# CHAPTER 3
# RESEARCH METHODOLOGY

## 3.1 INTRODUCTION

Present chapter deals with the design of the research. Present chapter will throw light to the research problem, hypothesis developed and also the sample statistics. Descriptive research was employed in the present study.

## 3.2 RESEARCH PROBLEM

M&A is an important strategic decision taken by the corporate houses. Cross border M&A are increasing in the Asian countries especially in China and India (**UNCTAD 2017).** In the year 2000 to 2013 more than 37% of cross border deals were from emerging economy **(Cogman et al 2015).** Most theories were developed in western context particularly USA and UK **(Saraswathy 2015)**. Asian and western countries differ because the government monitoring is less in developed market when compared to the Asian market like China and India. Also the investors risk tolerance, education level and investment preference varies. Investor"s protection law is the other factor which is differed in each country. Financial market is highly developed in western market. Considerable number of M&A started in India only after 1990"s **(Pradhan and Abraham 2005 and Beena 2004).** Indians were late to industrialization. Transparency of the financial market also varies. In this circumstance the study developed in western context could not be applied in Asian countries. **For example UNCTAD (2017)** says mostly the Asian countries motive for M&A differed from the European and American countries**. UNCTAD (2017)** also says that for Cross border M&A Indian market was favored by foreign firms because of the speedy growth on Indian market. **UNCTAD (2017)** compared to 2015 the Asian firms value from cross border M&A in 2016 had increased many fold. Many theories like synergy, empire building theory, diversification, market share, strategic realignment, Hubris – winners curse, Q- ratio, information and signailing, agency problem and mismanagement, managerialism, tax considerations had been developed to explain the driving forces of M&A. The western theories and studies should be applied in emerging economy context and check the relevance of the theory in the Indian corporate houses. Indian companies were mainly choosing M&A to expand the business. Studies regarding the

M&A were less in India. Even though the M&A were becoming popular in India most of the M&A could not improve the profitability of the firms. M&A was not able to create anticipated share value. M&A itself differed according to the economic shocks. Each merger wave showed the motive, the pattern of profit and share value creation had changed. Moreover Asian firms and Chinese corporate houses were different from the western corporate houses (**McCarthy et al 2016).** So the present study analyzed whether M&A impact positively or negatively in Indian manufacturing sector.

### 3.3 RESEARCH QUESTIONS

Was there an increase or decrease in share value and the operating performance of the acquiring firms after the deal?

Could determinants impact the share value creation?

Had Volatility increased or decreased after the M&A deal?

How M&A impact the stock liquidity of the acquirers?

Was there information leakage surrounding the announcement period?

### 3.4 SIGNIFICANCE AND SCOPE OF THE STUDY

M&A studies in India had mostly concentrated on either stock based approach alone or accounting based approach alone. But in the present study both the stock based and the accounting based approach was analyzed together for the same firms. Previous researchers in India identified only whether there was an increase or decrease in the operating performance and the share value creation. Most of the Indian studies did not study the short term share value creation instead Indian researchers focused on the long term impact on share price after the M&A using the Economic Value Added (EVA) method. But the present study analyzed the short term impact of share value after the M&A. In the preset study the impact of various determinants on share value was studied to understand the reasons for the share value to increase or decrease. Studies on volatility of the share value after the M&A deal was very limited. Hence the present study also analyzed the impact of M&A on the volatility of shares. Information leakage would have had happened during the announcement period. But there were very few studies in India which analyzed whether the dip in the share value during announcement period had been because of the information leakage. The present study also tried to find whether information leakage had happened during the announcement period.

- ✓ Present study would be helpful for the managers who are interested to expand the business using M&A.
- ✓ Academic person could understand the volatility and the determinants impact on the share value. Determinants and the volatility impact related studies were very few.
- ✓ Present study could add knowledge to the M&A literature because not many studies in India had analyzed whether the information leakage had happened during the announcement period. Information leakage could impact the share value creation negatively.

### 3.5 OBJECTIVES OF THE STUDY

Present study was addressed to evaluate the **operating performance and the share value creation** of the acquirers after the M&A deals in India. So the objective of the study was to understand whether the operating performance of the acquiring firms increased or decreased after the M&A deal. Other major objective of the present study was to identify the shareholders reaction to the M&A happening in Indian manufacturing sector.

