Asian Science
eISSN–0976–7959
Volume 11 | Issue 1 | June, 2016 | 40-46
DOI : 10.15740/HAS/AS/11.1/40-46
Visit us | www.researchjournal.co.in

RESEARCH PAPER

Fertilizer industry life cycle analysis

ANDUKURI RAJ SHRAVANTHI* AND K. MAHENDRAN
Department of Agricultural and Rural Management, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA

ABSTRACT

Life cycle is basically a concept relating to the different stages an industry will go through, from the first product entry to its eventual decline. A form of fundamental analysis involving the process of making investment decisions based on the different stages an industry is at during a given point in time. The specific objectives of the study were to study the evolution of fertilizer industry, to identify the life cycle stages in fertilizer firms and to compare the life cycle phases of older players in the industry to the recently founded ones. Secondary data such as financial data was collected from money control in 2013 and the company details were collected from the annual reports of the firm available in the firm's websites. Cluster analysis was used for grouping the firms and charts such as radar charts and scatter plots were used for analyzing the life cycle stages of the fertilizer companies. The total production of fertilizers in India is around 341.09 million tons in 2012. The annual output of fertilizer industry is around 121.10 lakh million tons. From the analysis of radar charts and scatter plots we can conclude that the older firms are in between a shakeout and maturity phase, while the younger firms are in growth phase and on a whole fertilizer industry in India is in growing phase.

Key Words : Life cycle analysis, Business cycle analysis, Industry life cycle analysis, Organizational life cycle analysis

View point paper : Shravanthi, Andukuri Raj and Mahendran, K. (2016). Fertilizer industry life cycle analysis. *Asian Sci.*, **11** (1): 40-46, **DOI : 10.15740/HAS/AS/11.1/40-46.**

Life cycle is basically a concept relating to the different stages an industry will go through, from the first product entry to its eventual decline. According to business dictionary, life cycle analysis is a method for analyzing industries based on the idea that they go through a series of identifiable life cycle phases. (*Source:* Business Dictionary.Com)

A form of fundamental analysis involving the process of making investment decisions based on the different stages an industry is at during a given point in time. The type of position taken will depend on firm specific characteristics, as well as where the industry is at in its life cycle.

The information gained from defining where an industry is in its life cycle is used to determine the risk/reward ratio of a potential investment. For example, investing during the introduction phase is high-risk since future growth is uncertain. However, an early investment also has the potential for the greatest return.

Objectives :

– To study the evolution of fertilizer industry.

*** Author for correspondence**
Andukuri Raj Shravanthi, Department of Agricultural and Rural Management, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA

– To identify the life cycle stages in fertilizer firms.
– To compare the life cycle phases of older players in the industry to the recently founded ones.

Overview of fertilizer industry :

The Indian Fertilizer industry had a very humble beginning in 1906, when the first manufacturing unit of Single Super Phosphate (SSP) was set up in Ranipet near Chennai with an annual capacity of 6000 MT.

India today is the third largest producer of nitrogenous fertilizer in the world only behind china and USA. The total production of fertilizers in India is around 341.09 million tons in 2012. The country imports half of its requirement of DAP and almost entire requirement of potash. Around 65 large scale fertilizer units are there in India which manufactures an extensive range of phosphatic, nitrogenous and complex fertilizers.

Some of the examples of the public and private fertilizer companies in India include Basant Agro Tech India Ltd, Bharat Fertilizer Ind. Ltd, Chambal Fertilizers and Chemicals, Mangalore Chemicals and Fertilizers, Meerut Agro Chemical Pvt. Ltd, Dharamsi Morarji Chemical, Nagarjuna Fertilizers and Chemicals, Gujarat Narmada Valley Fertilizer Co, Shriram Fertilizers and Chemicals, Southern Petrochemical Ind. Corp, Tuticorin Alkali Chemical and Fertilizer, United Phosphorus Ltd, Zuari India Ltd, National Fertilizers Limited (NFL), Rashtriya Chemicals and Fertilizers Limited (RCF), The Fertilizers and Chemicals Travancore Limited (FACT).

