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Trend Analysis to observe the Movement of Share Prices: A Reference to BSE Cement Industry

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Abstract--- ***Forecasting of the stock prices of stock market is considered an important and difficult task due to its dynamics and volatility. In this paper, an earnest attempt has made to predict the movement of stock prices of the stock market indices through trend analysis. It could help the investors to take appropriate investment decisions. This analysis suggests investors when to buy and sell a particular security if it is profitable or vice-versa. Bolzano Weierstrass theorem is considered more suitable for forecasting trends in stock market where the data is large in number. For the purpose of the present study, Bolzano Weierstrass theorem is used to identify the appropriate polynomial curve to imitate observed data. This analysis is used to assist stock market investors identify possible profit making industries in an industry and also help to develop model to pick the best from the given data set for profitable investment decisions.***

Keywords: Bombay Stock Exchange (BSE), Bolzano Weierstrass, Trend line, Cement Industries, Time Series.

I. INTRODUCTION

Cement is a less price and large quantity commodity essential for construction activities. India is the second largest cement producer in the world. The required raw materials for producing cement are limestone, gypsum, coal & power. The limestone deposits are very high in India. The main raw material required for manufacturing cement is limestone. The ratio of cement and limestone for manufacturing the cement is 1:1.5 respectively. The 70 per cent of limestone deposits are available in various states i.e., Andhra Pradesh, Karnataka, Gujarat, Madhya Pradesh and Rajasthan. The excise duty of limestone is very high as 5 per cent of total excise duty. Gypsum and coal are other important materials to manufacture the cement. 5 to 8 per cent gypsum is consuming in India. The availability of gypsum is very high in Rajasthan, Tamil Nadu and Gujarat states. Currently, the cement industries are required 60 per cent of coal[i].

There is certain strong link between cement demand, economic growth and population (Mahasenan *et. al.*, 2003; Choy, 2011).Gargano and Timmermann (2014)explains that there is a close relation between GDP and cement share prices, due to this reason historical data has been used to forecast future share values based on suited trend line methods. Cement is most useful material to build-up of infrastructure for various industries and transports. The economic growth is depends on the rapid growth of the industries construction.

Moreover, cement demand and population relation is proportionate in industrial countries with great income levels. According to the population growth, cement demand could be increased for the maintenance of old infrastructures and establishment of new infrastructures (Mahasenan*et.al.*, 2003). In the 12th Five Year Plan, the Government of India plans to increase investment in infrastructure to the tune of US$ 1 trillion and increase the industry's capacity to 150 MT[ii].

The cement production developed at a strong compound annual growth rate (CAGR) of 8.67 per cent was measured during the 10thPlan. Cement consumption has generally grown at 2 to 3 per cent is higher than the growth of GDP[iii]. According to the past trends, cement industry can be expected to develop at 11.5 per cent consistent to the GDP growth of 9 per cent. The expected capacity of cement production is 550 million tons by 2025 in India[iv].Quick developing economies are consumed more cement. From the investment view point, the stock market of quick developing countries are more volatile than the mature markets, and also provides or offers more returns (IEA-ETSAP (2010)). This situation is more risky as well as very attractive to the investors. As it concerned to BSE, it consists of various groups of cement industries such as Group A, B, P, T, XC, XD and XT[v]. To forecast the share value, there are many methods have been used such as econometric, survey, time series, stochastic and qualitative. (Dooley & Lenihan(2005)). Linear, logarithmic, polynomial, power, exponential and moving average trend line methods are six different types of trend/regression models.

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These models are working with in pre-established and well known formulas for forecasting share prices. Nonetheless, each cement industry has its own features regarding trading, transportation and infrastructure that result in construction configuration. The main purpose of the study is giving suggestions to investors where to invest with high profitability, less risk and faster payback periods. The same can be the case of other emerging countries also. In this juncture, the present inquiry is based on the cement industries listed in BSE Ltd in India. This paper considers the book values of shares of different cement industries listed in BSE Ltd. This paper enables the investors to understand the dynamics and volatility of share values to understand the present techniques and principles to forecast share prices.

II. REVIEW OF LITERATURE:

The following paragraphs have been devoted to review the existing literature in the area of the study to identify the gaps in order to frame statement of the problem and objectives of the study.

To forecast the share values or prices of securities, many authors have given important guidelines to opt the best suitable forecasting models such as qualitative, trend exploration, linear, econometric, stochastic and time series (He.K et al 2015, Shafee and Topal2014, Dooley &Lenihan2005, Watkins and McAleer2010). From the long haul, there is a relationship between economic environment and commodity stock markets. The assumptions of supply and demand are primary drivers to balance the prices and economic growth. Statistical and mathematical tools are using to forecast share price with historical data in the form of demand and supply levels are correlated with prices (Dooley & Lenihan (2005)).

