



“A Design of Financial Risk Factor Analysis Model for Business Forums”

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ABSTRACT

Financial statements are formal record of the financial activities of a business, person, or other entity and provide an overview of a company's financial condition in both short and long term. In this project, these financial statements i.e., the balance sheets, profit and loss statements of different companies, will be used to obtain the value of the company thereby to obtain certain ratios. The ratios will then be used in our developed financial model to determine the risk involved in an investment in a manufacturing sector company. The result will be numerical in nature ranging from 0-1, 0 being lowest and 1 being highest amount of risk.

Key words: Financial analysis. Financial model ratio. Financial risk model, Risk analysis, Bubble chart.

I. INTRODUCTION

The growth of a business forum will be motivated by many factors such as infrastructure, revenue, shareholder equity and liability, expenses and so on^[1]. Timely analysis of these factors can be done through the process called financial evaluation. Financial evaluation of a company gives a guideline to a company on usage of its assets, shareholder equity and liability, revenue and expenses and, financial ratio analysis is one of the best tools to achieve it.

Financial analysis is a process of taking accounting and other financial data and organizing them into a form which reveals a company's strengths and weaknesses^[3]. By highlighting these areas, the users of financial information can then make more informed decisions about the organization. Financial statements^[4] are records that quantitatively describe the financial health of the company. The objective of financial statements is to provide information about the financial position, performance and changes in the financial position of an enterprise that is useful to a wide range of users in making economic decisions. They give an accurate picture of a company's condition and operating results in a condensed form.

Financial statements should be understandable, relevant, reliable and comparable. Reported assets, liabilities and equity are directly related to an organization's financial position whereas reported income and expenses are directly related to an organization's financial performance. Analysis and interpretation of financial statements helps in determining the liquidity position, long term solvency, financial viability, profitability and soundness of a firm^[2].

There are three basic types of financial statements: balance sheet, profit and loss statements and trading account statements. There is no well-defined mathematical model which analyses the inhibiting factors and determines the intensity of the effect caused by those factors. Thus, the paper have tried to analyse the various factors which have a negating effect on the company growth, analyze their intensity^[6] and find the risk involved if an investment is to be made. This is achieved by,

- Learning and getting acquainted with the financial aspects of a company.
- Creating a financial model based on the knowledge acquired.
- Using the model developed to assess the investments in practical situations.
- Draw out conclusions and inferences based on the practical performance

II. LITERATURE REVIEW

A. Development of Financial Management^[1]

The utility of financial data has always assumed great importance in the history of finance and accounting. Accounting data has been used in many different ways to obtain an end result, which usually indicates the performance of the organization under consideration. Among the many types of analyzing financial data, financial ratio analysis is a prominent and well used method.

In the present scenario, the subject of ratio analysis is replete with untested assertions about which ratios should be used and what their level should be; and, similarly, the unexpected relationships of various ratios with a quantification of some desired, or undesired, end have generally not been formulated.

B. Financial Management

The term financial management varies from individual fund or financial life management as it applies to an association or organization's financial methodology, while the last alludes to an individual's management system. Financial management comprehends approaches to raise and apportion capital planning. This technique can be utilized to assign transient assets like current liabilities too. To cite Deepika & Maya Rani, "Financial management is that activity of management which is concerned with the planning, procuring and controlling of the firm's financial resources".^[1] The Principles of Financial Management are as follows,

- Consistency: Your financial policies and systems must remain consistent over time.
- Accountability: You must be able to explain and demonstrate to all stakeholders how you have used your resources and what you have achieved.
- Transparency: Your organization must be open about its work and its finances, making information available to all stakeholders.
- Integrity: Individuals in your organization must operate with honesty and propriety.
- Accounting standards: Your organization's system for keeping financial records and documentation must observe accepted external accounting standards.

C. Balance Sheet – A Financial Management Tool^[13]

Balance sheet is a statement of the financial status of a business at a particular moment of time. The balance sheet shows the amount of assets the owner has in his business. The net worth of a particular business can be determined by finding the difference between the total assets and the total liabilities.

D. Financial Ratio Analysis^[11]

Financial ratios are mathematical comparisons of financial statement accounts or categories. The relationships obtained by comparison of different entities in the financial statement accounts help investors, creditors, and internal company management determine the performance of a business and the limitations in the functioning of the company.