- ✓ To analyze the pre and post financial performance of the acquiring firms from manufacturing sector in India.
- ✓ To evaluate the pre and post share value creation of the acquiring firms from manufacturing sector in India.
- ✓ To understand if profitability of firm has improved and the reason for the increase or decrease in the firm profitability using DU PONT.
- ✓ To analyze the impact of certain firm specific variables on share value creation of the acquiring firms from manufacturing sector in India.
- ✓ To find whether information leakage had occurred during the announcement period.
- ✓ To analyze the volatility of the share before and after the M&A.
- ✓ To analyze the impact of M&A on stock liquidity of the acquirers.

- ✓ To analyze whether there is a significant relationship between the pre and post cumulative average abnormal return.

**3.6 RESEARCH DESIGN:** Present study was descriptive in nature. Mainly secondary sources of data had been employed.

**3.6.1 POPULATION OF THE STUDY:** According to Prowess IQ total number of firms in the manufacturing sector was 17844. Number of firms listed in BSE from manufacturing sector was 2007. Number of Indian firms gone for M&A as Acquirer from manufacturing sector was 1173 during the period 1999 – 2000 to 2002-2013.

**3.6.2 SAMPLING METHOD AND SAMPLING SIZE**: Purposive Sampling was used in the study. Total population was 1173 but then most of the acquirers had more than one M&A. If there was more than one M&A during the study period the impact of a particular acquisition could not be identified. Hence firms with only one M&A during the study period were considered. To study accounting based approach data was collected for 51 firms. To study stock based approach data for 49 firms were used to which data was available.

**3.6.3 SOURCE OF DATA:** To study operating performance of the firm data was collected from Prowess IQ. To study the stock based approach data was collected from Prowess IQ and Capitaline. To get the information of event announcement date and the deal completion date Prowess IQ, Capitaline, Company Annual Report, Money Control, BSE website India Infoline, Published News Paper Articles were used. Data on trade volume was collected from Capitaline for computing the impact of M&A on stock liquidity.

**3.6.4 PERIOD OF THE STUDY:** Only those firms which had announced the M&A deal between the periods of 1st April 1997 to 31st March 2016 was included for measuring the share value creation. Only those firms which had completed the M&A during the period of 1st January 2000 to 31st December 2013 were included for analyzing the pre and post operating performance. Financial data was collected for 3 years before and 3 years after the M&A deal completion excluding the event year. Share value creation was studied for different windows.

**3.6.5 RESEARCH FRAMEWOTK:** Operating Performance was analyzed using Ratio Analysis and Paired Sample t test. DU PONT analysis was also employed.

Share wealth creation was studied using event study methodology market model. Impact of determinants on share value was analyzed using Hierarchal regression. Impact of Volatility was identified by Standard Deviation. Impact of stock liquidity was analyzed by using the Independent Sample t test.

## 3.7 LIMITATIONS OF THE STUDY

- ✓ On 8th November 2016 Government of India had introduced demonetization. Including financial data after 2016 November may skew the result. Hence data collection was restricted to March 31, 2016.
- ✓ Sample size for the present study was restricted to 51 firms.
- ✓ Only single merger impact was studied. Subsequent M&A impact on acquirer‟s performance was not studied. In manufacturing sector most of the firms had subsequent mergers.

## 3.8 HYPOTHESIS

### 3.8.1 OPERATING PERFORMANCE

**HI:** There is no significant difference in the profitability of Indian acquirers in the pre and post period.

**H2:** There is no significant difference in the profitability of shares of the Indian acquirers in the pre and post period.

**H3:** There is no significant difference in the enterprise ratio of the Indian acquirers in the pre and post period.

**H4:** There is no significant difference in the liquidity of the Indian acquirers in the pre and post period.

**H5:** There is no significant difference in the operating efficiency of the Indian acquirers in the pre and post period.

**H6:** There is no significant difference in the growth of the Indian acquirers in the pre and post period.

**H7:** There is no significant difference in the leverage of the Indian acquirers in the pre and post period.

**H8:** There is no significant difference in the tax ratio of the Indian acquirers in the pre and post period.

**H9:** There is no significant difference in the cost utilization of the Indian acquirers in the pre and post period.

**H10:** There is no significant difference in the innovation and long term expenses of the Indian acquirers in the pre and post period.

### 3.8.2 SHARE VALUE CREATION

**H 11**: M&A announcement could not create significant pre abnormal return.

**H 12**: M&A announcement could not create significant post abnormal return.

**H 13**: M&A announcement could not create significant pre cumulative abnormal return.

**H 14**: M&A announcement could not create significant post cumulative abnormal return.

**H15:** There is no significant difference in the share value creation of the Indian acquiring firms in the pre and post period.

