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AN EMPIRICAL STUDY ON THE IMPACT OF WORKING CAPITAL MANAGEMENT ON PROFITABILITY: EVIDENCE FROM INDIAN SUGAR INDUSTRY

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ABSTRACT

*Every organization, whether profit oriented or not, depending upon its size and nature of business needs, requires Working Capital (**WC**). Efficient **WC** Management is an integral component of the overall corporate strategy to create shareholders' value. Sugar Industry in India occupies an important place in the Indian Economy, providing employment to nearly 7.5 million people, directly or indirectly, across the country, besides making the base for over 50 million people for their livelihood from growing and supplying sugarcane, which also contributes annually around Rs.50 billion by way of excise duty, cess, **VAT**, entry tax and octroi. The present study is aimed at analyzing the relationship between the Working Capital Management and the Profitability of Sugar Industry in India. It is proved that there is a significant positive coefficient with **CR**, **INV** and **ROI** at 5% level. Also there is a significant negative coefficient with **QR**, **WCTR** and **ROI** at 5% level. **DTR** has highly significant negative coefficient at 1% level with **ROI**. **CTR** has insignificant positive coefficient with profitability. The overall regression model fit* is *represented by $R^{2,}$ which is above 50% (0.51).*

Key words: Inventory Turnover Ratio (***INV***), Return on Investment (Profitability) (***ROI***), Working Capital (***WC***), Working Capital Management (***WCM***), Working Capital Turnover Ratio (***WCTR)***, Debtors Turnover Ratio ***(DTR)***, Creditors Turnover Ratio ***(CTR)***, Current Ratio ***(CR).***

JEL Classification: G32, G30

1. Introduction

Working Capital (***WC***) is regarded as the life blood of a business and it plays a pivotal role in keeping the wheels of a business enterprise running. However, the management of ***WC*** is a delicate area in the field of financial management as it involves frequent decision-making. **(Joginder Singh Dutta, 2000**). Every organization, whether profit oriented or not, irrespective of its size and nature of business,

needs a requisite amount of ***WC***. The efficient management of ***WC*** is crucial as it decides the survival, liquidity, solvency and profitability of the business organization concerned (**Mukhopadhyya, 2004**). ***WC*** Management (***WCM***) is recognized as an important concern of the financial manger due to many reasons. A typical manufacturing firm's current assets account for over half of its total assets and for a distribution company, they account for even more. The maintenance of excessive levels of current assets can easily result in a substandard return on a firm's investment. However, firms with inadequate levels of current assets may incur shortages of funds and have difficulties in smoothly maintaining day–to- day operations**.** Efficient ***WCM*** involves planning and controlling current assets and current liabilities in a manner that eliminates the risk of inability to meet due to short term obligations on the one hand and avoid excessive investment in these assets on the other **(Eljelly, 2004).**

2. Importance of Efficient *WCM*

The importance of efficient ***WCM*** is indisputable as the ***WC*** is the difference between resources in cash or which are readily convertible into cash (current assets) and organizational commitments for which cash will soon be required:

- The level of current assets changes constantly and regularly depending upon the level of actual and forecasted sales. This requires that the decision to bring the levels of current assets should be made at the earliest opportunity and as frequently as required.
- The changing levels of current assets may also require review of the financing pattern. Current assets usually represent a substantial portion of the total assets of a firm, resulting in the investment of large chunk of funds in the current assets.
- There is an obvious and inevitable relationship between the growth of sales and the level of current assets. The target sales level can be achieved only if supported by adequate ***WC.***

3. Profile of Sugar Industry in India

India is the second largest producer of sugar, after Brazil, in the world. The Sugar Industry occupies an important place in the Indian Economy. Nearly 7.5 million people across the country are directly or indirectly employed in the industry and over 50 million people depend on their livelihood from growing and supplying sugarcane. The Sugar Industry contributes annually around Rs. 50 billion by way of excise duty, cess, VAT, entry tax and octroi. The discovery of sugar from sugarcane originated in New Guinea and spread to Southeast-Asia and India. The Sugar Industry is the second largest agro-based industry, next to textiles, in India. Sugar is produced from sugarcane and sugar beet. Approximately 70 per cent of sugar is produced from sugarcane and 30 per cent is produced from sugar beet. Sugarcane is grown in semitropical region while beet is grown in temperate climate. Sugar Industry is cyclical in nature. Ethanol, a by product of sugar, can be used as a bio-fuel alternative to gasoline and it is widely used in cars in Brazil. Bagasse, also a by product of sugar, can be used as a bio-fuel and as a renewable resource in manufacturing pulp,

paper-products, building materials and also as a renewable energy for power generation. Sugar in India is a politicized industry. The Centre determines statutory minimum price for sugarcane. The Governments of most of the States, in which sugarcane is cultivated, fixes what is dubbed as the State Advised Price (***SAP***) that Mills of the State have to pay to the farmers.