Financial ratios are the simplest, most common and widely used tools to analyse a business' financial position. Ratios allow us to compare companies across industries, big and small, to identify their strengths and weaknesses. Financial ratios are divided into the following categories:

- Liquidity ratios
- Efficiency ratios
- Profitability ratios
- Solvency ratios

E. Hedging:^[12]

An investment to reduce the risk of unwanted price variations in an asset is called a hedge. Hedging is similar to taking out an insurance policy to protect one against the risk of other investments made by them. Even though hedging reduces potential gains, it helps keeping the risk factor of other investments in check, basically hedging has a price i.e., reduced gain for a more stable investment. A perfect hedge is one that eliminates all risk in a position or portfolio. In other words, a vulnerable asset is 100% opposite to that of a hedge. In reality, there can be no perfect hedge and even in a hypothetical scenario a perfect hedge will result in a reduced profit.

F. Portfolio Management:^[14]

A Portfolio Management alludes to the study of breaking down the qualities, shortcomings, opportunities and dangers for performing extensive variety of exercises identified with the one's portfolio for augmenting the arrival at a given danger. It helps in making determination of Debt Vs Equity, Growth Vs Safety, and different exchanges off.

There are essentially two sorts of portfolio administration if there should be an occurrence of shared and trade exchanged assets including inactive and dynamic.

- Passive administration includes following of the business sector record or list contributing.
- Active administration includes dynamic administration of an asset's portfolio by administrator or group of directors who take research construct venture choices and choices with respect to individual possessions.

G. Risk Management:^[15]

Risk Management is the ID, evaluation and prioritization of risks which assists with the financial utilization of assets to minimize and control the effect of deplorable occasions. Risk can originate from different sources, for example, instability in money related markets, venture disappointments, mishaps, lawful liabilities, regular causes and debacles. The methodology adopted in risk management is Identify, portray risk, Assess the helplessness of basic advantages for

particular risks, and determine the risk, Identify approaches to decrease those risks and Prioritize risk decrease measures in view of a methodology.

III. RESEARCH METHODOLOGY

This section describes the research methodology adopted to obtain the ratios used to develop the financial model to determine the level of risk involved, in steps.

Step 1: Identification of the problem.

The problem currently faced in the analysis of financial statements is that there were no ratios which exactly indicate the risk of investment in a company. There is a need to consolidate the significant ratios in such a manner that the different factors that affected the growth of a company can be understand, thereby indicating safety factor to invest in the company. The ratios were to help us compare a company with that of its competitors to understand the financial position of the company.

Step 2: Research on different ratios and the financial statements of the company.

The standard ratios were properly studied and analyzed to see if they could directly be incorporated in the model to be produced. Similarly, the financial statements of a company i.e., profit & loss accounts statements and balance sheets were thoroughly studied to see if a ratio other than the standard could be determined. After the critical analysis of both instead of using the standard ratios the financial statements would be used to try and help create the required model.

Step 3: Analysis of financial statements.

The elements in the financial statements were scrutinized and grouped under five different categories i.e., consumption, investments, Capital assets, income and expenditure parameters. After thorough analysis, 15 elements were chosen which were believed to contribute to the above said categories. These five categories were to be used to determine the value of the company.

Step 4: Selection of elements with negative effects.

Out of the 15 elements that were chosen, 8 elements were identified to be the ones having a negative effect on the growth of the company. This implied that these 8 elements would also be the ones contributing to the increase of risk of investment in the company.

Step 5: Determination of ratio and other parameters.

Each of the 8 elements is ranked on the basis of their numerical value. The effects of each of these elements were found out. The weight age of each of the negative effects on the value of the company was determined by the ratio of the numerical value of each negative effect to the value of the company.

Step 6: Calculation of annual risk.