Arezki et al (2014) noted that a suitable approach to forecast prices is co-movement of another commodity behavior by comparing with random walk models. Fama EF(1965) explains the random walk models, which states that historical data and actions cannot be useful to forecast time series behavior at the time of high fluctuations. Byrne et al (2013), Roberts (2009) and Rossen (2015) verified the strong co-movement relationship among aluminum, lead, iron ore, copper, silver, zinc, mercury, tin, platinum and ferrous scrap prices. Holden(1995) describes Vector auto regression (VAR) model to forecast the commodity prices using past data of all variables. Kulshreshtha and Parikh (2000) explain VAR models to forecast the demand of coal in India by using co- integrated variables.Vector Error Correction (VEC) and VAR models are used to investigate historical data to understand the behavior of variables and identifying their fluctuations. However, the irrelevant past data could be infer or infect the future significance over time (Bosch andPradkhan (2015)).Watkins and McAleer (2010) examined econometric models to forecast the short and long run prices of copper, nickel, zinc, aluminum and tin. The existing econometric models have a lack of many assumptions like economic, technical and temporary assumptions. Large number of variables is required to deal with econometric models. However, the significant drawbacks of econometric models are complex, static and high cost. The requirement of technical knowledge is very high to develop market analysis; this is the main reason for complexity. The main reason for static is when the market conditions are dynamic or volatile, and then the present scenario is useless. It is costly because to run the present analysis it requires more number of database analyzers and specialists.

To overcome the drawbacks of econometric models the time series modeling techniques are introduced to forecast and analyze future trends (Dooley &Lenihan (2005)). Generally, to forecast the mineral prices the time-series models have been used (Cuddington&Nülle (2014)). Linear models such as Autoregressive Moving Average (ARMA), Autoregressive Conditional Heteroscedastic (ARCH), Autoregressive Integrated Moving Average (ARIMA) and the generalized version of ARCH (GARCH) have been thoroughly used to forecast the commodity prices (Zang (2003), Labys(2006) Ru&Ren(2012) Tully&Lucey (2007)).

III. STATEMENT OF THE PROBLEM

Predication of share market prices is a challenge to the investors. Stock market movement is always subjected to the market volatility where in turn it is the result of market information. Among the various sectors of the economy, cement industry plays a vital role that pave a road for the robust economic development in the country. So far there are a few studies on the determinates of the profitability of cement industry but not on the prediction of share prices of cement industry as a whole that listed with BSE Ltd. Further, prediction of share of prices of cement industry using trend analysis through linear and polynomial order one, two and three is a new approach. The present study attempted to study profitability coupled with movement of share prices of cement industry. Therefore, this study aims to guide the new as well as existing investors in the share market in general and cement industry in particular for their investment decisions in the near future.

IV. OBJECTIVES OF THE STUDY

The primary objective of the study is to identify the type of trend and forecast the share price of cement industry listed in BSE Ltd. Further, the researcher has the following specific objectives. These are:to

(i) rank existing industries as per the growth of share value per unit time; and
(ii) identify the most preferable cement industry shares for investment among cement industries under the study.
(iii) identify the fluctuations and forecast the future share values of each cement industry

V. RESEARCH DESIGN AND METHODOLOGY:

Methodology: In stock market research, fundamental analysis and technical analysis are the two branches of analysis to find trend of stock prices. However, technical analysis is often preferred over fundamental analysis. Stock price of an industry will be based on their earnings and revenues.

Stock price can also be termed as market price. The market price can be analyzed by technical analysts. This study uses trend line analysis to forecast the future share prices. Technical analyst's main job is to identify the trends in stock market by the technical tool named as trend-line; it helps to determine the present direction in stock prices or market prices. A trend line is more consistent when its R-Squared value is near to 1.

In this study, researcher used polynomial curve for modeling stock prices. In particular, given the limited time-series data only polynomials of order 1, 2 and 3 were only used, to avoid the problem of over fitting. Bolzano Weierstrass theorem has been used in this study to identify the appropriate polynomial curve to mimic observed data. Bolzano Weierstrass theorem states that every smooth curve can be approximated by a polynomial whose degree is one greater than the number of turning points in the curve (paul&angu 2005). It helps to decide which degree polynomial (like linear line, quadratic, third degree curve, etc) is appropriate for the given data.

VI. DESCRIPTION OF METHODOLOGY

Polynomial trend of order one (linear trend):

After plotting our stock price values over time, if the general trend line (a smoothed curve) suggests no turning points in the data then polynomial of order 1 should be used to mimic the observed trend. A linear trend does mean that the observed data is in increasing or decreasing order over time, at a steady rate.

In a general form, a linear trend line can be written as follows.

$$Y = \alpha x + \beta \qquad \text{(i)}$$

where, 'α' is slope and 'β' is intercept. Slope is the steep of a line. i.e. how Y is changing with unit increase in x. A flat horizontal line slope is '0'. A diagonal line on the graph has a slope of '1'. Steeper lines have larger slopes. Intercept is the 'Y'when x=0, i.e., where the line touches y-axis.

