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Analysis of Degree of Global Competitiveness: A Case on Cement Industry

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Abstract:

In this paper, we want to measure the extent of global competition in cement industry, a core industry for developing economic infrastructure for a nation. Over the years, the demand for cement in real estate, infrastructure and industry expansion projects are increasing. This paper, analyses the global competitive data on cement producing countries with the help of time series analysis to predict the future direction. The result shows a significant decrease of the degree of competition of cement producing countries, but the performance of India is significantly increasing. Though, the Indian cement industry has some multinational giant firms, but broadly it is home grown. So, increasing market share of Indian cement has an opportunity for cement producing companies in India.

Keywords: Cement industry, degree of competition, time series analysis

1. Introduction

The global cement industry is a complex structure of cement/clinker movements and local, regional, national, and global markets. The structure is very dynamic affected by some environmental factors likes – housing sector booms, macro-economic growth, public spending levels, trade protectionism, transportation costs, etc. There are relatively few multinational companies dominating cement industry in many markets throughout the world, and thus this sector has become even more globalized in recent years. From the economic crisis in 2008, the global cement industry has undergone huge changes in recent years; like- India and China in these emerging markets represent approximately 90% of the world-wide cement market. Developed nations like Europe and the Americas account for most of the remainder, despite ongoing financial difficulties. With an increasing multinational presence in growing Chinese, Indian, Middle East and Latin American markets, the structure of world trade in cement and clinker continues to be dynamic, with the dramatic changes in shipping costs adding a further layer of complexity to trading patterns. In the coming years, there will be an extensive change in supply/demand patterns of cement, as different regions/nations enjoy very different development profiles.

Before 1914 India's contribution in the cement industry was not so significant. But from that year itself, they started production of 1000 t and increased the figure upto 1026 t in 1924. In the same 10years period, India consumed a total of 2Mt of cement, and half of the amount was imported.

In the year 1925 Indian Cement Manufacturers' Association (ICMA) was set up with the objective to end the uncertainty surrounding the industry and to promote for tariffs on imported cement. Then in the year 1961, the modern Cement Manufacturers' Association (CMA) was reformed.

In between 1925 to 1942, the capacity of the Indian cement industry gradually increased to 1.8Mt, with imports declining to just 1000t/yr over the same period. However, all was not well with the industry, as this industry like other industries, suffered due to the Great Depression in the USA and continued with the Second World War in Europe. To control the price wars, Associated Cement Companies (ACC) was formed from 11 competing firms in 1936.

From 1942 the cement industry of India was coming under the power of defence and government of India regulated prices directly from 1945 to 1956.

With the rapid growth of the Indian economy after the 1990s, the infrastructural development of the country was fantastic. The increase in construction activities has led to increase in demand for updated quality building materials and other related products. Cement is one of the main elements of the building; there is a growth in the cement industry in India. The Indian cement industry in 2013 was the second largest producers after China.

Consumption of cement in India has increased by nearly 7.5%. With the globalization of the Indian cement industry, many foreign cement producers to engage in contracts and deals with their Indian counterparts to get a share of growth.

2. Objective of the Study

To analyze the degree of global competitiveness in cement producing countries with special reference to Indian cement industry.

3. Limitations of the Study

- The data collected in a broader sense. It does not show the company wise production of a particular country.
- The data is confined only to the top 10 countries and not all the countries of the world
- The period is taken only from 2001 to 2013 due to its availability from the source.

4. Methodology

The following methodology is broadly divided into several sections like period covered, further research scope, and the techniques used to study.

5. Period Covered

The time period selected for the analysis is from 2001 to 2013. The data is dependent on the availability of the secondary data and is collected from the site from <http://minerals.usgs.gov/minerals/pubs/commodity/cement/>.

6. Further Research Scope

With the help of this study one can further study the attractiveness of the said industry. This study will help the researchers, economist and others to measure the degree of global competitiveness and change in the trends of the production of any other industries.