**H16:** M&A does not impact the volatility of stock return of the acquirers.

**H17:** M&A do not have significant impact on the stock liquidity of the acquirers.

**H18:** Information about the M&A deal has not leaked during the announcement period.

**H18:** Ownership structure has no significant impact on the CAR of the acquiring firms.

**H 19:** Prior experiences of the firms have no significant impact on the share return of the firms.

**H 20:** Type of firms has no significant impact in the cumulative abnormal return of the firms.

**H 21:** There is a significant relationship between the pre announcement and post announcement period abnormal return.

**H 22:** Significant abnormal returns do not exist in the pre announcement period for the acquirers.

**H 23:** Significant abnormal returns do not exist in the post announcement period for the acquirers.

**TABLE 3.1 RATIOS EXPLAINED**

| **Sl no** | **Classification of financial data** | **Variables** | **Description** | **Inferences** |
|---|---|---|---|---|
| 1 | **Profitability ratios** | Operating profit margin | Profit before interest and tax divided by net sales | OPM shows the operating efficiency of the firms. From sales the cost of goods sold and the operating expenses is deducted for finding operating efficiency **(Fabozzi and Peterson,2003, p. 737)** |
| 2 | | Gross profit margin | Gross profit divided by net sales | GPM shows sales revenue earned directly from the core business of firm after reducing the cost of goods sold **(Fabozzi and Peterson,2003, p. 736-737)** |
| 3 | | Net profit margin | Profit after tax divided by net sales | Net Profit ratio shows the overall profit of the firm **(Srinivasan andMurugan,2004, p.214),(Bragg,2007,p.** |

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| | | | | **128)** |
| 4 | | Return on asset | Profit after tax divided by total asset | ROA shows the profit created by making use of the total asset invested, firm is efficient if generating higher profit by using minimum assets **(Bragg,2007, p.127-128)** |
| 5 | | Return on net worth | Profit after tax divided by net worth | RONW shows profitability of firm from utilizing the ordinary shareholders" funds **(Khan and Jain,2011, p. 6.26)** |
| 6 | | Return on capital employed | Profit before interest and tax divided by capital employed | ROCE Show the overall profitability of the firm achieved by using efficiently the long term funds invested in the business (**Srinivasan and Murugan,2004, p.219)** **(Khan and Jain,2011 p. 6.24)** |
| 7 | **Profitability on shares** | Earning per share<br>Market prospect ratio | Directly from prowess | EPS shows the return equity shareholders would receive for each share **(Khan and Jain,2011,p. 6.26)** |
| 8 | | Book value per share | Directly from prowess | BPS compares the market price of the share and the book value. Ratio shows whether market price of the share is more than or lesser than the book value. |

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| | | | | Book value is computed by adding the good will and other tangibles of the firm. (**Bragg,2007, p.125)** |
| 9 | | Price earnings ratio<br>Market prospect ratio | Directly from prowess | PE Ratio consists of current share price and Current earnings. PE ratio shows that price the market is willing to pay for the firm"s share. Events like M&As or other changes impact on the firm could be seen in PE ratio **(Elliot and Elliot ,2007,p.662-663)** |
| 10 | **Liquidity ratio** | Current ratio | From prowess | CR is used to gauge the short term liquidity position of the firms. Ratio shows the relationship between the current asset and current liability **(Elliot and Elliot ,2007,p. 658-659)** |
| 11 | | Quick ratio | From prowess | QR is like current ratio but in quick ratio the inventories are not included. Higher the ratio it is better (**Gillingham CPA,2015, p. 30**) |
| 12 | | Cash ratio | Cash and cash equivalent divided by current liability | CL is more liquid than the quick ratio because the inventories and other liquid assets like accounts |

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| | | | | receivables are not included in the cash ratio. Higher the better **(Gillingham CPA,2015, p. 31)** |
| 13 | | Working capital to total asset | Net working capital divided by total asset | WC_TA to total asset shows how efficient the firm is to meet the short term necessities of the funds **(Sathishkumar 2013)** |
| 14 | **Operating Efficiency ratios** | Fixed asset turnover | Net sales divided by net fixed assets | FA_TR ratio shows the amount of money the firm had invested in fixed asset to generate the sales revenue **(Bragg,2007, p. 7) (Gillingham CPA,2015, p .49)** |
| 15 | | Working capital turnover | Net sales divided by net working capital | WC_TR shows the cash needed by the firm to maintain the net sales of the firm (**Bragg,2007, p. 6)** |
| 16 | | Capital employed turnover | Net sales divided by capital employed | CA_TR shows sales generated using each rupee of capital employed **(Gadhavi and Vekariya 2014)** |
| 17 | | Net worth turnover | Net sales divided by net worth | NA_TR shows the efficiency of firm to generate sales revenue by using shareholders‟ equity **(Sathishkumar 2013)** |