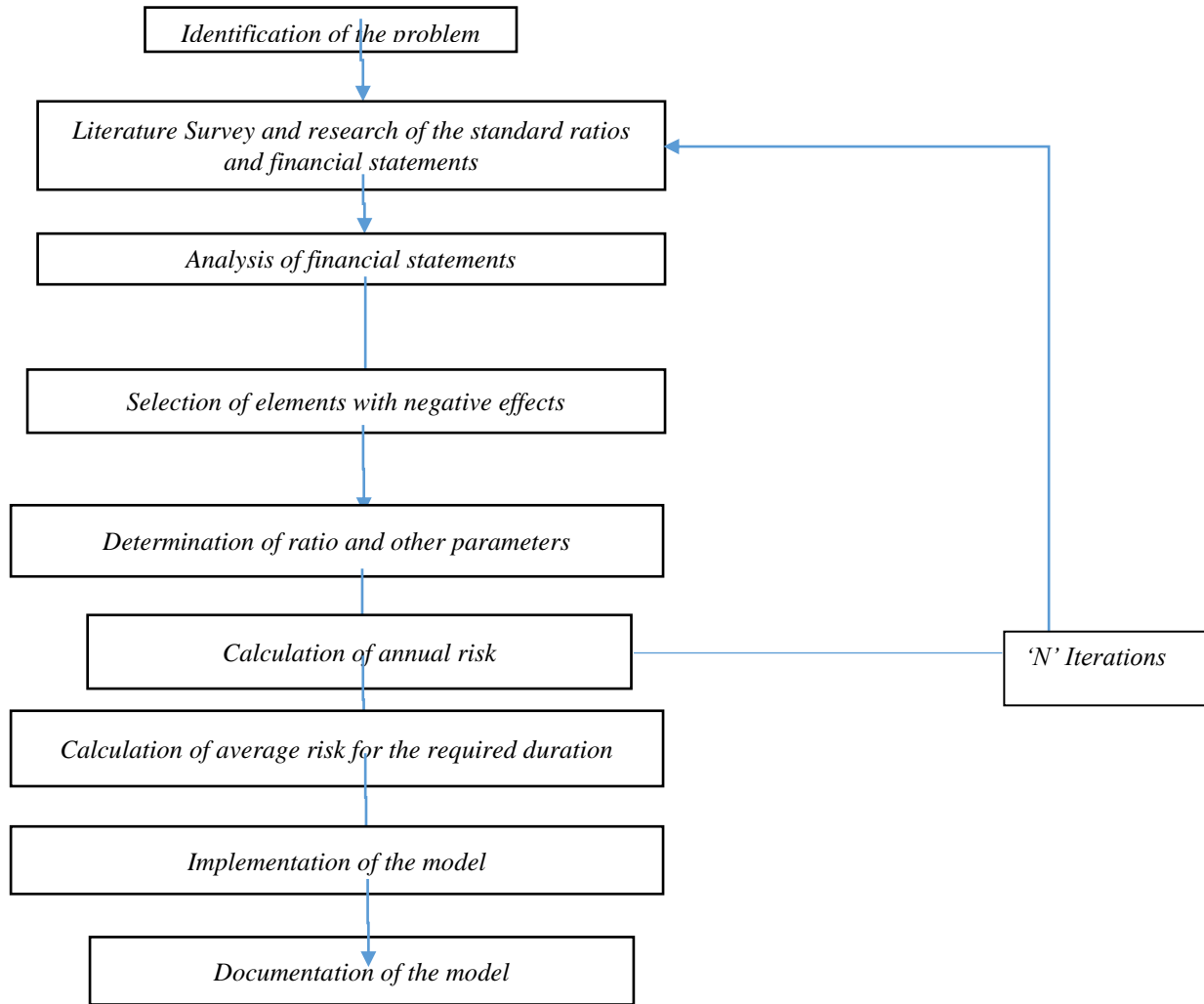
The product of effect and ratio parameters of each individual element gives the risk that particular element contributes to the overall risk. Hence, the individual risks of all the 8 elements are calculated and the sum of these individual risks gives the overall risk of investment in the company for that particular year and the average risk.

Step 7: Determination of growth rate and average risk.

The previous six steps are repeated to determine the value of the company and hence the risk for preceding five years. The average of the annual risk taken across the five years gives us the average risk of investment in the company. Apart from this, the annual values of the company can be used to find the growth rate of the company which helps compare the company with its competitors.

Step 8: Software implementation of the model.

The model is implemented in software form by using PHP, SQL, HTML and CSS. PHP and SQL have been used to design the back end of the program. HTML and CSS have been used to design the front end and UI of the model.



IV. DESIGN OF MODEL

This section describes the design of model with the assumptions to obtain the ratios used to develop the financial model to determine the level of risk involved.

Assumptions of the Model:

- i. Growth rate of the company is assumed to be steady i.e., drastic fluctuations in the growth rate should not be present.
- ii. The consumption, investments, capital assets, income and expenditure parameters are assumed to determine the value of the company.
- iii. Negative effects are ranked in ascending order of weightage based on the numerical value of the negative effect.
- iv. The summation of risk of each negative effect is assumed to give the total annual risk of the company.
- v. No market fluctuations are accounted for.
- vi. Hedging of investments is not considered.
- vii. Data considered is only of the previous 5 years and there is no guarantee that the risk of the next year will be accurate.
- viii. Investor intuition is not quantified.

The risk of a company is considered safe if the average risk is below 0.25, optimum if it is in the range of 0.25 and 0.6 and the risk is considered high if the average risk is above 0.6.

The entities chosen for design which played an important role in determining the value of the company classified as:

- Consumption parameters
- Investment
- Capital assets
- Income
- Expenditure

The value of company was determined using the formula:

$$\text{Value of the company} = \text{Consumption} + \text{Investments} + \text{Capital assets} + \text{Income} - \text{Expenditure} \quad (1)$$

After determining the value, we calculated the growth rate of the company for successive years.

