IMPACT OF APPLICATION OF SUPPLY CHAIN MANAGEMENT IN THE CEMENT INDUSTRY

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ABSTRACT

Supply Chain Management as a subject has gained huge prominence today which is undeniable. The benefit Supply Chain extends to the organization is huge and almost all organizations are adopting the practices in their functioning. But the most positive difference felt by the utilization of Supply Chain is felt in the manufacturing and production sector. Cement is one such sector where integration of Supply Chain Management in the manufacturing has shown huge positive effect.

As we have almost reached the end of second decade in the 21st century, one thing that has helped the supply of ever increasing demand of the population is the systematic approach towards production. Any production activity requires careful and well planned approach to bring out the end product which is produced by using the resources optimally without any wastage. The advent and spread of technology has been a crucial factor in this approach. Companies are thriving on thin margins to stay afloat in this competitive market. And the biggest factor for this is the deep study and research being carried out to find the best possible approach to be carried out by firms to achieve this level of competence. The markets have come a long way from being production oriented, then to being sales oriented, then customer oriented and now finally the customer is giving preference to other aspects such as green production.It was inferred that Supply Chain coupled with upgrade of technology had increased productivity.

The study carried at the manufacturing plant and offices of a cement factory helps to understand these effects.

INTRODUCTION

To study the impact of the supply chain on the cement industry a plant was selected.Vijay Lakshmi Industries was established in the late 1990's with the current plant which will be under study acquired in the year end of 2012. It was established under the leadership of Syed Ahsan Nadeem who has vast experience in the area of cement manufacturing. The company has 3 plants two of which are in kodangal in telangana and one in kodad in the state of telangana. In the kodangal branch under study there is a 250tpd capacity with two boll mills of 150 ton and 60 ton each.

The plant has all the facilities of a modern cement manufacturing plant. The outsourced clinker is generally stored in the warehouse specially built for the process of storage which also serves as a godown to store the finished cement bags. The ball mills are strategically installed to reduce spill over and wastage.

Vijay Lakshmi Cement produces under the names

    a.   Bharath shakthi cement
    b.   Kesari gold cement
    c.   Shakthi gold cement
    d.   Uttamtech cement Other products

The plant also produces fly ash bricks in addition to the cement. The fly ash that is sourced for cement production serves as a important raw material in the brick production.

OVERVIEW OF SUPPLY CHAIN MANAGEMENT

In order to better understand Supply Chain Management we need to delve deeper to its precursor, Logistics Management. It was a narrow approach which focused only on less crucial factors which had less impact when compared to other critical factors.

Logistics Management is defined as "The transfer of inventory from source to the production site to produce goods at lowest possible cost." Logistics mainly deals with the areas of transportation and distribution. It went through various levels of improvement to reach the present accepted approach of Supply Chain Management.

SUPPLY CHAIN MANAGEMENT is the integrated approach of planning and dissemination of process for the flow of inventory, funds, information in the areas of sourcing, demand planning, inventory management, transportation at the lowest possible cost within the least time possible.

In simple terms supply chain management is defined AS THE COORDINATION AND MANAGEMENT OF SMOOTH FLOW AND STORAGE OF GOODS AND SERVICES FROM RAW MATERIALS, WORK IN PROGRESS TO FINISHED GOODS FROM THE POINT OF ORIGIN TO THE POINT OF CONSUMPTION.

RESEARCH METHODOLOGY

OBJECTIVES OF THE STUDY

- ➢ To study the supply chain pathway of the selected firm.
- ➢ To evaluate the shift from manual to automatic technology.
- ➢ To study the effectiveness of the supply chain practices in the organisation.
- ➢ To evaluate the satisfaction of the B2B chain.

METHODOLOGY

- ➢ Careful investigation to study the chain from demand forecasting to final selling of the cement bags.
- ➢ Studying the total output in the period taking into all accounts of external and internal environmental factors.
- ➢ Finally, studying the wholesaler and retailer satisfaction.

DATA COLLECTION

Primary data

The data related to the chain is collected from first-hand experience of visiting the plant at the site location. The customer satisfaction is also analysed by taking feedback from the wholesalers and retailers.

Secondary data

To study the effect of upgrade of technology on the organisations output, past records of the company are analysed to compare them with that of the current results.