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| 18 | | Raw material turnover | Prowess | RW_TR could be found by dividing the material consumed with the average raw materials inventory **(Srinivasan and Murugan,2004, p.237)** |
| 19 | | Finished goods turnover | Prowess | FI_TR shows the time taken for a firm to convert the finished goods to sale (**Ganas and Hyz 2015)** |
| 20 | | Debtor turnover | Prowess | DR_TR consists of sundry debtors and bills receivable. Debtor turnover ratio is that portion of credit sales which is not collected **(Srinivasan and Murugan, 2004, p. 208)**. |
| 21 | | Creditor turnover | Prowess | CR_TR consists of sundry creditors and bills payable. Ratio shows the money to be paid to the suppliers from the total purchases made by the firm( **Srinivasan and Murugan,2004, p. 209)** |
| 22 | | Profit before tax to net worth | Profit before tax divided by net worth | PBT_NW shows the rate return on the shareholder‟s equity **(Sathishkumar 2013)** |
| 23 | **leverage ratio** | Debt to equity ratio | Total liability divided by net worth | DE shows in shareholder‟s equity to what extend the debt consists of.1:1 is the |

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| | | | | accepted level but if owners have greater share than the creditors then the firm is solvent **(Srinivasan and Murugan,2004, p. 222)** |
| 24 | | Interest coverage ratio | Profit before interest and expenses divided by interest expenses | ICR shows whether the firm would be able to pay the interest for the debt of the firm **(Fabozzi and Peterson,2003, p. 744)** |
| 25 | | Proprietary ratio | Net worth divided by total asset | PR Shows how much proprietor is invested in the overall business, higher the ratio better **(Anand and Jain 2011)** |
| 26 | **Growth ratios** | Growth on net sales | Current year sale minus previous year sale divided by previous year sale | G_SR shows whether the current year‟s net sale had an increase or decrease compared to the last year‟s net sale |
| 27 | | Growth on Operating Profit | Current year EBIT minus previous year EBIT divided by previous year EBIT | G_OP find whether the current year‟s operating profit of the acquiring firm had an increase or decrease compared to the last year‟s operating profit **(Hyunju and Choonsup, 2011)** |
| 28 | | Growth on Total Asset | Current year total asset minus previous year total asset divided by | G_TR shows whether the acquiring firm total asset had an increase or decrease compared to the |

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| | | | previous year total asset | last year‟s total asset |
| 29 | | Growth on Fixed Asset | Current year fixed asset minus previous year fixed asset divided by previous year fixed asset | G_FA shows whether the fixed asset of the acquiring firm had an increase or decrease compared to the last year‟s |
| 30 | | Growth on net worth | Current year net worth minus previous year net worth divided by previous year net worth | G_NW shows whether the net worth of the firm had an increase or decrease compared to the last year‟s net worth of the firm |
| 31 | **Tax ratio** | Tax efficiency | Profit after tax divided by profit before tax | TR shows the tax rate on the firm, lower the ratio better for the firm **(Klaassen and Eeghen 2015**) |
| 32 | **Cost utilization ratio** | Operating expenses to net sales | Operating expenses divided by net sales | OP_S ratio shows how much percentage of sales revenue is used to meet the operating expenses of the firm, lower ratio shows more efficiency in managing the |
| 33 | | Raw material expenses to net sales | Raw material expenses divided by net sales | RW_S explains the raw material expense consumed from the total sales revenue. Lower ratio shows more efficiency in managing the expenses (**Sathishkumar 2013)** |

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| 34 | | Salaries and wages expenses to net sales | Salaries and wages expenses by net sales | SW_S shows the salaries and wages expenses consumed from the sales revenue; lower ratio shows more efficiency in managing the expenses **(Sathishkumar 2013)** |
| 35 | | Distribution expenses to net sales | Distribution expenses divided by net sales | DI_S shows the relationship between the distribution cost and the net sales; lower ratio shows more efficiency in managing the expenses **(Sathishkumar 2013)** |
| 36 | | Power and fuel expenses to net sales | Power and fuel expenses divided by net sales | PE_S explains how much money from the sales revenue is used for meeting the expenses of the power and fuel; lower ratio shows more efficiency in managing the expenses **(Sathishkumar 2013)** |
| 37 | | Marketing Expenses to Net Sales | Marketing expenses divided by net sales | ME_S shows relationship between the marketing expenses and the net sales |
| 38 | | Advertising Expenses to Net Sales | Advertising expenses divided by net sales | AE_S shows relationship between the advertising expenses and the net sales |
| 39 | | Research and Development Expenses to Net Sales | Research and development expenses to net sales | R&D_S shows how much money is spend on the R&D from the total sales revenue |