The formula used to calculate the Growth rate is as follows:

$$\text{Growth Rate} = \frac{(\text{Value of company})_N - (\text{Value of company})_{N-1}}{(\text{Value of company})_{N-1}} \quad (2)$$

Where, 'N' denotes the current year.

The average growth rate of the company is computed for the past five years. The effect of each of these factors was calculated as follows:

$$\text{Effect of a factor} = \frac{(\text{Rating of the factor})}{(\text{Sum of rating of all factors})} \quad (3)$$

In order to find the impact these factors have on the value of the company, we found the ratio of amount spent of each factor to the value of the company.

$$\text{Thus, Ratio} = \frac{(\text{Amount spent on a factor})}{(\text{Net value of the company})} \quad (4)$$

Now, the generalized formula for risk involved is

$$\text{Risk} = \text{Probability of failure} \times \text{Impact of failure}$$

Thus, the contribution of each negative factor towards the risk involved is:

$$C = \text{Effect of a factor} \times \text{Ratio} \quad (5)$$

Hence, the total risk involved in the company for the particular year is:

$$\text{Risk involved} = \sum C \quad (6)$$

The procedure above is repeated for every year for the past five years and the average risk involved is found.

Thus, this gives an idea of the risk involved of an investment in the company.

A. ALGORITHM

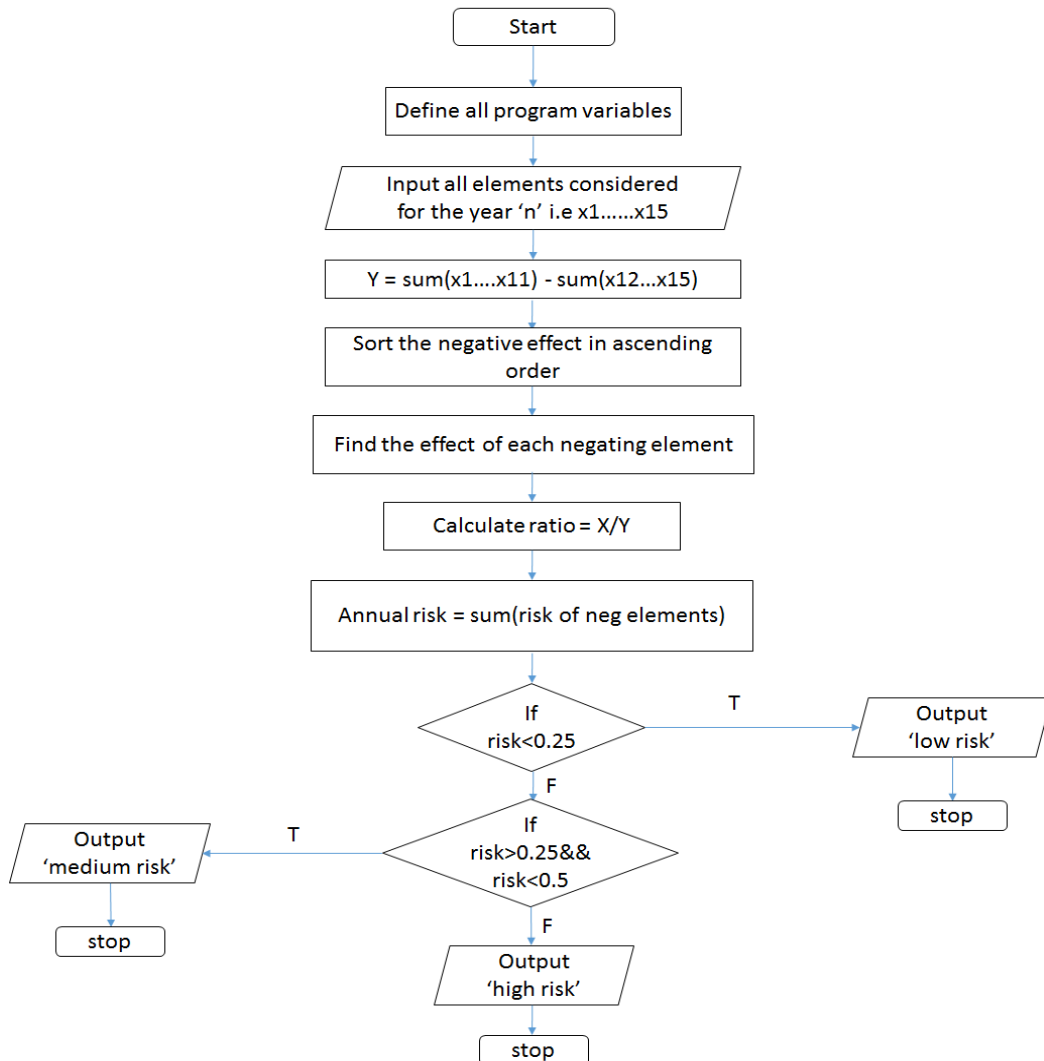


Figure 1: Financial Ratio Assessment Model

V. RESULTS AND DISCUSSION

The data is collected from thirteen different companies. A bubble chart is plotted to represent the stocks and net profit of each of those companies. This was followed by the data analysis stage.