SAMPLE FRAMEWORK

Customer satisfaction details were collected from 24 retailers around Hyderabad area.

Tools used for analysis

Various statistical tools used for analysis are as follows

1 Bar Charts 2 Pie Graphs 3 Other Data Visualisation Tools

Also various analytical tools used

1 SWOT Analysis 2 SCOR Analysis 3 Correlations 4 Regressions 5 Wilcoxon Signed Rank Test

REVIEW OF LITERATURE

Mrs. Isabel Agudelo, director of Centre for Latin American Logistic Association, in her paper "Supply chain management in cement industry" has stated that, established cement companies operating in oligopolistic market have not realised their full potential by not applying basic supply chain which can lead to drastic cost and time reduction. Various models such as SCOR model were taken into consideration while analysing the market. By applying Porter's 5 forces model she evaluated and concluded that by applying basic supply chain practices companies can remain competitive in the market.

Mr. Mohammad Nizamuddin and Mr. Dain D Thomas, professors at MRIIRS, Faridabad, in their paper "Application of supply chain management in Indian cement industry" have tried to find the process of supply chain management and for this they used eight parameters It was found that only those organisations which integrate all the factors efficiently were successful.

Mr. Vivek Pathak, Mr. Baben Hazarika and K M Pandey, from NIT Silchar, in their paper "A Study of Supply Chain Management in some Selected Cement Companies of North-East India" have used Porters five forces model and they used comparative analysis of these for Supply chain. Eight companies were evaluated for this study. The study found that customer response is still the best indicator of success of supply chain for most but asset utilization was also a good indicator.

Mr.Inda sukatia, Mr.Abu Bakar, Mr.Rosman Yusuf, in their research paper have tried to find the relationship between Supply Chain Management strategy and its practical applications. A comprehensive study on 200 managers who were classified based on their functions was conducted. The study gave evidence that the effect of efficient application of practices definitely yielded positive result for the firm profits.

Dr. Amit Srivastava, from Institute of planning and management, Jaunpur, in the paper titled "Impact of distribution and logistics management on price & cost with reference to Indian cement industry" using 250 transporters, stockists, retailers etc was carried out. By using various statistical tools such as SWOT, trend analysis etc on 17 firms it was found that 47% were following patterns above industry average whereas 53% were below industry average

Ms. Tracey et al, studied the impact of Supply Chain Management on business practices and to what level it impacts the organisations profits and asset utilisation. A comprehensive study of 474 managers was conducted to test this hypothesis. After analysis and evaluation it was found that there exists a clear positive relationship between the organisations supply chain practices and overall business performance.

DATA ANALYSIS AND RESULTS

Effect of Technology Up gradation

The plant underwent a shift in technology gradually which lead to the increase in output. The analysis of this shift is generally explained by change from manual to automatic filling of the mixture, automatic packaging. The output of cement is measured as number of cement bags produced per hour.

The data for the Ball Mill with 150 tonne.　　The data for ball mill with 60 tonne capacity

Duration	Avg.Before(bags per hr)
March 2018	140
April 2018	145
May 2018	138
June 2018	142
July 2018	135

Duration	Average before (bags per hr)
March 2018	65
April 2018	60
May 2018	64
June 2018	66
July 2018	70

RESULT

The average output in case of manual packaging is 140bags per hour for 150 tonne ball mill. But with the change in technology and change in the design the bags were being able to be packed automatically and a Standard Rate of around 160 bags per hour was being observed.

The average output in the case of 80 tonne ball mill was 65 bags per hour.But when this was changed and automation was added it was observed that a Standard output of 80 bags per hour was achieved.

INTERPRETATION

From the above data analysis it can be clearly observed that upgrade of technology has had a positive effect on the productivity of the firm. The output increased from 140 bags per hour to 160 bags per hour in the 150 tonne ball mill. Also the output increased from 65 bags per hour to 80 bags per hour in the 60 tonne ball mill.

ANALYSIS OF THE EFFECTIVENESS OF THE SUPPLY CHAIN

The retailers and wholesalers were asked about what their expectation is regarding various Supply Chain variables and also what level of satisfaction they observed with regards to these variables and the following data was inferred. This data was used to find how the company's efforts in regard to various activities matched the retailers' expectations. The data was used to study correlation, regression and test it to find where the company needs to put more effort and where it is meets the expectations.