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| 40 | | Employee compensation expenses to net sales | Employee compensation expenses divided by net sales | EC_S Ratio shows how much amount is used to pay the employee compensation from the total sales revenue; lower ratio shows more efficiency in managing the expenses (**Sathishkumar 2013)** |

***CAR is the dependent variable in the present study***

**TABLE 3.2 SHARE VALUE DETERMINANTS**

| Sl No | Variable | Previous Authors | Present Study |
|---|---|---|---|
| 2 | Growth or Value acquirers | Independent Variable | PE ratio in the prior year is used to classify the firms in to growth and value firms |
| 3 | Prior acquisition experience | Independent Variable | Sum of number of acquisition experience by the acquirer in the study period that is 2000 to 2013 |
| 6 | AGE | Control Variable | Year of incorporation to the year of acquisition announcement |
| 7 | Firm size (control variables) | Control Variable | Log of total asset |
| 8 | Prior performance (control | Control Variable | ROA in the year before the acquisition announcement. |

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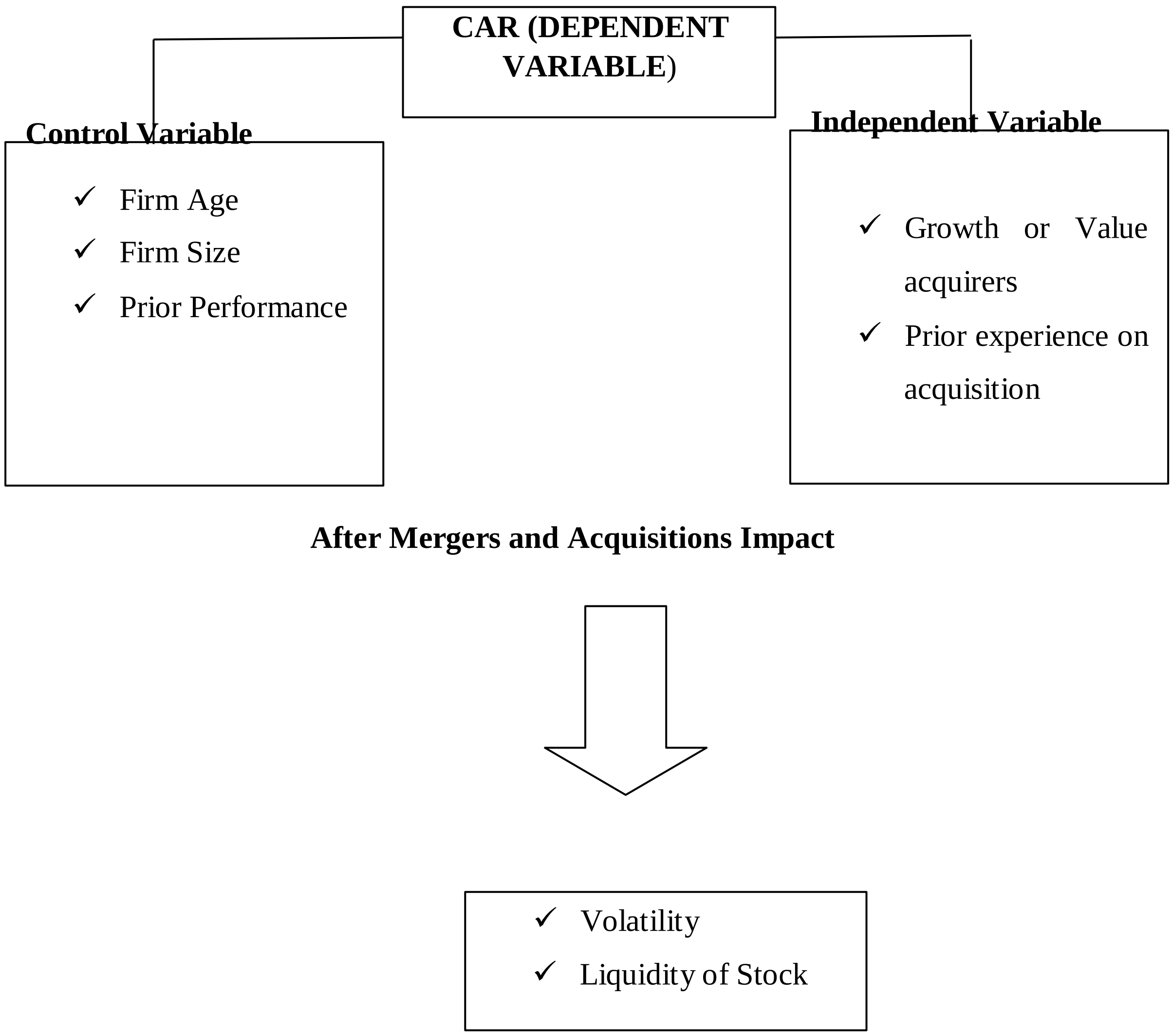
| | variable) | | |
| 9 | Volatility | | |
| 10 | Impact of Stock Liquidity | | |
| 10 | Information leakage | | |