7. The Techniques Used to Study

In order to find the degree of competition the market share of nations competing in global cement production should be collected. The data of top ten countries which is collected from the United Nations database has to be analyzed with the formula of degree of competition. The formula for degree of competition is $(1 - \sqrt{\sum s_i^2})$ where s_i is the market share of each individual

Nation in global cement production, i ranging from 1 to n . For each year we can calculate one such measure, generating there by a time series data. One can next carryout trend analysis. We have collected time series data of production of major cement producing countries from 2001 to 2013. For simplicity, we have presented only the data of production of top ten major cement producing countries in the world. Rank-wise we have selected ten top countries with China holding the 1st rank followed by India, United States, Iran, Brazil, Turkey, Russian Federation, Vietnam, Japan, Saudi Arabia. We have included the rest of the countries under the group "Others". Then we have proceeded by calculating their market share. We have next calculated squares of these individual market shares for a particular year and then added those squares to get $\sum s_i^2$ for that year. The entire process can be repeated for obtaining $\sum s_i^2$ for all the years. Next, we have calculated the value of $(1 - \sqrt{\sum s_i^2})$ to obtain the degree of competition for all the years. All those $(1 - \sqrt{\sum s_i^2})$ values calculated for the period under study have given rise to a time series data on the degree of competition. We have next plotted these values against time to get an idea about the trend equation to find out if the competition is stagnant, increasing or decreasing.

8. Descriptive Analysis

From Table 1 it is clear that the world production of cement majorly captured by China solely by 50% rest other countries share 50% among them differently. If we compare to the first rank country to second rank holder country the gap is ten times. So, is dominating this particular industry and sometimes dominate the whole world by their cement production. India's production is also in better side and maintaining its position from 2001 to 2013.

In the above period only three countries market share increases from earlier share, they are China, India and Vietnam. China's market share is sharply increases from .37% in 2001 to .58% in 2013 as per table 2. India's cement production market share increases only 1% in the above period. Vietnam throughout maintains a percentage of 1 but except for 2010, 2012 and 2013 percentage increases 1%. The market share decreases sharply for USA and Japan. USA's market share decreases from 5% in 2001 to 2% in 2013. Whereas, for Japan, the market share came down from 5% to 1% in the above period.

Countries	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	China	626.5	705	750	934	1000	1200	1300	1390	1400	1880	2000	2210
India	100	100	110	125	130	155	160	177	180	210	210	270	280
USA	90.5	91.3	92.6	99	99.1	99.7	96.4	87.6	72.8	67.2	68.4	74.9	77.8
Iran	26.7	30	31	30	32	33	34	44.4	45	50	52	70	75
Brazil	39.5	39.5	40	38	39	39.5	40	51.9	53	59.1	62.6	68.8	70
Turkey	30.1	32.6	33	38	38	47.5	48	51.4	51	62.7	64	63.9	70
Russia	35.1	37.7	40	43	45	54.7	59	53.6	55	50.4	52	61.5	65
Vietnam	12	15	20	25.3	27	32	32	37	37	50	50	60	65
Japan	76.6	71.8	72	67.4	66	69.9	70	62.8	60	51.5	47	51.3	53
Saudi Arabia	20.6	21	23	23.2	24	27.1	28	31.8	32	42.3	44	50	50
Others	642	656	648	707	720	792	733	852	814	787	750	820	894
World	1700	1800	1860	2130	2220	2550	2600	2840	2800	3310	3400	3800	4000

Table 1: Volume Of Cement Production (In Million Tonnes)
Source: [Http://Minerals.Usgs.Gov/Minerals/Pubs/Commodity/Cement/](http://Minerals.Usgs.Gov/Minerals/Pubs/Commodity/Cement/)

Countries	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	China	0.37	0.39	0.4	0.44	0.45	0.47	0.5	0.49	0.5	0.57	0.59	0.58
India	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
USA	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02
Iran	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Brazil	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Turkey	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Russia	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Vietnam	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02
Japan	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01
Saudi Arabia	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Others	0.38	0.36	0.35	0.33	0.32	0.31	0.28	0.3	0.29	0.24	0.22	0.22	0.22
$\sum s_i$	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 2: Market Share Of Top 10 Countries
Source: From Table 1

