

# **INDUSTRY CONCENTRATION VIS-À-VIS SUSTAINABLE GROWTH-CASE OF SOME SPECIFIC INDIAN INDUSTRIES**

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## **ABSTRACT**

The subject of industrialization receives the attention of scholars and policy formulators over the years throughout the world. By any reckoning the nineties represent a significant development in the recent economic history of Indian manufacturing industry. The economic liberalization and globalization of Indian economy in 1991 represents two important dimensions for the manufacturing industry in India. First, Trade liberalization- it represented an effort to integrate India with the rest of the world, second abolition of industrial licensing and increase the role of private sector in industrial development. This paper makes an attempt in analyzing industry concentration through Herfindahl Index and the sustainable growth of these industries through the factors like leverage, sales potentiality and assets investment to assess industrialization experience. The focus is on post reform period from 1990-2014 for four manufacturing industries and have also examined whether industry concentration is affecting sustainable growth for these industries or not.

**Keywords:** industrialization, liberalization, industry concentration, sustainable growth, Herfindahl Index, manufacturing industry etc.

## **INTRODUCTION:**

Industrialization plays a vital role in economic development of any country and this is particularly true for developing countries like India because it directly targets the generic problems of poverty, unemployment, low production, low productivity and low standard of living etc. The subject of industrialization receives the attention of scholars and policy formulators over the years. Before 1980 Indian industry was highly regulated and protected, most formal manufacturing sector were subject to licensing requirements and capacity control. The market structure in most of the manufacturing sector was largely shaped by stringent government regulations. The economic reforms that arguably began in 1980's gained prominence in 1991. The economic liberalization and globalization of Indian economy in 1991 brought a radical change in the Indian economy and particularly it represents two important dimensions for the manufacturing industry in India. First, Trade liberalization- it represented an effort to integrate India with the rest of the world, second abolition of industrial licensing and increase the role of private sector in industrial development via the modification of MRTP Act. As a result, industries in Indian manufacturing sector have been progressively deregulated and consequentially exposed to competition. It is reasonable to expect that after liberalization the market structure in Indian industry is determined more by normal competitive process and less by government regulations. Thus, by any reckoning the nineties represent a significant development in the recent economic history of Indian manufacturing industry.

If we look into the contribution of different sectors to the GDP over this period, it is observed that the sectoral shares have changed over the reform period and also there are changes in the factor intensities and diversification. The agricultural sector value added to GDP declined from 35 per cent in 1980 to 15 per cent in 2014. Over the 32 years the share of agriculture in GDP has shrunk by 18 percentage points. In the same period the share of industrial sector in GDP increased from 24 per cent to 26 per cent and that of manufacturing declined from 16 per cent to 14 per cent. For that matter, the share of manufacturing never went over 17 per cent of GDP ((1995 and 1996 it was 17 per cent). Industries share in the GDP went up to the maximum of 29 per cent of GDP in the years 2006 and 2007. This clearly indicates there has been stagnation in both industrial as well as manufacturing sector. Only sector which grew at a faster rate was the services sector. In 1980 the share of services sector in GDP was 38 per cent and in 2014 it increased to 57 per cent and a net increase of 19 percentage points over the years (Source: World Bank, World Development Indicators, CSO Various years.) The matter of concern is the rapid growth of service sector cannot be sustained in the long run unless it is adequately supported by the growing manufacturing economy. In this context, the kind of stagnation in manufacturing industry experienced need to be examined. Thus, one is interested to know whether the liberalization brought concentration of the industry into the hands of few because of privatization and that hinders the sustainable growth of the industry?

The purpose of this paper is to study the evolution of concentration in four specific Indian manufacturing industries over the period 1990-2014. This paper studies the market structure with the help of the industry concentration theory for four industries named Automobile-Passenger Car, Drugs and Pharmaceuticals, Cement and Steel. Also, it refers to the theory of sustainable growth of those industries and analyze the effect of industry concentration on sustainable growth.

The paper is organized as follows. Section I describes the industrial policy regime in India and its impact on market structure along with literature review. Section II describes industry concentration and structural growth. Section III shows the evolution of industry concentration for the four specific industries named Drugs and Pharmaceuticals, Automobiles (passenger Car), Steel and Cement for the time period 1990-2014-15. Section IV shows the data, methodology and calculation of sustainable growth. Section V discusses our empirical findings. Section VI concludes with a summary and some suggestions for the ongoing.

