction ability of the Z-score as being useful for investors and banks in decision making.

In a study aiming to explore the question of whether a well-established and widely used UK-based Z-score model has the true predictive ability, Agarwal and Taffler (2007) used Z-score to explore the track record over the 25 years from 1979 to 2003, for 232 failed companies listed in the London Stock Exchange. Their results indicated that the Z-score is a valid descriptive tool by nature, and a readily interpretable communication device. The study considers the different aspects of economic information in a firm set of accounts, compared with conventional ratios analysis. Agarawal and Taffler found that Z-score has true failure prediction activities and typifies a far more profitable modeling framework for banks than alternative approaches, and concluded that the Z-score if carefully developed and tested will continue to have significant value for financial statement users concerned about corporate credit risk and firm financial health.

Calandro (2007) stated that the Z-score is immensely influential in many areas including: credit risk analysis; distress investing; and merger and acquisition analysis. He also recommended that Z-score be developed to be applied to financial services firms to be used in determining if the change in risk base capital model and/or capital adequacy ratio for financial services firms contains information about market-adjusted return to
shareholders. Alternatively, discriminate analysis could be utilized to construct a financial-service-specific Z-score-like measure. Thus, concluding that Z-score is widely applicable to performance management.

**Jayadev (2006)** conducted a study covering 56 defaulted companies selected from the five largest public-sector banks using capital line as an information resource for obtaining accounting data for defaulted companies’ financing by those banks. The study affirmed the viability of using a multivariate accounting-based model such as Z-score for internal rating of commercial banks correlated to coefficient based on their database to several segments of borrowers.

**Liu et al., (2004)** set out to measure the insolvency risk of cooperative banks, selecting a number of Canadian banks where the Z-score based on option-pricing model had been used to measure the market value of the banks’ assets in relation to the book value of their liabilities. The study found a high degree of reliability of Z-score and concluded that Z-score is viable to measure distance to default of financial institutes.

Finally, **Zhang et al. (2006)** developed a modified Z China-score for 1,001 firms. They aimed to improve accounting procedure and corporate governance in China and establish a reliable government control tool for predicting the financial distress and financial risks in China’s stock market. They used the same Z-score structure with certain ratios found to best fit China’s economy. They found Z-score to be a useful tool in terms of the distress-prediction model in credit evaluation for business loans in the banking industry; they proposed it also as a model to support the government in assessment of the financial condition in each sector before forming any policy for macroeconomics. Notwithstanding the numerous advantages of Z-score, there have also been a number of criticisms of the model. These all centre on the issue that Z-score works better in some industries than for others, and that it is impossible for one tool to capture all the factors
causing corporate solvency. For instance, Z-score is seen to lack forecast accuracy for non-manufacturing firms and for firms not publicly held. Nevertheless, this criticism is countered by other studies which clearly indicate that a Z-score should be employed not as an explanatory theory of failure but rather as a pattern recognition device measuring financial risk (Altman, 2002).

Stage V 2.5 Reviews Relating to Tobin’s Q

Tobin’s Q refers to the value of a firm’s intangible relative to its tangible resources. The fair value of a firm’s tangible assets is the replacement cost of such assets -the current cost of purchasing an asset of equivalent productive ability, and can be estimated by appropriately adjusting accounting data. The value of a firm’s intangible resource can be estimated as the difference between a firm’s market value and the replacement cost of its tangible assets (Andersen, 1992). Firm resources include the managerial capability for deploying both tangible and intangible assets. When markets are efficient, capital market securities prices provide the best estimates of the value of a firm’s resources, i.e. of the present discounted value of the future stream of cash flows generated by those resources (Fama, 1970; Ross, 1983). If markets are assumed to be efficient in the aggregate, there is no reason to expect any systematic bias from this calculation in large cross-sectional samples.

Following earlier research, Tobin’s Q is used to measure resource intangibility. From an empirical point of view, it is well known that Tobin’s Q proxies for the intangible assets of firms as a result of the accounting treatment of intangibles (Lev, 2001). Tangible assets are capitalized, i.e. recognized as assets and reported on firms’ balance sheets. In contrast, intangibles are expensed, i.e. written off in the income statement along with regular expenses such as wages, rents, and interests. As a result, the book value of assets does not reflect the stock of intangibles that results from cumulative
investment, but market value does. The empirical association between $q$ and intangibility is evident from studies such as Lindenberg and Ross (1981), which reveal that the $Q$’s of firms in R&D or advertising-intensive industries are abnormally high. In fact, it is a fairly common practice in studies that use Tobin’s $Q$ as a measure of corporate performance to “correct” the denominator of $q$ for the presence of such intangibles.

Several studies have used $Q$ to measure specific intangible assets, by taking the predicted value from a regression of Tobin’s $Q$ on the accounting or survey measures of the intangible asset of interest. Examples include knowledge capital (Hall, 1993a; Megna and Klock, 1993; Sougiannis, 1994; Hall et al., 2000; Lev, 2001), brand equity (Simon and Sullivan, 1993), or customer asset (Ittner and Larcker, 1998). The approach, then, is a corporate version of the hedonic price regressions used in other contexts to value intangible goods such as car quality (Court, 1939; Griliches, 1961), clean air (Harrison and Rubinfeld, 1978), or other product differentiation attributes (Rosen, 1974; Epple, 1987).

From a theoretical point of view, there are also various precedents for using $q$ as a measure of intangibility at the firm level. In the particular context of the resource-based view that this study seeks to test, Teece et al. (1994, p. 19) have suggested that $q$ may be used as an indicator of either technical or organizational competencies. Note that this interpretation of $Q$ in fact assumes that the ratio not only captures those competencies or intangible resources in themselves, but also the different isolating mechanisms through which the rents they generate are effectively protected and appropriated by the firm (Rumelt, 1984).
2.6 Rationale of Review of Literature

There are various parametric and non-parametric approaches to measure performance of any companies. Performance ratios are widely used in all sectors of business. The best known ratios are Profitability Position, Asset Utilization Position, Liquidity Position, Leverage Position, Cash flow position, Growth Position. The above mentioned ratios are widely used in measurement of organizational performance. They however have one disadvantage. Each single ratio must be compared with some benchmark ratio at a time. While calculating financial ratio is relatively easy, the aggregation of those ratios can be quite complicated, which involves experience judgment. Financial ratios do provide information on the overall financial performance of an organization, but provide little information about performance. The Majority of the studies are made only on selected financial ratios to identify the financial performance. No study has made an attempt to utilize a variety of other financial techniques to predict the performance. Thus, the uniqueness of the study lie in the of usage of other than common ratios like ratio analysis, Gross Profit Margin, Determining earning power, identifying financial health and stability and measure the market based performance.