RESEARCH METHODOLOGY

Secondary data such as financial data was collected from moneycontrol.com and the company details such as its history, date of establishment and number of employees were collected from the annual reports of the firm available in the firm's websites. Top fifteen public listed fertilizer firms operating in India were selected based on their total assets and net sales. Cluster analysis is used for grouping the firms into two clusters based on its age, and charts such as radar charts and scatter plots were used for analyzing the life cycle stages of the fertilizer companies.

Sampling design :

The top fifteen fertilizer firms selected as per the total assets and net sales as shown in Table 1. The first fifteen public listed fertilizer firms based on their net sales in descending order were selected as sample firms. The first fifteen public listed fertilizer firms based on their total assests in descending order were selected as sample firms (Table 2). Agri–tech was eliminated since it was recently established firm and therefore, the data for past years was not available. Thus, the total sample consisted of fourteen fertilizer firms.

RESULTS AND REMONSTRATION

The findings of the present study as well as relevant discussion have been presented under following heads :

Clustering of sample firms :

The entire sample is divided into two clusters depending on the age of the firms. The age of the firms was calculated based on the year of establishment of the fertilizer firm from the present completed year *i.e.*, 2013 (Table 3). Cluster analysis using SPSS was done to divide the sample firms into two groups based on their age. The cluster membership and dendrogram results are presented in Table 4 and Fig. 1, respectively. Cluster 1 consisted of NFL, GNFC, Rashtriya Chemicals, Deepak Fertilizers, Basant Agro Tech, Rama Phosphates, Khaitan Chemicals and Liberty Phosphates with age group of 20 to 40 (*i.e.*, young firms) while cluster 2 consisted of GSFC, Coromandel International, Mangalore Chemicals, Zuari Global, Bharat Agri and SPIC within a age group of 40 to 60 (*i.e.*, older firms).

Table 1 : Top 15 companies based on net sales

Company name	Net sales (Rs. Cr)
Coromandel int.	8,560.24
Rashtriya chem.	6,894.49
NFL	6,720.23
GSFC	6,253.30
GNFC	4,252.57
Mangalore chem.	2,779.59
Deepak fert.	2,606.46
SPIC	2,069.38
Rama phosphates	617.23
Khaitan chem.	455.01
Basant agro tec.	291.02
Zuari global	99.54
Bharat agri.	57.27
Agri-Tech	0.1

Source: Secondary data available at *moneycontrol.com*, 2014

Table 2 : Top 15 companies based on total assets

Company name	Total assets (Rs. Cr)
NFL	6,350.16
GNFC	5,547.56
GSFC	5,363.76
Coromandel int.	4,407.95
Rashtriya chem.	3,979.29
Deepak fert.	2,313.66
Mangalore chem.	716.66
Zuari global	593.75
Khaitan chem.	336.82
SPIC	292.04
Basant agro tec.	175.67
Rama phosphates	84.75
Bharat agri	50.54
Agri-Tech	28.03

Source: Secondary data available at *moneycontrol.com*, 2014

Table 3 : Age of the sample firms

Fertilizer firm	Estab in	Age
NFL	1974	39
GNFC	1976	37
GSFC	1962	51
Coromandel int.	1961	52
Rashtriya chem.	1978	35
Deepak fert.	1979	34
Mangalore chem.	1966	47
Zuari global	1967	46
Basant agro tech.	1990	23
Bharat agri.	1959	54
Spic	1969	44
Rama phosphates	1984	29
Khaitan chem	1982	31
Dharamsi moraraj	1919	94
Liberty phos.	1987	26