## **LITERATURE REVIEW:**

In this section we briefly review the theoretical and empirical literature on the relation between industry concentration and structural growth. This paper studies the evolution of industry concentration of specific industries in the perspective of liberalization. Before liberalization the pattern of industry concentration was determined largely by the regulatory mechanism of the Government. In some sectors licenses were restricted

to a handful of firms, usually in order to prevent 'unnecessary duplication of investment', resulting in relatively concentrated markets (Athreye and Kapur 2004 'b'). After economic reforms in 1991 the scenario has been changed. Many industries became deregulated and exposed to foreign competition. Liberalisation of technology policy has allowed Indian firms to collaborate with international firms. (Basant ,2000) finds that Indian firms have increasingly turned to collaboration with foreign firms as a means of acquiring technology. After liberalization concentrated structure of some Industries are dominated by incumbent foreign firms (Athreye and Kapur 2004 'a'). The study of (Athreye and Kapur 2004 'b') explored the determinants of industry concentration before and after liberalization.

The focus of this paper tries to predict the relationship between the industry concentration and sustainable growth- to the best of our knowledge which have not been tested earlier. In the long run, the increased level of expenditures is sustainable only if profitability of that industry is high enough. Relatively fragmented market structures are unlikely to sustain such high levels of profitability. In such industries, larger market size may be associated with an escalated expenditure on advertising rather than competition. In industries where advertising and concentration do not matter, as market size increases, concentration levels might fall .another determinant we can consider is the financing choice of the active firms in any industry can affect the concentration level. Debt equity ratio which represent the capital structure or the financing choice of the active firms in the industry.Literature like (Dasgupta & Titman, 1998), long term debt induces firms to compete less aggressively in the market because it increases the rate at which future profits are discounted the model (Dasgupta&Titman,1998) Debt equity ratio which represent the capital structure or the financing choice of the active firms in the industry.Literature like (Dasgupta&Titman1998), long term debt induces firms to compete less aggressively in the market because it increases the rate at which future profits are discounted.

This paper is an empirical study of concentration in the Indian manufacturing sector for the period 1991-2014-15. We study the evolution of industry concentration of individually for four manufacturing sector named Drugs and Pharmaceuticals, Automobiles(passenger car), Steel and Cement. We have collected industry data from CENTRE FOR MONITORING INDIAN ECONOMY (CMIE) for the industries named Drugs and Pharmaceuticals, Automobiles (passenger Car), Steel and Cement industry.

#### **Industrial concentration and sustainable growth:**

Industrial concentration refers to the extent to which production is concentrated amongst firms in an industry. The number of active firms in the industry provides a simple measure of concentration; the greater is the number of firms the less concentrated (more competitive) is market structure. The Herfindahl index provides measure of industrial concentration for any industry this index is computed as the sum of the squared market shares of all firms in any industry; In a market economy, high concentration is usually indicative of lack of competition, with direct implications for prices, profits and economic welfare. The value of industrial concentration ranges from 0 (denoting extreme fragmentation) to 1 (extreme concentration).

The growth rate of any industry is an indicator of stability in future. This growth rate depends on earnings capacity, retention of earning policy, loan component i.e. leverage, sales potentiality and assets investment to the industry. Hence the sustainable growth (I.M. Pandey rate of an industry depends on the composite effect of all these factors and the planner of finance should always keep in mind all these factors at any point of time. Higher index value of Herfindahl indicates high concentration i.e. few firms dominates the industry and the remaining firms' performance are not significant. A low value of HI indicates less or no concentration i.e. all firms in that industry performing in competitive way. From this concept it is apparent that high sustainable growth (SG) rate may be a factor of HI.