The least square estimates of α and β are

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

$$\beta = \frac{\sum y - \alpha \sum x}{n} \qquad \text{(b)}$$

Polynomial Trend of order two and three:

If the trend line suggests one turning point in the data then polynomial order 2 should be used to mimic the observed trend. If the trend line has two turning points then polynomial order 3 is existed in the observed trend and this type of data has more fluctuations.If the order of polynomial is increased to second degree then the equation is

$$Y = ax^2 + bx + c \qquad \text{(ii)}$$

If the order of polynomial is increased to third degree then the equation is

$$Y = ax^3 + bx^2 + cx + d \qquad \text{(iii)}$$

The suggestions could give to the investors based on the following equation.

$$Y_t < Y_{t-1} \qquad \text{(iv)}$$

Where Y_t represents the forecast at time 't'

Y_{t-1} represents past year share value i.e. time t-1.

If the forecasted value (Y_t) is less than the previous historical share value (Y_{t-1}) then the suggestion would be sell the shares, because if they hold their shares then would get loses in the future.

Data Description: The data used for this study is secondary in character. The required data is collected from www.moneyworks4me.com based on 46 cement industries registered with BSE Ltd.

VII. SCOPE OF STUDY

There are 49 cement companies listed with BSE Ltd. Of 49 cement companies, the data for three cement companies namely Bigbloc Construction Ltd., Orient Cement Ltd., Vaishno Cement Co. Ltd is not available in complete form due to different reasons. The rest of 46 companies are taken as sample for this study. The study period is 10 years i.e. starting from 2008 to 2017.

VIII. RESULTS AND DISCUSSION

This section devoted to discuss the fitted model of the different trend line methods, graphical representation of trend lines along with formulas and forecast the future share prices. At last, researcher provide ranks by compare all the companies and give suggestions to the new investors as well as existing investors in the form of buy, sell or hold shares.

Table 1: Trends for 46 cement companies registered with BSE

S.No	**Security name**	**Type of Trend Line**	**Formula**
1	ACC LTD.	Polynomial order 2	$y = -2.1106x^2 + 45.529x + 220.54$
2	Ambuja Cements Ltd.	Polynomial order 2	$y = 0.4449x^2 + 1.8043x + 35.13$
3	Century Textiles & Industries ltd.	Polynomial order 3	$y = 0.7785x^3 - 12.02x^2 + 57.575x + 113.63$
4	Dalmia Bharat Ltd.	Polynomial order 3	$y = 0.3442x^3 - 3.6912x^2 + 24.023x - 8.0071$
5	Grasim Industries Ltd.	Linear	$y = 50.076x + 181.39$