Countries	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	China	0.13	0.15	0.16	0.19	0.20	0.221	0.25	0.23	0.25	0.322	0.34	0.33
India	0.00	0.00	0.00	0.00	0.00	0.003	0.00	0.00	0.00	0.004	0.00	0.00	0.00
USA	0.00	0.00	0.00	0.00	0.00	0.001	0.00	0.00	0.00	0.000	0.00	0.00	0.00
Iran	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00
Brazil	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00
China	5814	3403	259	228	2906	45	0.25	955	0.25	6	6	82	063
India	346	3086	35	344	3429	69	3787	388	4133	03	38	5	49
USA	2834	2573	248	216	1993	53	1375	095	0676	41	04	04	038
Iran	0247	0278	028	02	0208	17	0171	024	0258	23	02	03	035
Brazil	054	0482	046	032	0309	24	0237	033	0358	32	03	03	031
Others	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00

Turkey	0313	0328	031	032	0293	35	0341	033	0332	36	04	03	031
	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00
Russia	0426	0439	046	041	0411	46	0515	036	0386	23	02	03	026
	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00
Vietnam	0049	0069	012	014	0148	16	0151	017	0175	23	02	02	026
	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00
Japan	203	1591	15	1	0884	75	0725	049	0459	24	02	02	018
	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.00	0.00
Saudi Arabia	0147	0136	015	012	0117	11	0116	013	0131	16	02	02	016
	0.14	0.13	0.12	0.11	0.10	0.096	0.07		0.08	0.056	0.04	0.04	0.04
Others	2617	282	137	017	5186	47	9481	0.09	4515	53	87	66	995
$\sum s_i^2$	8478	5204	323	056	5883	38	6898	643	1422	34	06	21	768

Table 3: Square Of Market Share

Source: From Table 2

The consistent performance was shown by countries like Iran, Brazil, Turkey, and Russia. They all through maintain 2% market share in the above said period.

9. Statistical Analysis

The time series data set on global cement production have been used to study the trend in competition from 2001 to 2013. To calculate the degree of competition we have used Dr. Roy's formula $(1-\sqrt{\sum s_i^2})$, where s_i is the market share of the i^{th} country. In Table 3 we have calculated the $\sum s_i^2$ derived from Table 2 for each country for each year. To analyze the trend of competition for detecting any change in the degree of competition in global cement production over the years, we would like to plot the values of $(1-\sqrt{\sum s_i^2})$ over the years, which can be observed in Table 4.

Year	$\sum s_i^2$	$\sqrt{\sum s_i^2}$	$1-\sqrt{\sum s_i^2}$
2001	0.2885	0.53712	0.46288
2002	0.2952	0.54332	0.45668
2003	0.2932	0.54148	0.45852
2004	0.3106	0.55731	0.44269
2005	0.3159	0.56205	0.43795
2006	0.3254	0.57044	0.42956
2007	0.3369	0.58043	0.41957
2008	0.3364	0.58	0.42
2009	0.3414	0.58429	0.41571
2010	0.3853	0.62073	0.37927
2011	0.4006	0.63293	0.36707
2012	0.3921	0.62618	0.37382
2013	0.3877	0.62266	0.37734

Table 4: Calculation of Degree Of Competition

— Source: From Table 3

In Table 4, we have calculated the $1-\sqrt{\sum s_i^2}$ and analyze the data by making the trend line of the same.