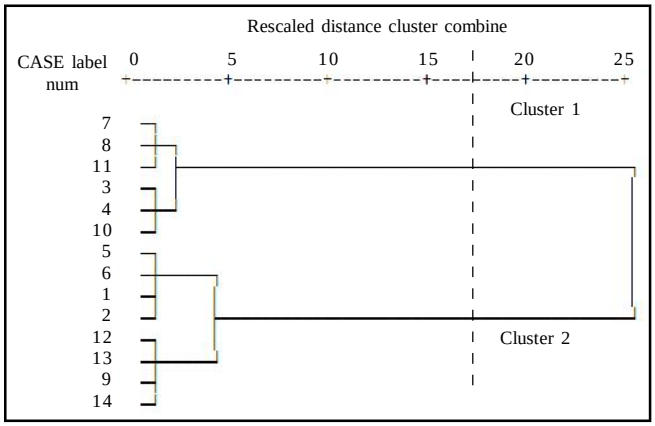

Fig. 1 : Dendrogram

Table 4 : Cluster membership

Case	Fertilizer firm	2 Clusters
1.	NFL	1
2.	GNFC	1
3.	GSFC	2
4.	Coromandel int.	2
5.	Rashtriya chem.	1
6.	Deepak fert.	1
7.	Mangalore chem.	2
8.	Zuari global	2
9.	Basant Agro tech.	1
10.	Bharat agri.	2
11.	Spic	2
12.	Rama phosphates	1
13.	Khaitan chem.	1
14.	Liberty phos.	1

Analysis using charts :

Charts such as radar, scatter gram have been prepared based on financial measures, such as total assets, net sales and expenditure. This temporal financial analysis is done to map the life cycle stages of fertilizer firms.

According to Maurer and Ebers (2006), the success of a firm can be related to its survival based on its revenue growth and employment growth.

According to Chen *et al.* (2012), firm size can be measured based on production scale (employment number, total assets and total production) and operating scale (net sales and revenue).

According to Hoy (2006), size of a firm can be determined by its sales and staff.

Charts based on total asset :

Total assets are everything that a business or an individual owns. Assets typically can be converted from a physical item into cash. The ease in which an asset can be turned into money is known as liquidity. Total assets are listed on a company's balance sheet based on their level of liquidity, which is based on the speed in which they can be exchanged for cash. The most liquid of assets can be found toward the top of a financial statement. These assets might include cash or short-term investments such as equities and accounts receivable, which are funds owed to a business. Below the most liquid of investments on a financial statement, current assets are outlined. Included among current assets is inventory. These are items that expected to be sold and to generate income within a 12-month period. The next

groups of assets are long-term assets. These are the items that would take the longest to convert into cash and include things such as real estate, trucks and other machines.

Intangible items also contribute to total assets (patents, trademarks and licenses are all included in the sum of total assets, stocks and bonds).

Total assets are inherently based on the purchase value of an item, so the price of many assets reflected on a balance sheet can be incomplete. This is because the market value of an asset, such as real estate, might appreciate or depreciate in value over a period of time. That change in value will not be reflected in the purchase value price, which is the price listed on the balance sheet. As a result, investors might not always value a company properly and may be too positive or negative on a stock unknowingly.

The total assets value (in crore) of all the fourteen firms was collected from 2000 to 2013 and for each cluster the average total asset value was computed and summarized in Table 5. Charts of the two clusters, based on average of the total assets are depicted in Table 2 and 3.Cluster 1 represents the younger firms while cluster 2 represents the older firms. Fertilizer industry has substantial valuation before they start producing profits. If the total assets are greater than the total expenditure, the firm is said to be growing. From the Fig. 2 and Fig. 3, it can be interpreted that the fertilizer industry and younger firms in particular were in embryonic stage from 2000 to 2010 and in growing stage from 2010 to 2013 which is depicted by a spike at 2013 for both the clusters which was due to high current assets during this period such as inventories, sundry debtors and cash and bank balance.