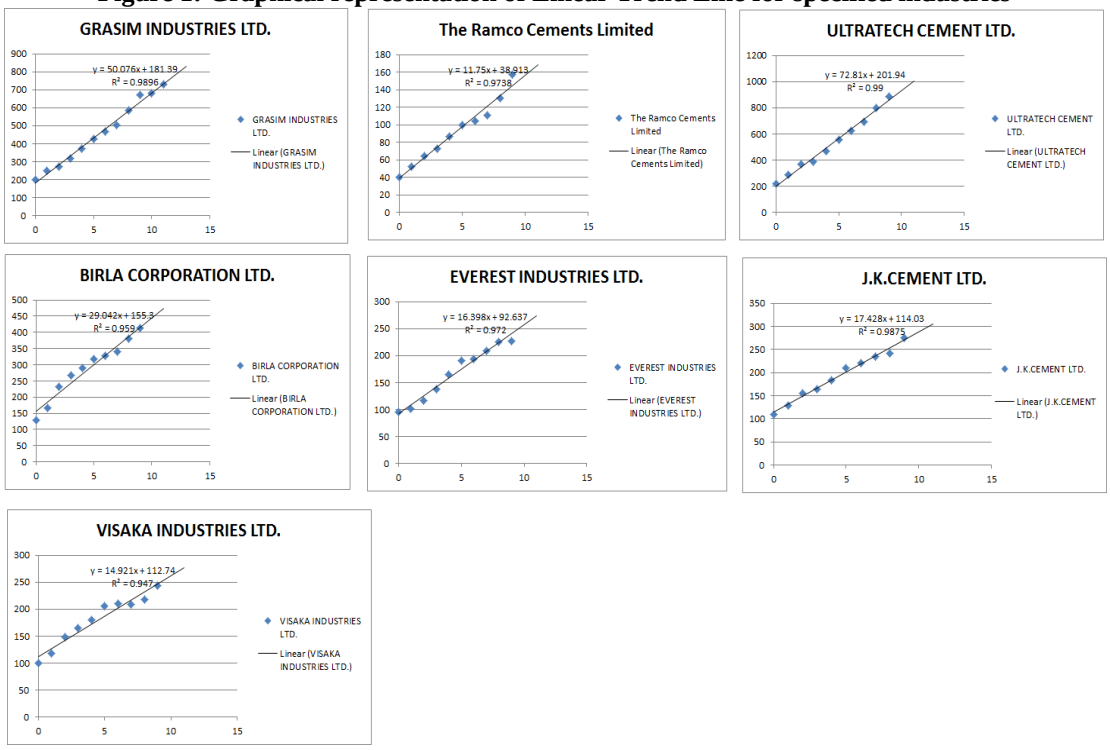
6	India Cements Ltd.	Polynomial order 3	$y = 0.5108x^3 - 6.0307x^2 + 22.056x + 90.229$
7	Jk Lakshmi Cement Ltd.	Polynomial order 2	$y = -0.7283x^2 + 13.589x + 52.227$
8	The Ramco Cements Limited	Linear	$y = 11.75x + 38.913$
9	Shree Cement Ltd.	Polynomial order 2	$y = 21.284x^2 + 61.884x + 221.3$
10	Ultratech Cement Ltd.	Linear	$y = 72.81x + 201.94$
11	Anjani Portland Cement Ltd	Polynomial order 3	$y = 0.4173x^3 - 4.9095x^2 + 16.819x + 17.213$
12	Birla Corporation Ltd.	Linear	$y = 29.042x + 155.3$
13	Burnpur Cement Ltd.	Polynomial order 3	$y = -0.0258x^3 + 0.3268x^2 - 1.0474x + 13.486$
14	Deccan Cements Ltd.	Polynomial order 2	$y = 0.8287x^2 + 5.676x + 107.12$
15	Everest Industries Ltd.	Linear	$y = 16.398x + 92.637$
16	Heidelberg Cement India ltd.	Polynomial order 3	$y = 0.1472x^3 - 2.1282x^2 + 9.6164x + 21.382$
17	Hil Ltd.	Polynomial order 2	$y = -2.2607x^2 + 71.553x + 193.62$
18	Indian Hume Pipe Co.Ltd.	Polynomial order 2	$y = 0.3981x^2 + 1.3374x + 32.428$
19	J.K.Cement Ltd.	Linear	$y = 17.428x + 114.03$
20	Kakatiya Cement Sugar & Industries Ltd.	Polynomial order 2	$y = 0.7741x^2 + 8.9821x + 143.29$
21	K.C.P.Ltd.	Polynomial order 2	$y = -0.1602x^2 + 3.1318x + 15.637$
22	Mangalam Cement Ltd.	Polynomial order 2	$y = -2.0819x^2 + 30.431x + 78.253$
23	Ncl Industries Ltd.	Polynomial order 3	$y = 0.2572x^3 - 3.4655x^2 + 14.397x + 27.676$
24	OCL India Ltd.	Polynomial order 2	$y = 4.6398x^2 - 11.703x + 121.97$
25	Orient Paper & Industries Ltd.	Polynomial order 3	$y = 0.3966x^3 - 5.9715x^2 + 21.964x + 21.224$
26	Prism Cement Ltd.	Polynomial order 3	$y = 0.063x^3 - 0.9218x^2 + 2.8141x + 22.827$
27	Sagar Cements Ltd.	Polynomial order 3	$y = 0.9155x^3 - 7.9294x^2 + 31.889x + 90.581$
28	Sanghi Industries Ltd.	Polynomial order 3	$y = -0.0767x^3 + 1.3975x^2 - 3.4369x + 29.272$
29	Star Cement Ltd	Polynomial order 3	$y = -0.6514x^3 + 4.1887x^2 + 8.7391x + 54.387$
30	Visaka Industries Ltd.	Linear	$y = 14.921x + 112.74$
31	Kalyanpur Cements Ltd.	Polynomial order 3	$y = 7.1592x^3 - 133.33x^2 + 756.19x - 1374.4$
32	Gujarat Sidhee Cement Ltd.	Polynomial order 3	$y = -0.3115x^3 + 3.4085x^2 - 4.1781x + 0.6293$
33	Andhra Cements Ltd.	Polynomial order 3	$y = 0.038x^3 - 1.0675x^2 + 6.2259x + 0.3334$
34	Barak Valley Cements Ltd.	Polynomial order 3	$y = 0.0751x^3 - 1.3214x^2 + 6.9838x + 27.602$
35	Panyam Cements & Mineral Industries Ltd.	Polynomial order 3	$y = 0.1946x^3 - 3.5406x^2 + 20.877x - 25.151$
36	Saurashtra Cement Ltd.	Polynomial order 3	$y = -0.3844x^3 + 5.7512x^2 - 16.791x + 7.8616$
37	Shree Digvijay Cement Co.Ltd	Polynomial order 2	$y = -0.3602x^2 + 4.3654x + 1.242$
38	Udaipur Cement Works Ltd.	Polynomial order 3	$y = -0.1982x^3 + 2.9651x^2 - 7.3317x - 22.403$

39	Shiva Cement Ltd.	Polynomial order 3	$y = -0.015x^3 + 0.1637x^2 - 0.1769x + 3.5734$
40	Sahyadri Industries Ltd.	Polynomial order 2	$y = -1.8807x^2 + 24.382x + 40.289$
41	Shrikeshav Cements And Infra Ltd	Polynomial order 2	$y = 0.3524x^2 - 0.1948x + 11.891$
42	Vardhman Concrete Ltd	Polynomial order 2	$y = 0.5178x^2 - 6.6199x + 7.5205$
43	Scan Projects Ltd.	Polynomial order 2	$y = 0.037x^2 + 1.5756x - 5.4758$
44	A Infrastructure Ltd	Polynomial order 3	$y = -0.1279x^3 + 1.9633x^2 - 6.6946x + 34.748$
45	Keerthi Industries Ltd.	Polynomial order 3	$y = 0.8304x^3 - 10.599x^2 + 34.3x + 30.209$
46	Sainik Finance & Industries Ltd.	Polynomial order 3	$y = 0.0439x^3 - 0.4945x^2 + 1.6633x + 20.954$