	EXPECTED LEVEL RANKS	OBSERVED LEVEL RANKS
1 pricing	2	4
2 material handling	8	1
3 product quality	3	5
4 delivery speed	5	3
5 return policy	6	7
6 order fulfillment	4	2
7 packaging	7	8
8 overall service	1	9
9 complaint management	10	10
10 easiness to deal	13	6
11 communication	9	11
12 responsiveness	11	12
13 customization	12	13

Correlation

To test the correlation between the observed and expected ranks Spearman's Rank Correlation was conducted. The data was entered in spss software and the following results were obtained

Correlations

			VAR000 04	VAR000 05
Spearman's rho	VAR000 04	Correlation Coefficient	1.000	.489[*]
		Sig. (1-tailed)	.	.045
		N	13	13
	VAR000 05	Correlation Coefficient	.489[*]	1.000
		Sig. (1-tailed)	.045	.
		N	13	13

*. Correlation is significant at the 0.05 level (1-tailed).

INTERPRETATION

From the above table it is observed that the correlation coefficient is .489. It is also known that correlations above 0.4 are considered relatively strong correlations.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.489010989
R Square	0.239131747
Adjusted R Square	0.169961906
Standard Error	3.548085553
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	43.52198	43.52198	3.457168	0.089913
Residual	11	138.478	12.58891		
Total	12	182			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.576923077	2.08751	1.713487	0.114627	-1.01766	8.171503	-1.01766	8.171503
X Variable 1	0.489010989	0.263002	1.859346	0.089913	-0.08985	1.067874	-0.08985	1.067874

REGRESSION ANALYSIS

INTERPRETATION

When a regression test was conducted for the above data, the model showed a 16.9% of variance between the ranks and there is a 23.9% variance in ranks according to the R Square. From the above it can be concluded that the difference between the expected and observed ranks was not very significant as the variance was around 23%.

WILCOXON SIGNED RANKED TEST

Ranks

		N	Mean Rank	Sum of Ranks
VAR00002 - VAR00001	Negative Ranks	5[a]	7.10	35.50
	Positive Ranks	6[b]	5.08	30.50
	Ties	3[c]		
	Total	14		

a. VAR00002 < VAR00001

b. VAR00002 > VAR00001

c. VAR00002 = VAR00001

Test Statistics[a]

	VAR00002 - VAR00001
Z	-.229[b]
Asymp. Sig. (2-tailed)	.819

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

INTERPRETATION

When the data was tested to study the difference between the observed and expected ranks it was found that there was no significant difference between them. As the mean ranks are -7.10 and 5.08 but the test statistic z value lies between them so we can conclude there is no significant difference between the ranks and the company is able to match its supply chain variable with expected variables upto a significant level.

SWOT ANALYSIS

SWOT Analysis translates to the Strength, Weakness, Opportunities and Threats. It is a strategic tool to analyse the organisations current position and standing in the market. Nowadays it has become a go to tool for analysis. Its success can be attributed to its simple descriptive nature.

Strengths and Weakness are related to Internal environment whereas opportunities and threats are related to External environment.

The SWOT analysis of the company is as below

Strengths

- Having two other plants as subsidiaries from where the shortages and surpluses can be adjusted.
- The plant has an expansionist outlook and they are trying to reach larger markets.
- Early Realisation of the importance of Supply Chain and integrating these practices in the manufacturing and production.
- Motivated team of managers, sales executives have helped the firm greatly.

- Upgrade of technology has improved the productivity to a large extent.
- Distribution and logistics channel is well established.

Weaknesses

- The sourcing and procurement function has been found to not be smooth.
- The quality is good but is far behind established brands.
- The overall operating cycle when compared to benchmarked established brands shows the company needs to improve its performance to stay relevant in the market.
- The labour is hesitant to adapt to the upgrade in technology.
- The workforce needs more training programmes to be able to compete with the bigger brands.

Opportunities

- The company can expand its market base by introducing new products or rebranding its products.
- The company can make drastic changes in its overall service by improving the communication channel as was observed through the questionnaire.
- Since there is integration of technology in all aspects of the chain the company can utilize this to procure better sources of raw materials after analysis.
- As there is a shift in the economy in the country and particularly the market region of the plant sale is developing at a rapid pace the company can utilise this opportunity to gain foothold in the market.