Table 5 : Total assets (average) of fertilizer firms (in crore)

Year	Cluster 1	Cluster 2
2000	835.03	1,323.26
2001	842.84	1,251.24
2002	729.62	1,124.51
2003	717.06	1,118.65
2004	667.93	1,198.75
2005	652.70	1,166.98
2006	725.36	1,064.38
2007	917.62	1,180.38
2008	1,035.45	1,269.96
2009	1,123.16	1,445.54
2010	1,237.31	1,636.02
2011	1,336.75	1,681.88
2012	1,837.77	1,874.17
2013	2,726.25	2,100.37

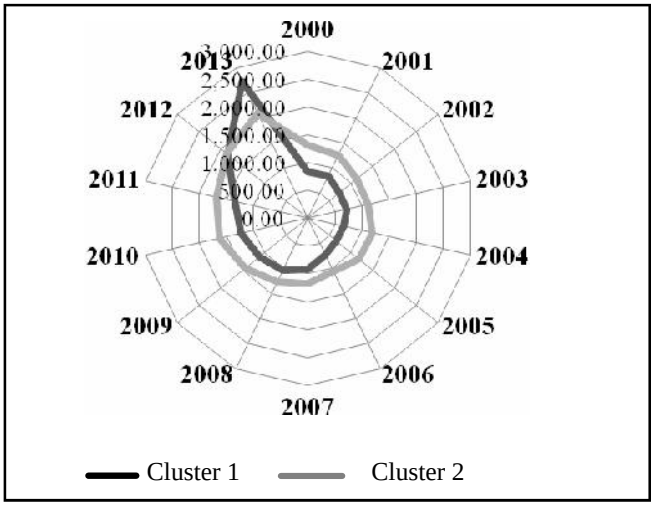

Fig. 2 : Radar chart (on total assets)

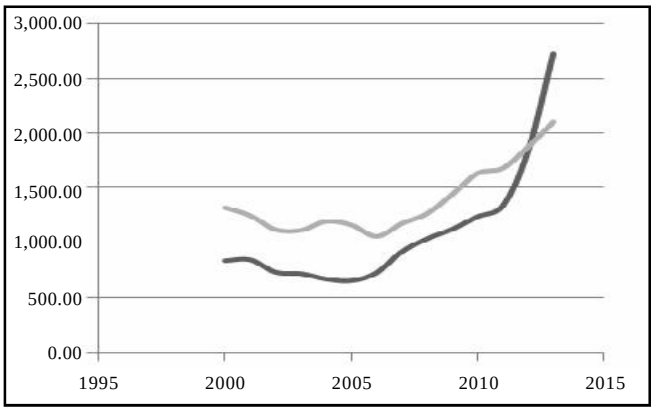

Fig. 3 : Scatter plot (on total assets)

Charts based on net sales :

Net sales usually refer to a company's revenue net of discounts and returns. The amount of sales generated by a company, after the deduction of returns, allowances for damaged or missing goods and any discounts allowed. The sales number reported on a company's financial statements is a net sales number, reflecting these deductions. Deductions from the gross sales are represented in the net sales figure. Therefore, a net sale gives a more accurate picture of the actual sales generated by the company, or the money that it expects to receive. A company will book its revenue once the good or service is delivered or performed for the customer. However, in the case of returns, even after a good has been sold it can often be returned under a company's return policy. If the good is returned by the customer, it is not considered a sale, as the customer will receive a credit or money back, so it needs to be

deducted from the gross sales. The allowances for damaged or missing goods reflect the situations in which the goods are damaged in transit or are not what the customer expected.

The net sales (in crore) of all the fourteen firms was collected from 2000 to 2013 and for each cluster the average net sales figure was computed and presented in Table 6. Charts of the two clusters, based on average of the net sales are depicted in Table 4 and 5. Sales are the value of the output supplied to the customers. It is the life blood of a business enterprise. Without which the business cannot survive. Further, sales are the indicator of the operational efficiency of management has used the assets of the business. The higher the volume of sales, the more efficient the management is. Sales are also related to profitability of an enterprise, if other things remain constant. The higher the amount of sales, the more profitable the business is and vice versa. The trend of sales indicates the direction in which a concern is going on, and on the basis of which forecast for further can be made. The trend analysis of sales helps to understand, the growth of a business enterprise. From the Fig. 4 and Fig. 5, it can be interpreted that the fertilizer industry is in growing stage from 2010 to 2013 in terms of net sales for both the clusters. The net sales reached peak during 2009-10 which is shown by a spike in radar chart. The global recession lowered the use of nitrogen in the industrial sectors of the world which, in turn, increased the supply of urea and other nitrogenous products for agriculture. Due to the disequilibrium in the demand and supply, the prices of urea and DAP dropped in the international market.