Linear Trend Line:

Seven cement companies out of 46 cement companies under the study such as Grasim Industries Ltd., The Ramco Cements Limited, Ultratech Cement Ltd., Birla Corporation Ltd., Everest Industries Ltd., J.K.Cement Ltd., Visaka Industries Ltd are exhibiting a clear linear trend in share prices and the share values of these companies over time were depicted in Figure 1. The Figure 1 shows forecasted industry shares for the next two years (i.e. for years 2018 and 2019). In addition to this, it also shows the R-Square value of the fitted model. Linear trend line

Figure 1: Graphical representation of Linear Trend Line for specified industries



Source: compiled by author

is providing an excellent fit to the observed share values of the above-mentioned industries over time, with R-square value being greater than 0.9 in each case. As one could be observable from Figure 1, all the seven industries are having an upward trend in terms of their share values. In other words share prices increasing every year. All these industries are getting good returns in the form of share values. It does mean that if an investor invests in these industries he/she is anticipated to receive high returns.

Table 2 shows that the forecasted share values of seven cement industries, which are experiencing to linear trend analysis. It could be observable from the Table - 2 that the forecasted values for all the above-mentioned seven cement companies are greater than their present share values in 2017. As mentioned in the methodology section, these companies were ranked based on their share value change per year (i.e. based on α value). High rank of the industry refers to the high profitable when compare to the other industries under linear trend. Investors suggestions are given in the form of buy sell and hold strategies. Buy suggestion refers to purchase of new shares could be expect more returns in the future than the present returns.

Hold suggestion do means that to hold existing shares for the next two years could expect high returns. Sell suggestion means that the industry could get less profit margin when compared to the present trend. In other words future share value could be decreased when compared to the present share value

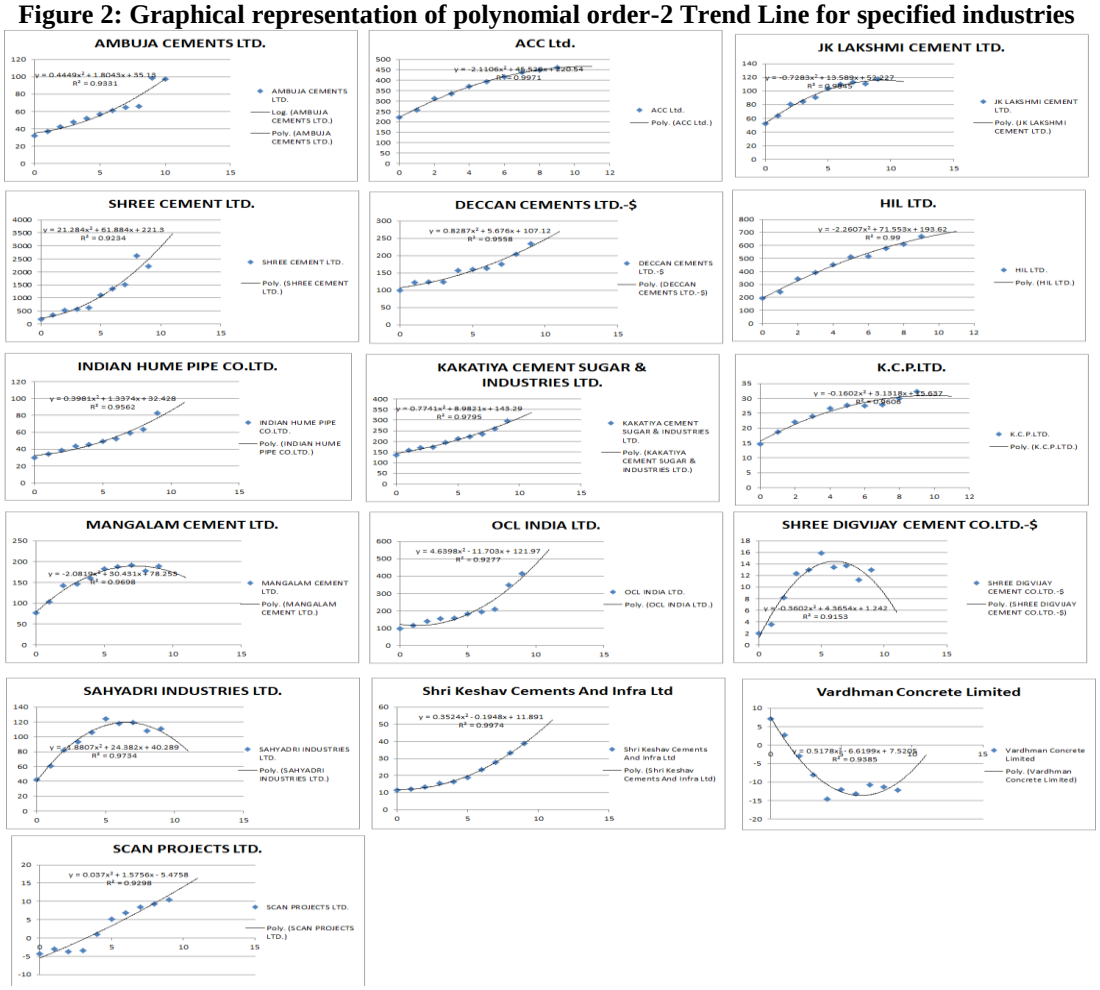
Table 2: The standing of the various cement industries that are experiencing linear trend in their share values