#### **Industry Concentration of some Indian Industries:**

##### **Automobile-Passenger Car Industry:**

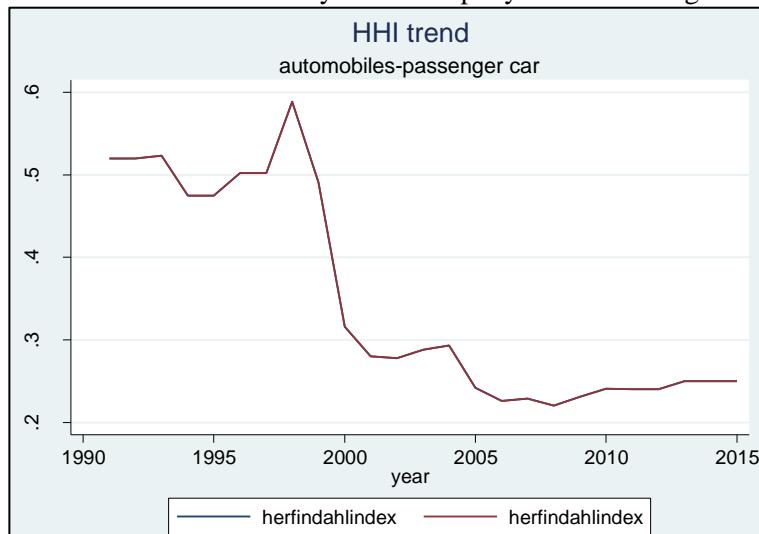
The automotive industry is one of the focus industries for the emerging economies like India. Demographically and economically, India's automotive industry is well-positioned for growth, servicing both domestic demand and increasingly, export opportunities.

Domestically, some consolidation or alliances might be expected, driven by the need for access to better technology, manufacturing facilities, service and distribution networks. The components sector is in a

strong position to cash-in on India's cost-effectiveness, profitability and globally-recognized engineering capabilities.

After 1991 with the introduction of New Industrial policy and with the death of license raj automobile industry was allowed to expand. The passenger car segment has been dominated by three vendors – Maruti Suzuki, Hyundai and Tata Motors (which together accounted for 70 percent of passenger car sales in 2009-10).( SIAM)

Considering the robust growth the industry is currently witnessing, it is clear that any new entrant would need to demonstrate consistent and clear differentiators to make a play for a leadership position in the Indian market. After the relaxation of restriction in FDI Many multinationals like Daewoo, Peugeot, General Motors, Mercedes-Benz, Honda, Hyundai, Toyota, Mitsubishi, Volvo, Ford and Fiat entered the market. As the new entry took place concentration in industry declines rapidly as it is showing in the graph.



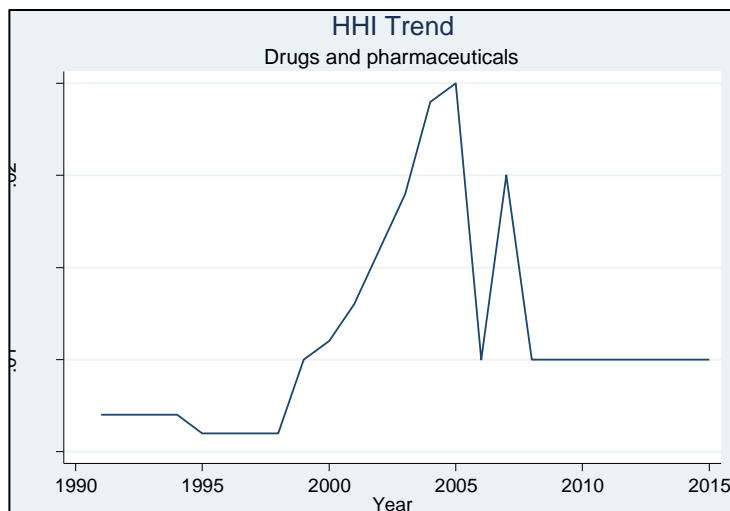
It is a known markets fact that health of country's automobile industry is one of the key indicators of the manufacturing competitiveness of the country. India has emerged as one of the key global (both as consumption and as production base) in automobile industry and particularly in last few years it has witnessed tremendous growth and has also been base for global manufacturers . Volkswagen, Nissan, Renault, General Motors, Ford, Honda, Suzuki, Hyundai, Daimler, BMW, Skoda, Audi, all top brands are present in India. In June 2014, the domestic passenger vehicle (PV) industry sales volumes at 218,828 units recorded a growth of 11.2% YoY, a reasonably strong performance considering the persistent weakness in demand that has weighed on industry growth in the last three years. In terms of market share, the largest player Maruti Suzuki improved its share in the domestic PV industry to 44.0% in 2014-15 (42.1% in 2013-14) as seven out of its 10 key models witnessed a positive growth. Compared to 2013-14, Hyundai and Honda improved their market share with the latter emerging as the fourth largest player (after Maruti Suzuki, Hyundai and M&M) has overtaken Tata Motors (SIAM).