Table 6 : Net sales (average) of fertilizer firms (in crore)

Year	Cluster 1	Cluster 2
2000	867.87	1,186.97
2001	893.07	1,107.96
2002	918.83	1,018.80
2003	990.99	963.61
2004	1,012.57	1,110.69
2005	1,115.91	1,452.47
2006	1,243.10	1,877.20
2007	1,467.55	1,902.61
2008	1,832.23	2,179.51
2009	2,372.27	4,061.39
2010	1,926.03	2,879.94
2011	2,134.08	3,695.41
2012	2,737.70	3,744.43
2013	2,787.13	3,303.22

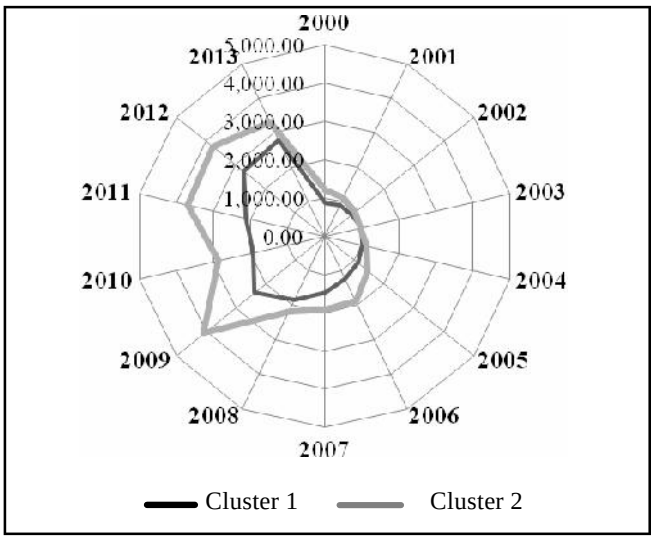

Fig. 4 : Radar chart based on net sales

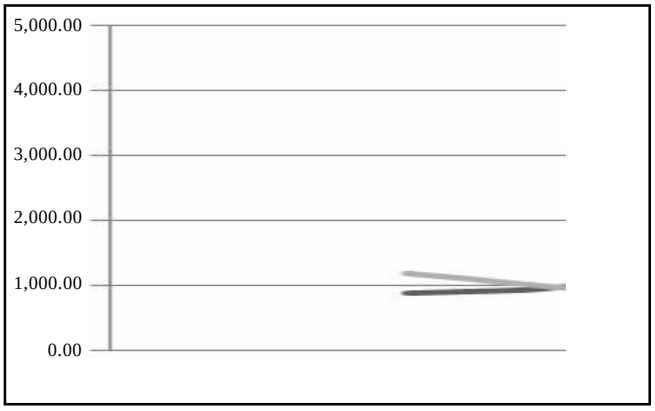

Fig. 5 : Scatter plot based on net sales

Charts based on total expenditure :

A measure of the total costs associated with managing and operating an investment fund. Business expenses are categorized in two ways: fixed expenses and variable expenses. Fixed expenses or costs are those that do not fluctuate with changes in production level or sales volume. They include such expenses as rent, insurance, dues and subscriptions, equipment leases, payments on loans, depreciation, management salaries, and advertising. Variable costs are those that respond directly and proportionately to changes in activity level or volume, such as raw materials, hourly production wages, sales commissions, inventory, packaging supplies, and shipping costs. It is important to understand the behaviour of the different types of expenses as production or sales volume increases. Total variable costs increase proportionately as volume increases, while

variable costs per unit remain unchanged. A small business owner can use a knowledge of fixed and variable expenses to determine the company's break-even point (the number of units at which total revenues equal total costs, so the company breaks even), and in making decisions related to pricing goods and services.