**Fig 3.1 Dependent Variables, Independent Variables and the Control Variables Employed in the Present Study**



### 3.10 SAMPLE STATISTICS

- ✓ Only firms from manufacturing sectors were included in the study financial firms are excluded from the present study.
- ✓ Acquirer should have involved only in one acquisition in the subsequent years that was 6 years in the present study. Further deal year was also excluded otherwise chances are there for the event to influence the immediate year performance.
- ✓ Acquiring firms were listed in Bombay stock exchange.
- ✓ Deals that were announced and completed during the period 2000-2001 to 2012-2013 had been included in the sample. Current study required 3 years post acquisition financial data hence only till 2013 could be considered.
- ✓ Companies were classified according to the NIC code.

**TABE 3.3 PROFILE OF SAMPLE COMPANIES**

| Name of the firms | Short form | Total asset | Industry | Target | Deal Completion year |
|---|---|---|---|---|---|
| Aarti Drugs Ltd | Aarthi drugs | 343.32 | Drugs and Pharmaceuticals | Suyash Laboratories Ltd. [Merged] | 2006 |
| Abbott India Ltd. | Abbott | 868.99 | Drugs and Pharmaceuticals | Solvay Pharma India Ltd. [Merged] | 2011 |
| Ador Welding Ltd. | Ador | 280.9 | Miscellaneous electrical Machinery | Plasma Laser Technologies Ltd. | 2013 |
| Ajanta Soya | Ajanta | 37.44 | Vegetable Oil | Kasturi | 2004 |

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|---|---|---|---|---|---|
| Ltd. | | | and Products | Finlease & Invst. Ltd. [Merged] | |
| Alfa Transformers Ltd. | Alfa | 29.72 | Generator, Transformers and Switches | Phoenix Surgicare Pvt. Ltd. | 2008 |
| Anjani Portland Cement Ltd. | Anjani | 53.43 | Cement | Hitech Print Systems Ltd. | 2007 |
| Aplab Ltd. | Aplab | 113.8 | Other electronics | Intel Instruments & Systems Ltd. [Merged] | 2012 |
| Arvind International Ltd. | Arvind | 17.65 | Rubber products | Aparna Polyproduct Ltd. [Merged] | 2004 |
| Ashima Ltd. | Ashima | 526.18 | Cloth | Ahmedabad New Cotton Mills Co. Ltd. [Merged] | 2000 |
| Asian Paints Ltd. | Asian | 3013.37 | Paints and Varnishes | Technical Instruments Mfrs. (India) Ltd. [Merged] | 2009 |

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| Asian Star Co. Ltd. | Asian star | 942.32 | Gems and Jewellery | Inter Gems D M C C | 2008 |
| Associated Alcohols & Breweries Ltd. | AABL | 133.78 | Beer and Alchocol | Vedant Energy Pvt. Ltd. | 2013 |
| Bannari Amman Sugars Ltd. | BASL | 658.94 | Sugar | Maheswara Sugars Ltd. [Merged] | 2007 |
| Bliss G V S Pharma Ltd. | Bliss | 213.51 | Drugs and Pharmceuticals | Kremoint Pharma Pvt. Ltd. | 2012 |
| Citurgia Biochemicals Ltd. | Citurgia | 100.5 | Inorganic chemicals | Jasper Investments Ltd. [Merged] | 2002 |
| Deepak Nitrite Ltd. | Deepak | 158.74 | Chemicals | Aryan Pesticides Ltd. [Merged] | 2000 |
| D & H India Ltd. | D & H | 36.81 | Miscellaneous electrical machinery | V & H Fabricators Pvt. Ltd. | 2012 |
| Dishman | Dishman | 530.15 | Drugs& Pharmceuticals | Fine Chemicals & Vitamin | 2007 |