Security Name / **Present value of the share**	Grasim Industries Ltd.	The Ramo Cements Ltd	Ultratech Cement Ltd.	Birla Corporation Ltd.	Everest Industries Ltd.	J.K.Cement Ltd.	Visaka Industries Ltd.
Mar'18	682.15	156.413	930.04	445.72	256.617	288.31	261.95
Mar'19	732.226	168.163	1002.85	474.762	273.015	305.738	276.871
R^2	0.9896	0.9738	0.99	0.959	0.972	0.9875	0.947
Rank	II	VII	I	III	V	IV	VI
Suggestion	Buy/ Hold	Sell	Buy/ Hold	Buy/ Hold	Sell	Buy/ Hold	Sell

Above table explains that the new and existing investors can buy or hold their investments in Ultratech Cement Ltd., Grasim Industries Ltd., and Birla Corporation Ltd. These companies are having increasing trend even in the future forecasted share values. However, the suggestion is to buy and hold the above three industry shares to the new investors as well as existing shareholders respectively. The Ramco Cements Limited, Everest Industries Ltd. and Visaka Industries Ltd., J.K.Cement Ltd., companies are having more volatility and risk in future share values. However, the suggestion given to these industry stack holders is sell the existing shares and not to buy these shares.

Polynomial order 2:

Figure 2: Graphical representation of polynomial order-2 Trend Line for specified industries



Source: Compiled by author

Table 3 shows the forecasted share prices of cement companies for 2018 and 2019 years, R-Square values, ranks and investors suggestions. The above sixteen industries are having fluctuations from 2008 to 2017. Therefore, these industries are fitted in polynomial order 2 trend line. The R-Square values are near to 1 i.e.> 0.9. From the Table 3, higher rank specifies the highest return when compared to each company in the row.

Table 3: The Standing of the Various Cement Industries That Are Experiencing Polynomial Trend Order 2 in their Share Values

S.No	Security Name	Mar'18	Mar'19	R^2	Rank	Suggestion
1	Acc Ltd.	464.77	465.9764	0.9971	XV	Sell
2	Ambuja Cements Ltd.	97.659	108.8058	0.9331	VI	Buy/ Hold
3	Jk Lakshmi Cement Ltd.	115.287	113.5817	0.9845	XII	Sell
4	Shree Cement Ltd.	2968.54	3477.388	0.9234	I	Buy/ Hold
5	Deccan Cements Ltd.-$	246.75	269.8287	0.9558	III	Buy/ Hold
6	Hil Ltd.	683.08	707.1583	0.99	XVI	Sell
7	Indian Hume Pipe Co.Ltd.	85.612	95.3095	0.9562	VII	Sell
8	Kakatiya Cement Sugar & Industries Ltd.	310.521	335.7592	0.9795	IV	Buy/ Hold
9	K.C.P.Ltd.	30.935	30.7026	0.9606	X	Sell
10	Mangalam Cement Ltd.	174.373	161.0841	0.9698	XIV	Sell
11	Ocl India Ltd.	468.92	554.6528	0.9277	II	Buy/ Hold
12	Shree Digvijay Cement Co.Ltd.-$	8.876	5.6772	0.9153	XI	Sell
13	Sahyadri Industries Ltd.	96.039	80.9263	0.9734	XIII	Sell
14	Shrikeshav Cements And Infra Ltd	45.183	52.3886	0.9974	VIII	Sell
15	Vardhman Concrete Limited	-6.8985	-2.6446	0.9385	V	Sell
16	Scan Projects Ltd.	13.9802	16.3328	0.9298	IX	Sell

Source: Compiled by author

This rank has been calculated based on the equation (ii). In this equation, 'a' specifies the curved line, which reflects the more fluctuations, if this value is high which means to increase the share value for the future. According to rank, the investor's decision has been suggested in the form of buy, sell or hold shares. The existing investors can hold their investments and new investors can buy the shares of Shree Cement Ltd., Ocl India Ltd., Deccan Cements Ltd.-$, Kakatiya Cement Sugar & Industries Ltd., and Vardhman Concrete Limited Industries. The remaining industries in the above Table 3 are having more fluctuations and there is no guarantee to get good profits for the future. So, suggestion could be sold to the existing investors and not to buy these shares.