The Indian automobile industry is set to continue its growth trajectory, in the medium term, on the back of steady economic growth. Some consolidation or alliances could possibly be expected, driven by the need for access to technology, manufacturing facilities, service and distribution networks:- Some evidence of this has already been seen with Fiat's diesel engine being used in Suzuki's vehicles, as well as Tata vehicles- Tata is managing the service and distribution facilities for Fiat India.(KPMG 2010 Report).

The market for greener vehicles opens up a whole new world of possibilities for Indian companies, even outside the automobile sector (such as leaders in renewable energy), to make a global foray.

- A greater focus on export opportunities could tap into a worldwide market hungry for green technology, which India can provide cost-effectively and to global standards. Business models of global green vehicle manufacturers should be examined to see how mass market penetration can be enhanced
- Collaboration is likely to be the theme for the next decade as new markets and products are created by companies forging previously unimagined partnerships. Companies will need to think beyond existing business models.

## DRUGS AND PHARMACEUTICALS INDUSTRY:



Pharmaceutical industry is uniquely an industry in which the normal processes of concentration and competition do not follow the same theory like other industry.

The structure of the pharmaceutical sector in India, and the behavior of market players, suggest that all the major dimensions of competition law need to be brought into play. As pointed out in the pioneering study by Nanda and Khan (2006), there is the possibility of anti-competitive horizontal agreements at the level of producers as well as distributors, vertical agreements between producers and distributors in the supply chain; abuse of dominance arising out of patent protection; and mergers and acquisitions which increasingly involve foreign takeovers of Indian firms. In addition, several other government policies, some unique to the sector, have a significant impact on competition in the pharmaceutical sector. Most obviously, it is perhaps the only sector in which the Indian government still regulates the prices of private producers for a range of products.

Until 1970, the Indian pharmaceutical market was dependent on imports and dominated by multinational corporations. Drug prices were amongst the highest in the world. The scenario changed dramatically after the Patents Act of 1970 allowed process but not product patents for pharmaceuticals, enabling Indian firms to imitate foreign drugs by making minor modifications to the manufacturing process. Finally, like other industries, domestic pharmaceuticals manufacturing benefited from the highly protectionist trade regime based on high tariffs and stringent import licensing. All these policies were put into reverse gear from the late 1980s. In particular, imports and foreign investment which had been kept at bay were now permitted to increase their penetration of the domestic market, and product patents were reintroduced in 2005 as part of India's obligations under the WTO TRIPS Agreement. There was a wave of mergers and acquisitions, increasingly involving foreign takeovers of Indian firms. More firms have exited than entered the industry in recent years. Despite these trends, price-cost margins of the industry have been under pressure, and concentration has fallen, especially after accounting for import competition. However, due to brand-name differentiation and marketing strategies, concentration is high and rising, with widely dispersed prices, at the level of some individual standardized generic drugs.

Sections of the Competition Act that require notification and screening of mergers above specified asset and turnover thresholds were brought into force only in mid-2011, and only six merger applications in the pharma sector have been reviewed since then. All of them have been approved because they did not pose competition concerns. In one case, the CCI forced the parties to modify their non-compete agreement. However, many other mergers in the sector were not reviewed because they fell below the notification thresholds. There is a case for reducing the thresholds for critical sectors like pharmaceuticals, which will be possible only as and when a recently-tabled bill to amend the Competition Act is passed by Parliament. A major change in the approach has been proposed in the