Threats

- As a large number of small companies are propping up and the company is facing stiff competition from them and has to work with reduced margin.
- Due to entrance of international companies compiled with large established Indian brands the threat looms large over the company.
- Smaller companies may resort to unfair pricing and malpractices which will have a detrimental effect on the company.

Findings

From the above analysis and interpretation the following findings can be inferred

- ➢ The SWOT analysis revealed that the greatest strength is the plants ability to adapt the supply chain practices successfully.
- ➢ The SWOT analysis also revealed about the weakness that there needs to be more education about the positive effects of supply chain.
- ➢ Upgrade of technology has had a huge positive impact on the output and productivity as the output increased from 140 to 160 units per hour and 65 to 80 units per hour.
- ➢ 45% of the respondents are very satisfied in case of material handling whereas around 50% of the respondents are dissatisfied or very dissatisfied with the customization.
- ➢ 66% of the respondents are very satisfied or satisfied with order fulfilment on the other hand 47.5% of the respondents are very dissatisfied or dissatisfied with the responsiveness.
- ➢ 50% of the retailers are satisfied or very satisfied with the delivery speed whereas 38% of them felt that the overall service is neutral.

> ➤ 45% of the retailers are satisfied or very satisfied with the pricing but around 30% felt the complaint management is dissatisfactory.

Suggestions

- The company needs to improve its efforts in sourcing and could try to source from better alternatives.
- The company can also install clinker kiln in order to further manufacture efficiently.
- The workforce especially the labour can to be trained well to streamline the efforts.
- Unwanted and non productive activities could be eliminated and the price could be further reduced as pricing is one the most important factor that the retailer expects from the company.
- The product quality needs to be further enhanced to be able to compete with already established brands.
- The company can also include the retailers' insights while formulating the product as customization also helps to better engage with the retailers and the buyer for the product is readily available.
- The company can have a better complaint management, redressal system and better response to the complaints as these are found to be the worst performing indicators.
- Products with different branding could be introduced to expand the market.
- Manufacture of other products such as fly ash bricks could be increased as they have a huge demand and it could help to keep the company sustainable.

Conclusions

The study above of the Supply Chain Management in the cement industry has confirmed that integration of supply chain management practices in the cement industry definitely has a positive impact on the productivity of the organisation. The seamless supply chain including all the logistical activities is advantageous to the organisation and its results can be evaluated to confirm it. Also upgrade of technology is a huge positive to the organisation as seen in the analysis above. It reduces wastage and increases output.

The supply chain variables when analysed for their satisfaction levels individually give crucial understanding of the customer expectations and their views. This helps the organisation to plan his strategy and focus on areas of importance. It also helps to study how far the company's efforts align with those of the customer expectations.

Finally we can conclude that Supply Chain Management is very important for all organisations to stay competitive in the market where the competition is immense and the margin of profit is falling. Also the potential of integrating Supply Chain in the manufacturing and production process guarantees better productivity, increased performance, reduced wastage, better coordination and optimal utilisation of resources. Theses parameters are the basis of any organisation and Supply Chain Management helps achieve it.

BIBLIOGRAPHY

Books and Journals

1. Porters . M "competitive advantage : creating and sustaining super performance New work the free press 1985.
2. Kothari C.R. Researcher methodology.
3. Rahul V Altekar: Supply Chain Management, PHI learning Ltd, New Delhi,2009
4. The IUP Journal of Supply Chain Management, IUP Publications
5. Lapide, L. (2006, March). The Essence of Excellence. Supply Chain Management Review, 10(3), 18-24.
6. Donald J Bowersox and David J Closs 'Logistics Management,' The Integrated Supply Chain Process.

7. **Websites**

Approach to innovative Supply Chain Strategies in Cement Industry
https://www.sciencedirect.com/science/article/pii/S1877042813005776

Supply Chain Excellence in India part 1   https://www.worldcement.com/asia-pacific-rim/28052014/supply_chain_excellence_in_india_part_1_254/

Understanding how the Indian cement industry works https://www.alphainvesco.com/blog/understanding-indian-cement-industry/

Portland Cement Association . Industry Overview [WWW Document] URL
http://www.cement.org/econ/industry.asp

Supply Chain Management in Cement Industry Isabel Agudelo https://dspace.mit.edu/handle/1721.1/51643