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|---|---|---|---|---|---|
| | | | | business | |
| Ecoplast Ltd | Ecoplast | 36.12 | Plastic films & flexible packaging | Synergy Films Pvt. Ltd. | 2013 |
| Empee Sugars & Chemicals Ltd. | ESCL | 771.2 | Electricity generation | Empee Distilleries Ltd. | 2012 |
| Exide Industries Ltd. | Exide | 4105.97 | Storage batteries | Exide Life Insurance Co. Ltd. | 2013 |
| Faze Three Ltd. | Faze | 137.21 | Other textiles | Pana Textil Gmbh | 2007 |
| Gayatri Sugars Ltd. | Gayatri | 141.13 | Sugar | G S R Sugars Pvt. Ltd. [Merged] | 2010 |
| G M M Pfaudler Ltd. | G M M | 109.85 | Industrial machinery | Mavag A G | 2007 |
| Grauer & Weil (India) Ltd. | Grauer | 116.59 | Chemicals | Bombay Paints Ltd. [Merged] | 2009 |
| Gujarat Apollo Inds. Ltd. | Gujarat | 126.46 | Mining & construction equipment | Apollo Earthmovers Ltd. | 2008 |

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| Gujarat State Fertilizers & Chemicals Ltd. | GSFC | 3302.39 | Fertilizers | G S F C Investment & Leasing Co. Ltd. [Merged] | 2007 |
| Harita Seating Systems Ltd. | HSSL | 106.17 | automobile ancillaries | Harita Fehrer Ltd. | 2008 |
| Incap Ltd. | Incap | 12.49 | electronics | Incap Insulators Pvt. Ltd. [Merged] | 2010 |
| J B M Auto Ltd. | J B M | 214.23 | automobile ancillaries | J B M Auto System Pvt. Ltd. | 2009 |
| Kabra Extrusion Technik Ltd. | Kabra | 152.23 | Industrial machinery | Gloucester Engineering Co. Inc. | 2011 |
| Kirloskar FerrousInds. Ltd. | Kirloskar | 365.94 | Metal products | Kirloskar Industries Ltd. | 2006 |
| Kisan Mouldings Ltd. | Kisan | 17.78 | Plastic tubes, pipes, fittings & sheets | Gaurav Agro Plast Ltd. [Merged] | 2005 |
| Kore Foods Ltd. | Kore | 11.51 | Processed foods | Gokhatak Enterprises | 2010 |

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|---|---|---|---|---|---|
| | | | | Ltd. [Merged] | |
| K S B Pumps Ltd. | K S B | 193.24 | General purpose machinery | Grade-O-Castings Ltd. [Merged] | 2001 |
| Loyal Textile Mills Ltd. | Loyal | 541.1 | Diversified cotton textile | Shri Chintamani Textile Mills Ltd [Merged] | 2011 |
| Makers Laboratories Ltd. | Makers | 30.87 | Drugs & pharmaceuticals | Harleystreet Pharmaceuticals Ltd. [Merged] | 2011 |
| Mirc Electronics Ltd. | Mirc | 745.47 | electronics | Guviso Holdings Pvt. Ltd. [Merged] | 2009 |
| Modi Naturals Ltd. | Modi | 25.7 | Vegetable oils & products | JP Management Systems Pvt. Ltd. [Merged] | 2007 |
| Navin Fluorine Intl. Ltd. | Navin | 472.14 | Inorganic chemicals | Manchester Organics Ltd. | 2011 |

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|---|---|---|---|---|---|
| Nikhil Adhesives Ltd. | Nikhil | 11.49 | Trade in other chemicals | Mafatlal Dyes & Chemicals Ltd. | 2003 |
| Nimbus Foods Inds. Ltd. | Nimbus | 1.57 | Bakery products | Majesty Agro Foods Pvt. Ltd. [Merged] | 2008 |
| Paramount Communications Ltd. | Paramount | 170.68 | Wires & cables | A E I Cables | 2007 |
| Pidilite Industries Ltd. | Pidlite | 637.68 | Chemicals | Vinyl Chemicals India Ltd. | 2007 |
| Pix Transmissions Ltd. | Pix | 69.1 | Rubber products | Pix Autos Ltd. [Merged] | 2001 |
| Ramsarup Industries Ltd. | Ramsarup | 696.2 | Metal products | Ramsarup Lohh Udyog Ltd. [Merged] | 2008 |
| Shanthi Gears Ltd. | Shanthi | 88.27 | General purpose machinery | Shanthi Precision Inds. Ltd. [Merged] | 2004 |
| Sudarshan | Sudarsha | 454.44 | Dyes & pigments | Eckart | 2011 |