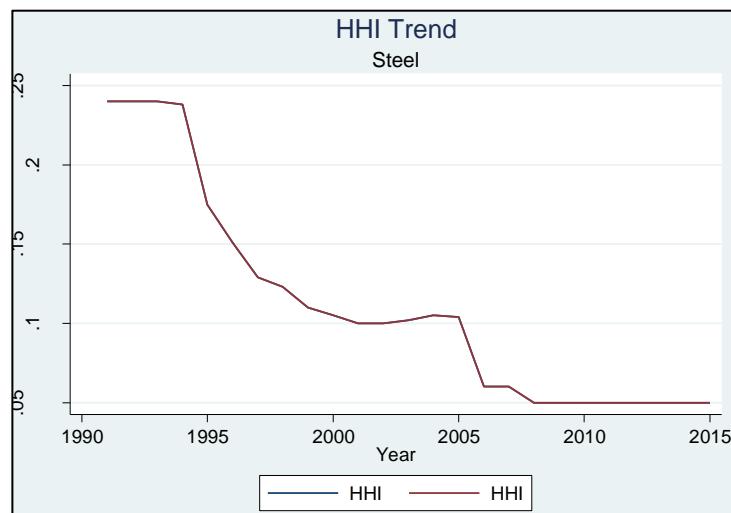
National Pharmaceuticals Pricing Policy (NPPP) 2012. Although it will greatly expand the number of drugs under control, it will cover only formulations. According to the First Pharmaceutical Manufacturing Census of India, reported in the Annual Report of the Department of Pharmaceuticals 2010-11, there were 10,563 pharma manufacturing units in India, comprising 8174 producing formulations and 2389 producing bulk drugs(website of Ministry of Statistics and Programme Implementation, Central Statistics Office, Annual Survey of Industries 2010-11).

As the country has embarked on the new patent law regime, with concurrent liberalization of industrial, trade and price control policies, the industry is experiencing major changes. There is consolidation in the industry in the form of mergers, acquisitions, joint ventures, contract research and manufacturing etc. The foreign companies are acquiring the leading Indian companies. Ranbaxy's acquisition by Daichii, Piramal's acquisition by Abbott, and Dabur's acquisition by Fresenius Kabi Oncology Ltd. are just a few examples where the leading Indian pharma companies have been acquired by the foreign companies. "Many of the world's leading pharmaceutical companies have subsidiaries or other operations in India. Multinational companies like GlaxoSmithKline (GSK) Baxter, Aventis, Pfizer, Novartis, Wyeth, and Merck have been active in India's pharmaceutical market mainly through subsidiaries. The reintroduction of product patents precipitated the return of a large number of other MNCs, some of whom left during the process patent era.

Concentration measures give an insight about the competition in an industry. The higher is the industry concentration, the lower is the level of competition and we expect a small number of firms to control the market. Economists rely on the market shares of the firms to arrive at concentration indices. As part of her study on mergers, Kaur (2012, pp.318-24) calculates the HHI for pharmaceuticals using Prowess data and shows that it declined considerably during the 1990s and then rose somewhat during 2000-2004, due to almost no entry and an upsurge in merger activity. She shows that this is mirrored by similar trends in the combined market share of the top four firms in the industry (CR4), but not for the next eight firms. This indicates that the increase in concentration in the more recent period is attributable to the enlargement of market shares of the top four firms. However, she argues that the composition and ranking of the 12 leading firms (in terms of sales) changed considerably over the period, and interprets this as a sign of healthy competition. Using somewhat more recent Prowess data going up to 2007, but only for those pharma firms quoted on the Bombay Stock Exchange, Mody et al (2011) also found a sharp decline in the HHI during the 1990s, followed by an equally sharp increase in the 2000s.

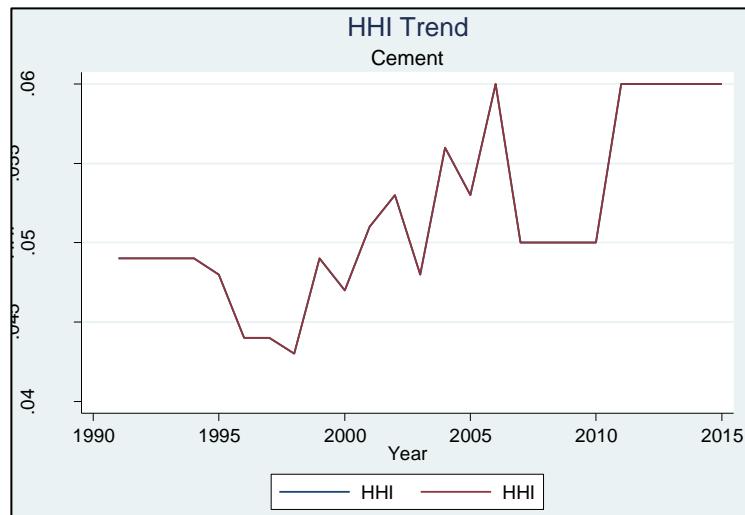
In Conclusion, we can say that pharma industry there is massive heterogeneity among the size of the firm. The industry's typical feature is extreme fragmentation with concentration at the top. In other words we can say that it consists of a very large number of small firms and small number of large firms. Concentration levels differ among segments. In some particular segment it is fairly competitive but for some segments there are high levels of concentration.