A.

BUBBLE CHART:

Business organizations use bubble charts as a tool for decision making through business intelligence. Bubble charts used with quadrants help users get intelligent information in a single view with a clear demarcation of business initiative and project categories. To add more value to the chart, name the four quadrants in the bubble chart to the following values:

- **Pearls:** The top-right quadrant in the bubble chart represents projects that are of immense value. These are the projects that have a high ROI and very low risk associated with them.
- **Oysters:** The top-left quadrant represents projects that have a high ROI but are also prone to higher risks.
- **Bread and Butter:** The bottom-left quadrant represents projects that have a relatively low ROI and are also less risky to execute. These are usually the most common projects and are usually larger in number and smaller in size and complexity.
- **White Elephants:** The bottom-right quadrant represents projects that have a low ROI and are highly prone to risks. These are the projects that are very complex in nature to execute and are not very high on value.

The following plot shows the bubble chart from the data collected as shown in figure 2. The x axis represents the net profit of the company, y axis represents the sales turnover and the size of the bubble represents the market capital of each company.

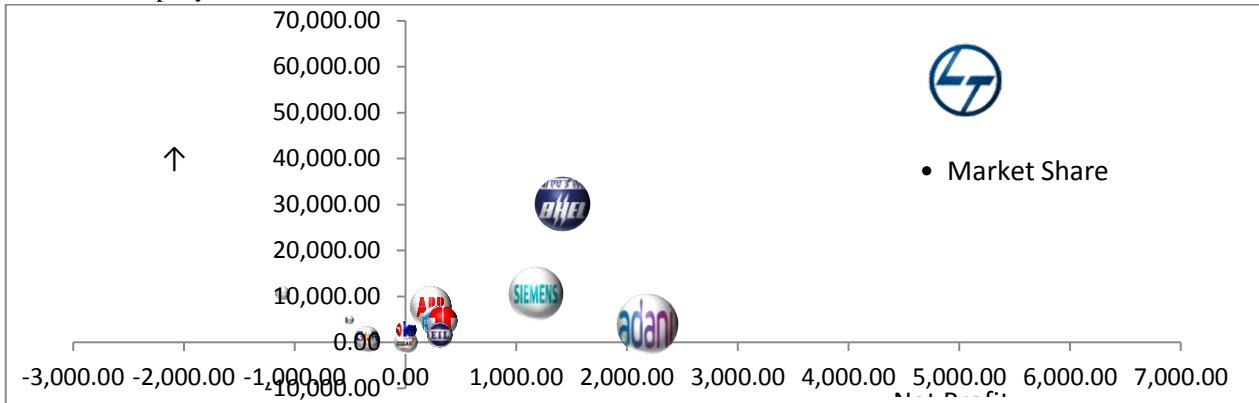


Figure2. Bubble Chart

Table 1: Data Collected (Average of Past Five Years)

ame	Last Price	Net Profit	Sales Turnover	Market Cap.	Total Assets
				(Rs. Cr.)	
Larsen	1,142.20	5,056.18	57,017.41	1,06,363.35	49,384.26
BHEL	147.35	1,419.29	30,182.98	36,065.39	34,145.60
Siemens	1,000.50	1,183.29	10,512.35	35,629.83	5,126.60
ABB India	968.2	228.51	7,733.27	20,516.97	3,183.05
NBCC	916	277.3	4,662.14	10,992.00	1,324.13
Thermax	838.85	335.94	4,697.41	9,995.43	2,298.57
GMR Infra	13	-352.65	649.74	7,846.73	13,999.69
Engineers India	212.7	307.98	1,713.00	7,166.64	2,567.89
Essar Ports	130.7	0.6	34.63	5,597.31	2,851.67
BEML	1,098.90	6.76	2,809.19	4,576.31	2,668.92

<u>JaiprakashAsso</u>	9.15	- 1,109. 77	10,854.33	2,225.7 0	42,521. 46
<u>PunjLloyd</u>	24	- 506.66	5,067.46	797.03	7,759.1 7

Of the thirteen companies plotted in the bubble chart, Larsen, BHEL and Siemens lie in the Pearl region of the chart. Hence, we chose these companies for our further analysis.

B. DATA ANALYSIS

The data collected as shown in table 1 is analyzed with respect to the following companies as they have the largest market share, net profit and the sales turnover for the last five years.