The total expenditure (in crore) of all the fourteen firms was collected from 2000 to 2013 and for each cluster the average total expenditure figures were computed and presented in Table 7. Charts of the two clusters, based on total expenditure are depicted in Table 6 and 7. From the Fig. 6 and 7, it can be interpreted that the fertilizer industry is in growing stage from 2010 to 2013 in terms of total expenditure for both the clusters. The total expenditure was high and reached peak during 2008-10 which is shown by a spike in radar chart. The total expenditure for a fertilizer firm in general includes raw material costs, power and fuel costs, other manufacturing expenses, selling and administrative expenses etc. The reason for high increase in expenses during 2008-10 was due to high raw material cost. The fertilizer industry is reliant on gas for the manufacturing of urea and phosphoric acid for the manufacturing of phosphatic fertilizers and DAP. India imports its raw material from foreign countries which understand the quandary of the Indian fertilizer industry and have started exploiting the scarcity through exorbitant pricing.

Summary and conclusion :

Currently, there are 65 large scale fertilizer units in India which manufacturing an extensive range of phosphatic, nitrogenous and complex fertilizers. The country has 32 installed units of urea, 13 units of Calcium ammonium nitrate and ammonium sulphate, 20 units of complex fertilizers and di-ammonium phosphate. There are also a large number of medium and small scale industries in operation (72 approximately). The annual output of fertilizer industry is around 121.10 lakh million tons.

Charts based on total assets showed that the fertilizer industry and younger firms in particular were in embryonic stage from 2000 to 2010 and in growing stage from 2010 to 2013 which is depicted by a spike at 2013 for both the clusters which was due to high current assets during this period such as inventories, sundry debtors and cash and bank balance.

Charts based on net sales revealed that the fertilizer

Table 7 : Total expenditure (average) of fertilizer firms (in crore)

Year	Cluster 1	Cluster 2
2000	798.94	1,101.56
2001	792.74	1,020.88
2002	806.52	911.45
2003	845.07	868.20
2004	863.47	1,006.27
2005	981.98	1,322.60
2006	1,081.68	1,601.90
2007	1,342.70	1,667.79
2008	1,657.53	1,891.73
2009	2,097.60	3,787.49
2010	1,748.20	2,567.74
2011	1,945.40	3,322.39
2012	2,566.46	3,400.27
2013	2,606.11	2,998.97

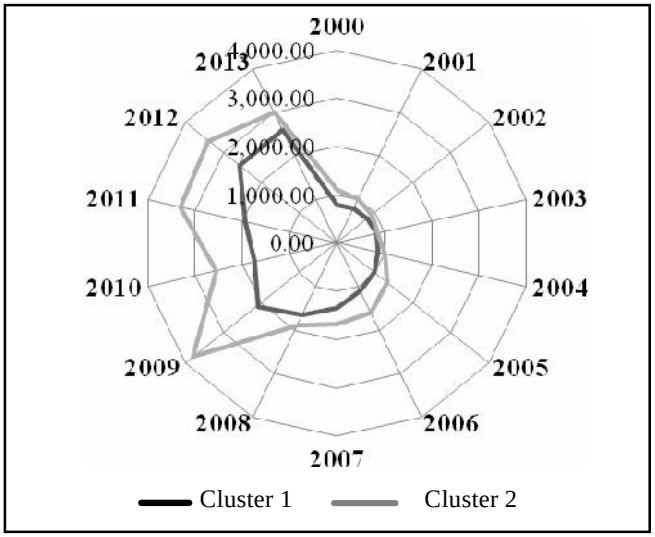

Fig. 6 : Radar chart (total expenditure)