### **Steel Industry:**



Consumption of steel is taken to be the measure of economic development so India's economic growth is contingent upon the steel industry. The establishment of Tata Iron and Steel Company (TISCO) in 1907 was the starting point of modern Indian steel industry. Afterwards a few more steel companies were established namely Mysore Iron and Steel Company, (later renamed Vivesvaraya Iron & Steel Ltd) in 1923; Steel Corporation of Bengal (later renamed Martin Burn Ltd and Indian Iron & Steel Ltd) in 1923; and Steel Corporation of Bengal (later renamed Martin Burn Ltd and Indian Iron and Steel Co) in 1939. All these companies were in the private sector. In 1973 Steel Authority of India Limited (SAIL) was created as a holding company to see the iron and steel production of India (Government of India Joint plant Committee Report 2007). At the time of independence, India had a small Iron and Steel industry with production of about a million tons (mt). In due course, the government was mainly focusing on developing basic steel industry, where crude steel constituted a major part of the total steel production. Many public sector units were established and thus public sector had a dominant share in the steel production till early 1990s. Mostly private players were in downstream production, which was mainly producing finished steel using crude steel products. Capacity ceiling measures were introduced. Basically, the steel industry was developing under a controlled regime. Till early 1990s, when economic liberalization reforms were introduced, the steel industry continued to be under controlled regime, which largely constituted regulations such as large plant capacities were reserved only for public sector under capacity control measures; price regulation; for additional capacity creation producers had to take license from the government; foreign investment was restricted; and there were restrictions on imports as well as exports. However, after liberalization—when a large number of controls were abolished, some immediately and others gradually—the steel industry has been experiencing new era of development. Major developments that occurred at the time of liberalization and thenceforth were: large plant plant capacities reserved for public sector was removed, elimination of export restrictions, Import tariff reduced from 100 to 5% and decontrol of domestic steel prices (Government Of India, ministry of Steel Annual Report 2007-08). Price regulation in steel Industry was abolished in 1992 since then the industry became market oriented and integrated with the Global steel industry. After that private players increased their competitiveness by bringing new cost effective technologies not only in domestic market but also in global arena. Impressive developments in steel industry with active participation of the private players and integration with the global steel industry induced government to come up with National Steel Policy in 2005. the policy targets 110 million tons by 2019-20. The Indian steel industry has entered into a new development stage from 2007-08 and rapid rise in production has resulted India becoming the 3rd largest producer of Crude Steel in 2015 (World Steel in Figures 2015', published by WSA in June 2015). Data from a range of sources including Joint Plant Committee, Prowess Database, as well as international trade data, all reveal that there is no single entity that dominates either the sector as a whole, or any of the major product segments. With increasing need for large investments in the industry private sector's role would be crucial in the development of the steel industry. The future, it appears, will continue to be dominated by a few large players and the industry will remain oligopolistic – as it is internationally. TISCO, public sector entities, POSCO, Jindals, Essar, and Arcelor-Mittal will be among the major players. There is a key factor behind the predominance of large units and oligopolistic industry structure is the production process. Steel sector was the first to be liberalized and we can see from our study that there are enough players; though the industry is concentrated in some segments. However, this is no way suggests that the sector should be subject to regulation, which also includes the government. In this sector, therefore a far-sighted pro-competitive action would be more to deal with enabling rapid entry and expansion, reducing controls on international trade, and ensuring a level playing field. Regulation should thus be restricted to case of market failures like natural monopolies, externalities and asymmetric information between buyers and sellers.