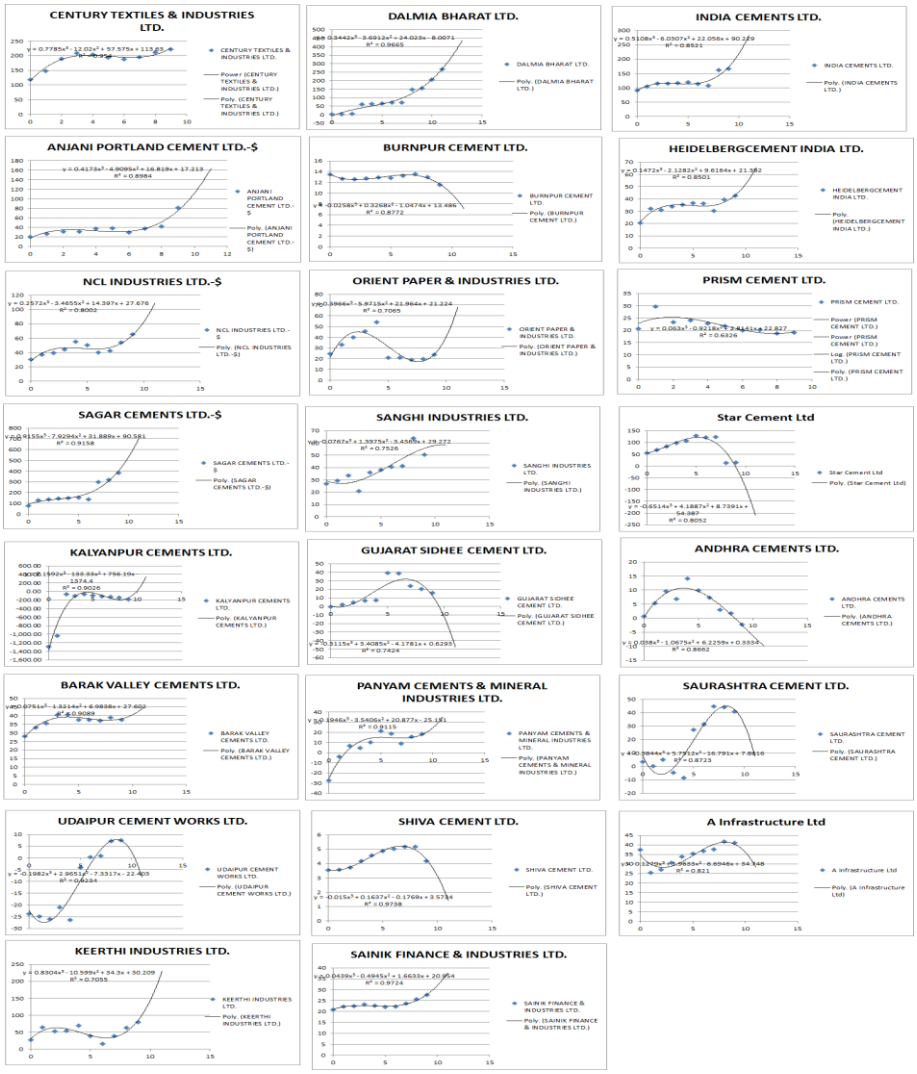


Figure 3: Graphical representation of polynomial order-3 Trend Line for specified industries

Polynomial order 3:

Source : Compiled by author

Table 4 shows the forecasted values of share prices for 2018 and 2019 financial years, R-Square value, Ranks and suggestions to investors in terms of buy, sell and hold actions on shares. About twenty-three companies are measured with high fluctuations from 2008 to 2017, according to the R-Square value these industries are fitted into polynomial order-3 trend-line projection method. Highly fitted industries are Shiva Cement Ltd., Sainik Finance & Industries Ltd., Dalmia Bharat Ltd. And Century Textiles & Industries Ltd. These R-

Table 4: The standing of the various cement industries that are experiencing polynomial trend order 3 in their share values

S.No	Security Name	Mar'18	Mar'19	R^2	Rank	Suggestion
1	Century Textiles & Industries Ltd.	265.88	328.7185	0.954	IV	Buy / Hold
2	Dalmia Bharat Ltd.	207.2741	267.697	0.9665	VIII	Buy / Hold
3	India Cements Ltd.	218.519	283.0051	0.8521	V	Buy / Hold
4	Anjani Portland Cement Ltd.-$	111.753	163.5988	0.8984	VI	Buy / Hold
5	Burnpur Cement Ltd.	9.892	7.1676	0.8772	XVII	Sell
6	Heidelbergcement India Ltd.	51.926	65.5734	0.8501	XI	Buy / Hold