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|---|---|---|---|---|---|
| Chemical Inds. Ltd. | n | | | Gmbh | |
| Uniply Industries Ltd. | Uniply | 61.5 | Wood | Surge Trading Ltd. | 2007 |
| Vijay Solvex Ltd. | Vijay | 75.1 | Agricultural Products | Goenka Products Pvt. Ltd. [Merged] | 2005 |
| Visaka Industries Ltd. | Visaka | 531.24 | Construction Materials | Somerset Entertainme nt Ventures Singapore Pte Ltd. | 2011 |
| V S T Tillers Tractors Ltd. | V S T | 51.18 | Agricultural machinery | V S T Precision Components Ltd. | 2003 |

**3.11 TOOLS OF ANALYSIS**

Ratio analyses were incorporated to understand the operating performance of the firms. Paired sample t tests was used to identify the before and after effect of various variables in the study. Du Pont analysis was employed to understand the reason for increase or decrease in operating performance variables. Market model was applied to understand the shareholder‟s reaction after the M&A deal. Independent Sample t test, F test was also applied in the study. Hierarchal linear regression was applied to study the impact of determinants in the study.

### 3.11.1 DU PONT ANALYSIS

**OCFRA = OCFRS * TOTAL ASSET TURNOVER**[2] ⟶ **Equation 15**

The method was used to identify whether the sales had improved because of the "improved profit margin per rupee of sales" or "generating more sales revenue per rupee of investment" **(quoted from Rani et al (2013)**

### 3.11.2 MARKET MODEL

Market model in event study methodology was used to identify the shareholder‟s reaction after and before the event. In an event study methodology the researcher has to define the particular date on which the event (M&A) had occurred. Zero could be the taken as day in which the M&A announcement was published. Estimation period was 252 days before the announcement of the event to the public. Estimation window should not overlap the event window**.** (-252,-20) days had been taken for the present study.

**For computing CAR** the abnormal return was computed. Abnormal return was the

**$Rit = ai + \beta i\ Rm,t + \varepsilon i$,** ⟶ **Equation 1**

ai and $\beta i$ are the values of ordinary least square. Estimation period daily share price return was used to compute the ai and $\beta i$. $\varepsilon i$, is the error term

after computing the regression coefficient the expected return was computed

**$E(Rit) = ai + \beta i\ Rm,t$** ⟶ **Equation 2**

Abnormal return = Rit - Rmt ⟶ **Equation 3**

**CAR i = $\sum$** ⟶ **Equation4**

**CARt = $\sum$** ⟶ **Equation5**

CAR i = pre event CAR

CAR t = post event CAR

T stat = AR/ standard error ⟶ **Equation 7**

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[2] **Rani , Yadav and Jain (2013)**

Single Factor Model was used for the present study.

### 3.11.3 AGGREGRATE ANALYSIS

AAR was computed by aggregating the average abnormal return of each day. The AAR was aggregated to compute the Cumulative Average Abnormal Return.

### 3.11.4 INDEPENDENT SAMPLE T TEST

**r = ( 1 – 2 ) – ($\mu_1$ - $\mu_2$ ) / √ (1/$n_1$-1/$n_2$) ⟶ Equation 9**

**($\mu_1$-$\mu_2$)** was the population mean difference

**$S^2_p$ is the** pooled variance difference

**$S^2_{P} = (n_1 - 1)\, S^2_1 + (n_2 - 1) S^2_2 / n_1 + n_2 - 2$ ⟶ Equation 10**

**Df = ($n_1$+$n_2$-2)**

### 3.11.5 VOLATILITY

For finding the change in volatility the variance was found using the f test

**F = ($M1^2/M2^2$), with $M1^2 \geq M2^2$ ⟶ Equation 11**

Where M1 and M2 are the standard error of the share return for the pre event and post event window.

### 3.11.6 TWO PAIRED SAMPLE T TEST

**x is the (n-1) degree of freedom defined as**

**X=** — — √ ⟶ **Equation 12**

= Σ ⟶ **Equation 13**

= √Σ Σ ⟶ **Equation 14**

**denoted the normal distribution when the researcher knows the difference of α.**

## 3.12 CONCLUSION

This Chapter focuses on the hypothesis developed for the study based on previous studies and the research design of the present research work. Research methodology is developed based on the research problems identified in the present study. Not many Indian researchers had studied the impact of M&A on Volatility and liquidity of stock but the present study was done to understand the impact of M&A on volatility and the stock liquidity of the acquirers.