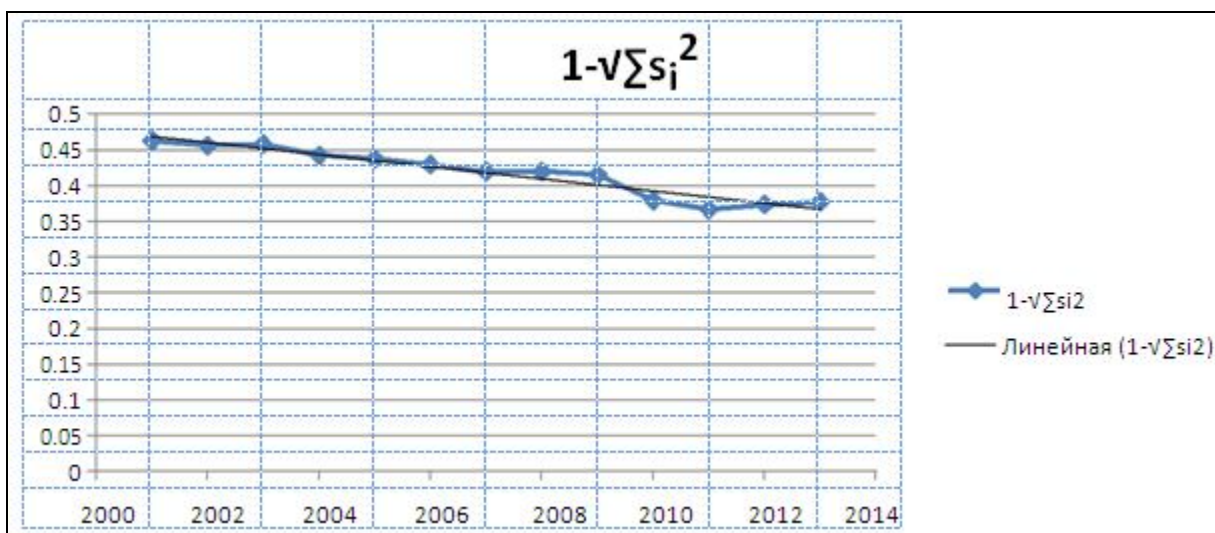


Figure 1: The graph shows the trend line of global competitiveness in world cement production during 2001 to 2013

In view of Figure 1, we further propose to go for linear regression analysis. The hypothesis which is considered for the above study is H_0 as null hypothesis that there is no change in the degree of global competition in cement production over the years against H_a as the alternative hypothesis that there is an increase or decrease in the same over the years.

Let the linear trend equation of Global Competitiveness of the Cement producing countries represented by

$GC_C = x + y t + \epsilon$	(1)
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Table 5

where GC_{CV} is the global competitiveness of cement production, t is the time variable, x and y are the regression parameters, and ϵ is the error term. Estimate value of x and y can be determined from the least square method, using time series data from Table 4.

The corresponding analysis is presented below			
<u>LINEAR</u>			
Multiple R	.963	R Square	.928
Adjusted R Square	.921	Standard Error	.010
ANOVA			
	DF	Sum of Squares	Mean Square
Regression	1	.013	.013
Residuals	11	.001	.000
Total	12	.014	

Table 6

F =	141.560	Signif F = .000			
----- Variables in the Equation -----					
Variable	B	SE B	Beta	t	Sig t
Time	-.008	.001	-.963	-11.898	.000
(Constant)	.478	.006		84.753	.000

Table 7

The estimated value of x and y are and Here is .478 and is -.008. To examine the significance value of y , we like to test the null hypothesis, where y is equal to zero against the alternative hypothesis that y is greater or lesser than zero. The observed value of t is -11.9, with t significant value of .000, which is less than .05. Hence, the null hypothesis is rejected at 5% level of significant i.e. the

global competitiveness of world commercial vehicle production is “decreasing over time”. The value of R, is 0.963. The value of F ratio is 141.560 with significant value 0.000, which is also less than .05. Thus, one can conclude, the decreasing trend of linear equation is good fit for the said problem.

10. Conclusion

Thus, we finally conclude that the global competition for Cement production is decreasing over the years. Whereas, the market share of India is increasing over the years. So, decreasing competition of global cement production along with increasing market share of India indicates a positive sign for Indian companies.

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