Larsen and Toubro Limited, otherwise called **L&T** is an Indian multi-national aggregate headquartered in Mumbai, Maharashtra, India. It was established by Danish designers taking asylum in India, and also an Indian financing accomplice. The organization has business intrigues in designing, development, producing merchandise, data innovation, and monetary administrations, furthermore has an office in the Middle-East and different parts of Asia.

L&T is occupied with center, high effect divisions of the economy and our incorporated capacities traverse the whole range of 'outline to convey'. With more than 7 many years of a solid, client centered methodology and a nonstop mission for world-class quality, L&T have unmatched mastery crosswise over Technology, Engineering, Construction, Infrastructure Projects and Manufacturing, and keep up an initiative in all our significant lines of business.

The initial data collected for **Larsen** is as shown in table 2:

Table 2: Data collected

Year	Sep, 2015	Sep, 2014	Sep, 2013	Sep, 2012	Sep, 2011
Sales Turnover	57,558 .07	57,163 .85	60,873 .26	53,170 .52	43,905 .87
Total Income	59,936 .47	58,958 .28	64,110 .25	55,103 .57	45,918 .88
Total Expenses	50,808 .07	49,821 .87	55,598 .23	47,427 .68	38,798 .94
Net profit	9,128. 40	9,136. 41	8,512. 02	7,675. 89	7,119. 94

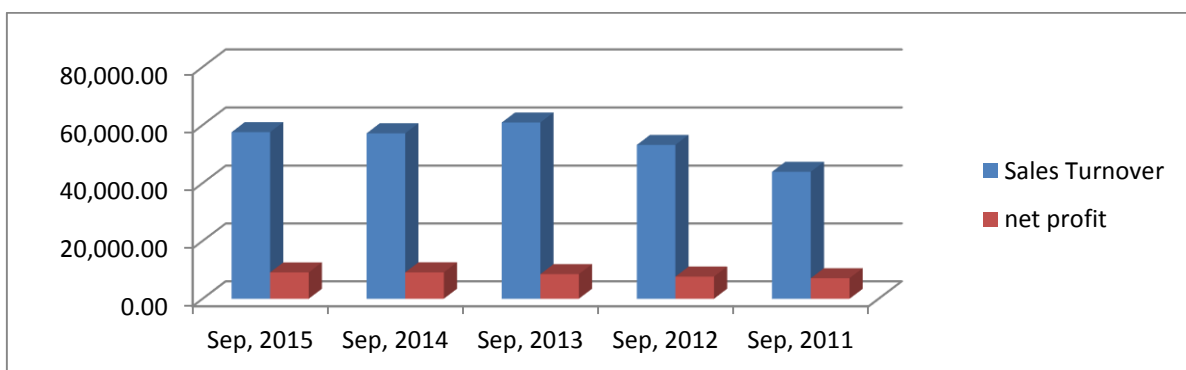


Figure 3 : Graphical representation of Larsen and Toubro data

As evident from the graph of figure 3, Sales Turnover increased till Sep 2013 and then it is decreasing. However, the net profit is increasing gradually with time. Moreover, there is a large gap between sales turnover and net profit which suggests a probable hiccup in the pricing strategy.

Bharat Heavy Electricals Limited (BHEL) possessed by the Government of India, is a force plant hardware maker and works as an engineering and manufacturing organization situated in New Delhi, India. Set up in 1964, BHEL is India's biggest engineering and manufacturing organization of its kind. It has a system of 17 manufacturing units, 2 repair units, 4 territorial workplaces, 8 administration focuses, 8 abroad workplaces, 15

provincial focuses, 7 joint endeavors, and base permitting it to execute more than 150 ventures at destinations crosswise over India and abroad. BHEL has held its business sector authority position amid 2015-16 with 74% piece of the overall industry in the Power Sector. An enhanced spotlight on task execution empowered BHEL record its most astounding regularly appointing/synchronization of 15059 MW of force plants in residential and worldwide markets in 2015-16, denoting a 59% expansion more than 2014-15.

BHEL's interest in R&D is amongst the biggest in the corporate segment in India. Amid the year 2012-13, the organization contributed about Rs. 1,252 Crore on R&D endeavors which compares to about 2.50% of the turnover of the organization, concentrating on new item and framework advancements and upgrades in existing items for cost aggressiveness, higher unwavering quality, proficiency, accessibility and quality and so on. To meet client desires, the organization has overhauled its items to contemporary levels through consistent in-house endeavors and in addition through obtaining of new innovations from driving engineering associations of the world.