### Cement Industry:



The attempt to produce cement in India dates back to 1889 when a Calcutta firm attempted to produce cement from Argillaceous (kankar). But the first organized effort on mass scale to manufacture Portland cement commenced in Madras (Washermanpet), in 1904, by South India Industries Limited (Cement Manufacturers Association 1964; (Gadhok, 2000). The factory could not succeed hence it failed. However, it was in 1914 that the first commissioned cement-manufacturing unit in India was set up by India Cement Company Limited at Porbandar, Gujarat, with an installed capacity of 10,000 tons and production of 1000 tons. Subsequently two plants; one at Katni (M.P.) and another at Lakheri (Rajasthan) were set up. The First World War gave positive stimulus to the infant industry. This period can thus be called the Nascent Stage of Indian cement industry.

The Indian cement sector had been under strict government control for almost the whole of the period. Government intervention took place both directly and indirectly, happened in the form of government control overproduction, capacity and distribution of cement. In 1989 the cement industry was considered to be prepared for free market competition and in July 1991 cement industry was delicensed. As a result of economic liberalization all controls on the cement sector has been removed to accelerate growth and induce modernization. Though the industry saw consolidation by domestic players starting in the mid-1990s, it was only in the late 1990s that foreign players entered the market. The structure of the industry can be viewed as fragmented, although the concentration at the top has increased, as the top 5 players control around 60.28% of market share, which was 55% in 1989-90, whereas the other 39.72% of market share is distributed among 50 minor players. The fragmented structure is a result of the low entry barriers in the post decontrol period and the ready availability of technology. The extent of concentration in the Indian cement industry has increased over the years. This concentration mainly occurs from the acquisition by the larger and the more efficient units taking over relatively weaker units. Some of the key benefits include-economies of scale resulting from larger size of operation, time and cost saving for setting up new plant, access to new market, special facilities of the acquired company. The booming demand for cement attracted global majors who entered Indian domestic market through mergers, acquisitions, joint ventures or Greenfield projects. In 2005-06 the major players include France's Lafarge, Holcim from Switzerland, Italy's Italcement and Germany's Heidelberg Cements.

The consolidation witnessed in the industry in recent times has resulted in two crucial domestic deals. First being the de-merger of L&T's cement (renamed as Ultratech Cement Ltd.) division and its acquisition by Grasim. This has led to the creation of cement giant, making the Ultratech- Grasim combine the market leader in the country in terms of market share, particularly in the South. The other consolidation effort was seen when Gujarat Ambuja acquired 14.4% stake in ACC in 2000 (India Infoline). Following this Holcim took a big stake in ACC in the year 2005 and has recently announced an acquisition of 14.8% in Gujarat Ambuja Cement Ltd., now Ambuja Cements Ltd. Thus, the top two

groups in the industry, Aditya Birla Group (Grasim and Ultratech Cements Ltd. combine) and Holcim Group (Ambuja Cements Ltd. - ACC Ltd. combine) now control more than 45 % of total capacity in the country. The Herfindahl-Hirschman Index is calculated to view the industry concentration ratios, which shows steady increase. The index (converted into percentage) has increased particularly in late the 1990s, reaching highest in 2000-01, although it decreased thereafter. The value has again started to increase from the year 2005-06. All this indicates that the consolidation of capacities through mergers and acquisitions is going to be the name of the game for the players to grow and consolidate their share since green field projects involve a considerable gestation period. Further, the fragmented nature of the industry, offers ample opportunity for quickly acquiring the capacities and size (CARE RATINGS). It is known that the status of the concentration or competitiveness of the industry is the resultant factor of the sum total of the performance of the industry. So it becomes relevant to study the performance of each industry individually to get the clear scenario of the whole industry.

#### **Sustainable Growth and Concentration Index:**

The sustainable growth rate of an industry depends on the composite effect of earnings capacity, retention of earning policy, loan component i.e. leverage, sales potentiality and assets investment to the industry. Using these factors sustainable growth of the industry is computed by the formula as follows:

$$\text{Sustainable Growth} = \frac{\text{Net Margin} \times \text{Retention} \times \text{Leverage}}{\text{Assets-to-Sales} - (\text{Net Margin} \times \text{Retention} \times \text{Leverage})}$$

$$g_s = \frac{\frac{PAT}{S} * \frac{RE}{PAT} * \left(1 + \frac{D}{E}\right)}{\frac{NA}{S} - \left[\frac{PAT}{S} * \frac{RE}{PAT} * \left(1 + \frac{D}{E}\right)\right]}$$

Where,

PAT = Profit after Tax, NA = Net Assets, S = Sales, RE = Retained Earnings, D = Debt, E = Equity

$$= \frac{p * b * l}{a - (p * b * l)}$$

Where p = Net Margin = PAT/S, b = retention ratio = RE/PAT

l = leverage = (1 + D/E), a = assets-sales ratio = net assets sales

The above sustainable growth incorporates the interactions between four financial policy goals expressed as ratios e.g. target sales growth, target return on investment ( net assets ), target dividend payout and target debt-equity ( capital structure ).