7	Ncl Industries Ltd.-$	82.296	109.0507	0.8002	IX	Buy / Hold
8	Orient Paper & Industries Ltd.	40.314	68.1511	0.7065	VII	Buy / Hold
9	Prism Cement Ltd.	21.788	26.0973	0.6326	XIII	Buy / Hold
10	Sagar Cements Ltd.-$	532.031	700.4331	0.9158	II	Buy / Hold
11	Sanghi Industries Ltd.	57.953	58.4759	0.7526	XVIII	Buy / Hold
12	Star Cement Ltd	-90.752	-209.664	0.8052	XXIII	Sell
13	Kalyanpur Cements Ltd.	13.7	339.6552	0.9026	I	Buy / Hold
14	Gujarat Sidhee Cement Ltd.	-1.368	-2.0759	0.7424	XXI	Sell
15	Andhra Cements Ltd.	-11.8017	-47.5078	0.8662	XV	Sell
16	Barak Valley Cements Ltd.	-6.1576	-9.7712	0.9089	XII	Sell
17	Panyam Cements & Mineral Industries Ltd.	40.4	44.4925	0.9115	X	Buy / Hold
18	Saurashtra Cement Ltd.	24.159	35.096	0.8723	XXII	Sell
19	Udaipur Cement Works Ltd.	8.876	5.6772	0.9234	XX	Sell
20	Shiva Cement Ltd.	2.59	-8.0788	0.9738	XVI	Sell
21	A Infrastructure Ltd	13.9802	16.3328	0.821	XIX	Sell
22	Keerthi Industries Ltd.	36.232	28.4318	0.7055	III	Buy / Hold
23	Sainik Finance & Industries Ltd.	143.709	230.2924	0.9724	XIV	Buy / Hold

Source : Compiled by author

Square value is greater than 0.9.Higher rank shows in table-4do means that the more returns when compare to other industries. This rank calculated based on the equation (iii). In this 'a' specified the first curve, 'b' specifies the send curve fluctuations, if 'a' value is high that means future share price will be high. Based on the rank, the authors given suggestions. If the rank is high and positive 'a' value is existed then the suggestion could be buy or hold shares. Otherwise sell shares, because, these shares are more fluctuated in the future and also highly risk.

Most Profitable Cement Companies

Out of 46 cement industries listed with BSE Ltd, 13 cement industries are found to be most lucrative for investors for their investment purpose. Table 5 exhibits the list of most profitable cement industries as per the trend drawn.

Table 5: Most Profitable Industries as per Trend Line

S.No	Security name	Type of Trend
1	Ultratech Cement Ltd.	Linear
2	Grasim Industries Ltd.	Linear
3	Birla Corporation Ltd.	Linear
4	Kakatiya Cement Sugar & Industries Ltd.	polynomial order-2
5	Shree Cement Ltd.	polynomial order-2
6	Ocl India Ltd.	polynomial order-2
7	Century Textiles & Industries Ltd.	polynomial order-3
8	Dalmia Bharat Ltd.	polynomial order-3
9	India Cements Ltd.	polynomial order-3
10	Anjani Portland Cement Ltd.	polynomial order-3
11	Sagar Cements Ltd.-$	polynomial order-3
12	Kalyanpur Cements Ltd.	polynomial order-3
13	Sainik Finance & Industries Ltd.	polynomial order-3

Source: Compiled by author

It may be summed up that if the investors put their investments in these 13 cement industries they could get high returns when compared to other cement industries.

IX. SUMMARY AND CONCLUSIONS:

This paper analyzed the time series trend-line projection methods for identifying the high return industries among BSE registered cement industries. This analysis is mainly used to identify the fluctuations in each industry, forecast the future share value and give suggestions to the existing and new investors by using higher rank. There are polynomial trend line method has been used with order 1,2 and 3 namely linear trend line, polynomial order-2 and polynomial order-3 during the period 2008 to 2017. If the

line is linearly increasing or decreasing order which cross or touch almost all points in the graph, then this line considered as linear trend, if the line is in single curved manner which touches almost all points, it is considered as polynomial order-2 trend line and if the line is in two curved with high up and downs which may or may not be touch all points in the graph could be considered as polynomial order-3 trend line.

To forecast the future share values, authors have used polynomial equations (equation (i), (ii) and (iii)). The calculated values are shown in the Table-2, Table-3 and Table-4. The forecasted equations are presented in Table-1. The industries under the linear trend are having less fluctuations, according to the value of 'α' rank has been shown in Table-2. Based on rank and positivity of 'α' value the suggestions have been given in Table-2. If the suggestion is buy that means that particular industry's historical background is positive and future also it performs very encouragingly. So, the existing and new investors can take a chance to get more profits with purchase of particular shares. Hold suggestion describes that the existing investors would get better profits in the future, comparing with present situations. If they wait up to next two years they would increase their profits. Moreover, sell suggestion is given to the investors at the decreasing profit situation. This could be explained in equation (iv). The suggestion could be sell the shares when the forecasted share value is less than the historical share value because if they hold their shares then the investors would get loses in the future.

The present analysis concludes that the thirteen industries are getting good profits and share values are also in increasing manner. If the investors were participating actively in the above industries, they would be created high returns. Further, the analysis can be applied in other homogeneous securities for the future work to find reasons for the fluctuations in the market.

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