The initial data collected for **BHEL** is as shown in table 3

Table 3: BHEL data

<i>Year</i>	<i>Sep, 2015</i>	<i>Sep, 2014</i>	<i>Sep, 2013</i>	<i>Sep, 2012</i>	<i>Sep, 2011</i>
<i>Sales Turnover</i>	31,103 .40	39,108 .83	48,424 .65	47,978 .89	42,246 .59
<i>Total Expenses</i>	28,422 .38	33,531 .60	38,918 .61	38,894 .85	33,788 .50
<i>Total Income</i>	31,741 .47	39,667 .46	49,430 .15	50,067 .64	43,394 .58
<i>net profit</i>	3,319. 09	6,135. 86	10,511 .54	11,172 .79	9,606. 08

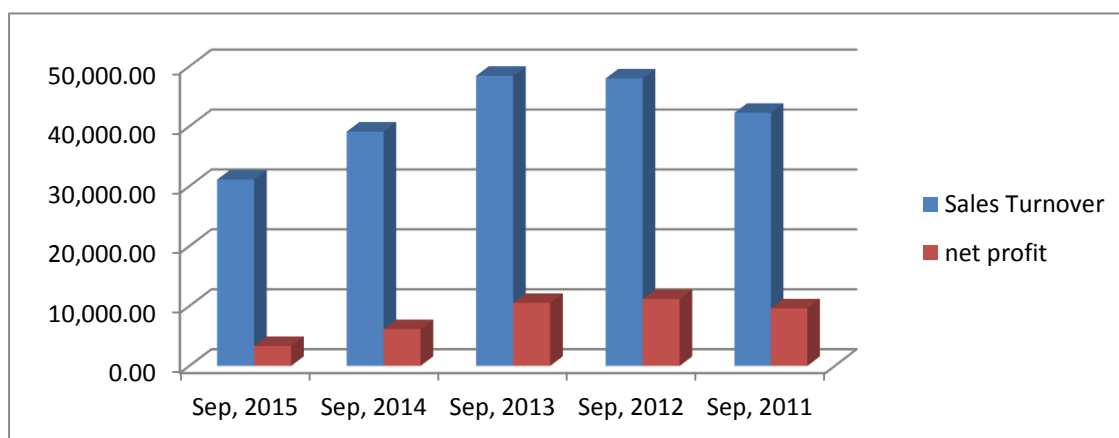


Figure4: Graphical representation of BHEL

As evident from the graph as shown in figure 4, Sales turnover and net profit increase and decrease with respect to each other.

Siemens AG is a German organization headquartered in Berlin and Munich and the biggest engineering organization in Europe with branch workplaces abroad.

The key divisions of the organization are Industry, Energy, Healthcare, and Infrastructure and Cities, which speak to the primary exercises of the organization. The organization is a conspicuous producer of therapeutic diagnostics gear and its restorative social insurance division, which creates around 12 percent of the organization's aggregate deals, is its second-most beneficial unit, after the mechanical robotization division. The organization is a part of the Euro Stoxx 50 securities exchange record. Siemens and its auxiliaries utilize roughly 362,000 individuals' worldwide and reported worldwide income of around €71.9 billion in 2014 as per their yearly report.

Siemens offers an extensive variety of electrical building and gadgets related items and administrations. Its items can be comprehensively separated into the accompanying classes: structures related items; drives, mechanization and modern plant-related items; vitality related items; lighting; medicinal items; and transportation and logistics-related items.

The initial data for **Siemens** is as shown in table 4:

<i>Year</i>	<i>Sep, 2015</i>	<i>Sep, 2014</i>	<i>Sep, 2013</i>	<i>Sep, 2012</i>	<i>Sep, 2011</i>
Sales Turnover	10,848.60	10,954.40	11,705.40	12,919.90	12,028.90
Total Income	11,349.40	11,297.90	11,397.20	12,958.80	12,215.90
Total Expenses	9,430.10	10,217.00	10,909.50	12,130.00	10,776.10
Net Profit	1,919.30	1,080.90	487.70	828.80	1,439.80