In this particular case year-wise sustainable growth is calculated for Cement Industry, Drugs and Pharmaceuticals Industry, Auto Industry (Passenger Car) and Steel Industry. The results are summarized as follow:

**Table I: Mean Value and Standard Deviation of Sustainable Growth (SG) Rate**

Industry	Mean	Stand. Deviation
	SG	SG
Cement	0.054	0.070
Drugs and Pharmaceuticals	0.125	0.028
Auto Industry	0.048	0.053
Steel	0.036	0.097

From the above table, it is found that the growth of the Drugs and Pharmaceuticals is the highest followed by Cement, Auto Industry and Steel Industry.

Measurement of Concentration of Industries by HI is a relative measure. Hence for comparison of four industries Cement, Drugs and Pharmaceuticals, Auto Industry and Steel basic tools of statistics Mean

and Standard Deviation values of Concentration index and Sustainable Growth of these industries are computed and compared as follow:

**Table II: Industry-wise Mean Value and Standard Deviation of Herfindahl Index (HI) & Sustainable Growth (SG) Rate**

Industry	Mean		Stand. Deviation	
	HI	SG	HI	SG
Cement	0.051	0.054	0.005	0.070
Drugs and Pharmaceuticals	0.019	0.125	0.0054	0.028
Auto Industry	0.033	0.048	0.128	0.053
Steel	0.116	0.036	0.067	0.097

From above it is found that Cement and Steel industries are more concentrated in comparison to Drugs and Pharmaceuticals and Auto Industry as mean value for both of them are high and standard deviation values are low in comparison to others.

Next one is interested to know whether there is any correlation between the growth rate and concentration. The following calculations give the result as follows:

**Table: III: Correlation Value of Herfindahl Index with Sustainable Growth Rate**

Industry	Correlation
Cement	0.109
Drugs and Pharmaceuticals	0.385
Auto Industry	0.211
Steel	(-)0.269

For all these industries, it is found that the correlation value is very low which indicates sustainable growth rate of firms has no relationship with high concentration in industry i.e. with HI.

Hence factor-wise analysis is done for finding out the relationship between HI and each factor of Sustainable Growth rate. The computed values are shown as follow:

**Table IV: Industry-wise Correlation Value of Herfindahl Index with Factors of Sustainable Growth Rate**

Industry	Sales	PAT	DER	NET ASSETS
Cement	0.642	0.395	(-)0.325	0.639
Drugs and Pharmaceuticals	0.048	0.053	(-)0.194	(-)0.424
Auto Industry	(-)0.268	(-)0.464	0.697	(-)0.676
Steel	(-)0.769	(-)0.637	0.068	(-)0.686

In the case of Cement industry Sales and investments have significant effect on HI but profit after tax (PAT) has low relationship and leverage has negative drugs and pharmaceuticals all factors relating to sustainable variables show poor relationship with HI. Hence we may conclude that this type of industry has low concentration.

For auto industry leverage shows high positive correlation value with concentration but increase in investments to farms has negative concentration effect to that industry. Hence we can say this type of industry has low concentration.

For steel industry sales, pat and net assets have high negative relationship with concentration while only leverage has mere positive relation with concentration. Hence it may be interpreted that for Steel Industry, as the concentration increases growth rate decreases ( $r = -0.269$ ) and vice versa. This is true because of negative correlation between the different factors.

## **CONCLUSION:**

Herfindahl Index measures the concentration of an industry. Sustainable growth appears to be a vital reason for concentration but when detail analysis is done it is found that it has low relationship but the factors of growth of an industry has a significant relationship. In this present analysis, Cement and Steel Industry has high concentration in comparison to Drugs Pharmaceuticals and Auto Industry.

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