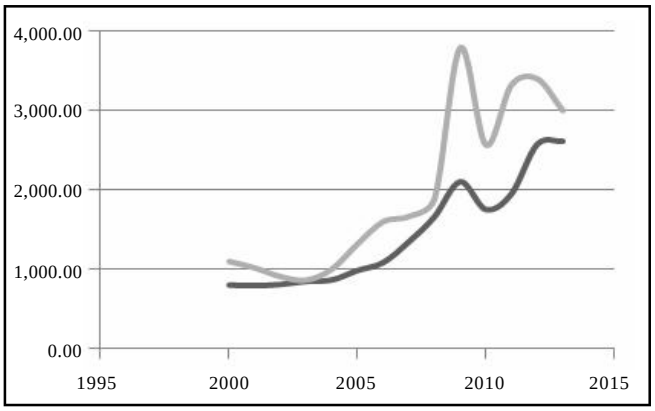

Fig. 7 : Scatter plot (total expenditure)

industry is in growing stage from 2010 to 2013. The net sales reached peak during 2009-10 which is shown by a spike in radar chart. The global recession lowered the use of nitrogen in the industrial sectors of the world which, in turn, increased the supply of urea and other nitrogenous products for agriculture. Due to the dis-equilibrium in the demand and supply, the prices of urea and DAP dropped in the international market.

From the charts based on total expenditure, it can be interpreted that the fertilizer industry is in growing stage from 2010 to 2013 for both the clusters. The total expenditure was high and reached peak during 2008-10 which is shown by a spike in radar chart. The total expenditure for a fertilizer firm in general includes raw material costs, power and fuel costs, other manufacturing expenses, selling and administrative expenses etc. The reason for high increase in expenses during 2008-10 was due to high raw material cost. The fertilizer industry is reliant on gas for the manufacturing of urea and phosphoric acid for the manufacturing of phosphatic fertilizers and DAP. India imports its raw material from foreign countries which understand the quandary of the Indian fertilizer industry and have started exploiting the scarcity through exorbitant pricing.

From the analysis of these charts we can conclude that the older firms are in between a shakeout and maturity phase while the younger firms are in growth phase and on a whole fertilizer industry in India is in growing phase.

REFERENCES

Donald, L. and John, A. (2003). Organisational life cycle: A Five- Stage empirical scale. *Internat. J. Organisat. Anal.*, **11**(4): 339-354.

Mala, P. (2013). Fertilizer Scenario in India. *Internat. J. Soc. Sci. & Interdisciplinary Res.*, **2**(1) : 61-72.

Muthusamy, A. and Karpagalakshmi, S. (2011). A study of sales trend and cost stucture of Indian fertilizer industry, *Mgmt. Insight,* **7**(2) : 9-19.

Prameela, S. and Devaraj, K. (2012). Performance of fertilizer industry in India, EXCEL *Internat. J. Multidisciplinary Mgmt. Stud.*, **2**(3) : 233-249.

Rudina, L. (2013). The growth performance of small business under the view of life cycle model. *Mgmt. Res. & Practice*, **5**(4) : 58-67.

Yahn, S. (2013). Financial performance of audit firms in different life cycle stages: Evidence from Taiwan. *Internat. J. Finance & Res.*, **7**(4) : 43-62.

Yanging, C. and Wang, Le. (2012). The size distribution of chinese manufacturing firms: From the perspective of Industry life cycle. *Internat. J. Econ. & Finance*, **4**(7) : 67-77.

WEBLIOGRAPHY

Fertilizer Industry, India Fertilizer Industry (2010, June, 29). *Economy Watch*. Retrieved from *http://www.economywatch.com/business-and-economy/fertilizer-industry.html*

Financial reports and annual reports of fertilizer companies. (2014). *Moneycontrol.com*. Retrieved from *http://www.moneycontrol.com/*

Indian Fertilizer Industry (2014). *Indian Mirror*. Retrieved from *http://www.indianmirror.com/*

Industry Life Cycle (2014). *Inc.com*. Retrieved from *http://www.inc.com/encyclopedia/industry-life-cycle.html*

Industry Life Cycle Analysis (2014). Business dictionary. Retrieved from *http://www.businessdictionary.com/definition/industry-life-cycle-analysis.html*

Received : *29.01.2016;* **Revised :** *24.04.2016;* **Accepted :** *19.05.2016*