Table 4: Siemens data

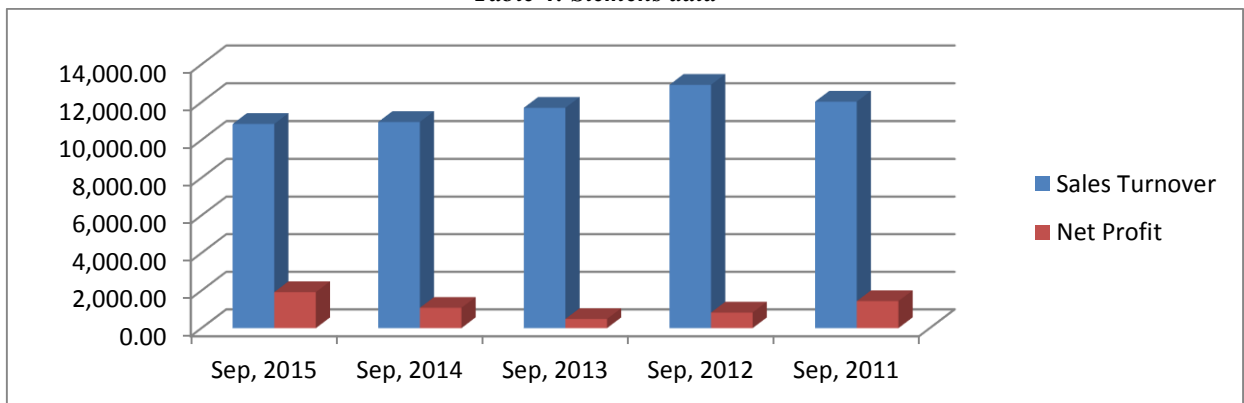


Figure5: Graphical representation of Siemens

Even with the reducing sales turnover, their profit has increased post 2013 as shown in figure 5.

ABB (ASEA Brown Boveri) is a Swedish-Swiss multinational company headquartered in Zurich, Switzerland, working predominantly in mechanical autonomy and the influence and mechanization innovation territories. It positioned 158th in the Forbes Ranking (2013).

ABB is one of the biggest engineering organizations and one of the biggest combinations on the planet. ABB has operations in around 100 nations, with roughly 135,000 workers in December 2015, and reported worldwide income of \$35.5 billion for 2015. ABB's Indian unit, ABB India Limited, is exchanged on the National Stock Exchange of India and on the Bombay Stock Exchange. The Indian auxiliary of ABB has a business sector capitalization of over \$4 billion.

The Corporate and Other division of ABB manages the general administration and working of the organization and additionally resource administration and speculation. It underpins MNCs.

The initial data for ABB India is as shown in table 5:

Table 5: ABB India data

<i>Year</i>	<i>Sep, 2015</i>	<i>Sep, 2014</i>	<i>Sep, 2013</i>	<i>Sep, 2012</i>	<i>Sep, 2011</i>
Sales Turnover	8,156.91	7,721.99	8,026.36	7,772.26	6,638.16
Total Income	7,706.57	7,741.96	7,572.73	7,574.96	6,273.84
Total Expenses	7,133.60	7,265.05	7,229.19	7,196.99	6,086.97
Net Profit	572.97	476.91	343.54	377.97	186.87

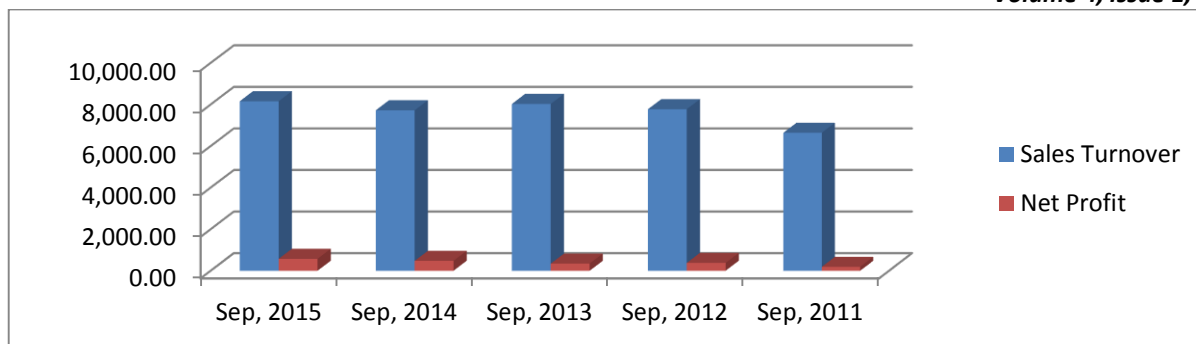


Fig 6: Graphical Representation of ABB India

From the graph as shown in figure 6, the company's net profit incurred is incomparable with the sales turnover even though it shows a steady increase.

VI. CONCLUSION

Analysis and interpretation of financial statements is an important tool in assessing a company's performance. It reveals the strengths and weaknesses of a firm. It helps the clients decide in which company the risk is less or in which they should invest so that maximum benefit can be earned. It is a known fact that investing in any company involves a lot of risk. So, before putting up money in any company one must have thorough knowledge about its past records and performances. Based on the data available the trend of the company in the near future can be predicted.

This paper mainly focuses on the determination of the risk involved in the investment in a company with the help of the ratios developed by us and its incorporation in the model. From the model the financial position of a company with respect to its competitors can be determined. The model helps determine the growth rate of the company as well as the value of the company based on 15 elements considered after thorough analysis of the financial statements of the company. Also, the average risk involved in investment in the company can be calculated.

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