3. a. Sugar Prices

According to the Indian Sugar Manufacturers Association (***ISMA***), the cost of production in North India, where sugar recovery from cane is about 9.5 per cent, works out to Rs. 29 per kilogram, even after factoring in returns from by products such as ethanol and losses incurred on levy sugar supplies at a low fixed price of Rs.18.50 per kilogram. When Government discontinued free sugar exports, sugar prices fell from an ex-factory price of about Rs.30 per kilogram to Rs.28 per kilogram in Uttar Pradesh and to Rs.26 per kilogram in Maharashtra. Despite good output, sugar prices are expected to stay firm in 2011. Traders, Analysts and Millers expect the ex-mill prices to remain in the range of Rs.34-35 per kilogram and the gap between demand and supply is expected to be narrow.

3. b. Steps for Production of Sugar

- Extracting juice by pressing sugarcane
- Boiling the juice to obtain crystals
- Creating raw sugar by spinning crystals in extract
- Taking raw sugar to a refinery for the process of filtering and washing to discard remaining non-sugar elements and hue
- Crystallizing and drying sugar
- Packaging the ready sugar.

The production and consumption of sugar in India during 1999-2000 to 2009 – 2010 are shown in **Table -1** and **Chart** – A. There was a decline in consumption of sugar when compared to the sugar production. For example, during the period 2005-06 to 2007-08, the consumption of sugar came down from 143.90% to 82.08%; from 151.72% in 2008 – 09 to 114.41% in 2009 – 10 while the production had started to resurge in 2008-2010 and it is likely to gain strongly in 2011-12. The trend of production and consumption of sugar in India reveals that the consumption surpasses the production, giving room for scaling up of the sugar production as well the opportunity to import sugar for domestic consumption. The consumption price will drastically rise in the years to come unless some serious measures are taken by the policy makers in this regard.

4. Literature Review

WCM is a very sensitive area in the field of financial management. It involves the quantification of various components of ***WC*** and combination of Current Assets (***CAs***) and the financing of these assets. Before entering into the empirical study, we may throw a little light on the existing literature on the Management of Working Capital. During the last few decades, several studies have been conducted, both in India as well as abroad, regarding the various aspects of Working Capital Management. A brief explanation of some of the studies is shown below.

The literature work on ***WCM*** was pioneered by **John Bauer (1916)**. He examined the pattern of operating revenue for a year and found that the average time taken by consumers for paying service was two months. The operating revenue for this period was $2, 00,000 and the expenses incurred were $1, 20,000. This contributed to the necessity of Working Capital. If the company is a new one, with its actual fixed capital and volume of business, it would practically have to provide this amount in its initial investment. Thus, the company actually has to tie up this sum in the business, which in turn earns a return on the amount. **Vijayakumar** and **Venkatachalam (2003)**, in their paper entitled, "Working Capital Management: A case study of Tamil Nadu Sugar Corporation", indicated a moderate trend in the financial position and the utilization of ***WC***. They also suggested that attempts should be made to use funds more effectively to keep an optimum level of ***WC*** since holding more current assets causes reduction in profitability. **Deloof (2003)** evaluated ***WC*** management effect on the profitability of selected Belgian firms and stated that there are companies which have large amount of cash invested in ***WC*** and there is a significant negative relation between gross operating income and the number of days, accounts receivable, inventories and accounts payable of firms. The study suggested that the managers could create value for the shareholders by reducing the number of days for accounts receivable and inventories to a reasonable level. The negative relation between accounts payable and profitability is consistent with the view that less profitable companies wait longer to pay their bills. **Samiloglu** and **Demiraunes (2008)**, in their study, "The effect of ***WC*** management on the firm profitability in Turkey firms", analyzed the effect of ***WC*** management on the profitability of the firms. They found that the accounts receivable period, inventory period and leverage affect the profitability of the firm negatively while growth affects the firms' profitability positively. **Uyar (2009)**, in his paper titled, "The relationship of Cash Conversion Cycle (***CCC)*** with firm size and profitability: An empirical investigation of Turkey firms", examined the industry benchmarks for ***CCC*** of merchandising and manufacturing companies and found that merchandising industry has shorter ***CCC*** than manufacturing industries. Further, the study examined the relationship between the length of the ***CCC*** and the size of the firms and indicated a significant negative correlation between the length of ***CCC*** and the firm size, in terms of both net sales and total assets. The study further showed significant negative correlation between the length of ***CCC*** and profitability. **Azhagaiah** and **Muralidharan (2009),** in their paper entitled, "The relationship between working capital management efficiency and ***EBIT***", analysed the relationship between working capital management efficiency and earnings before interest & taxes of the Paper Industry in India during 1997–1998 to 2005–2006. To measure the ***WCME,*** three index values viz., *Performance Index, Utilization Index, and Efficiency Index* were computed and associated with explanatory variables. Further, fixed financial assets ratio, financial debt ratio and size are considered as control variables in the analysis and are associated with the ***EBIT***. The study

reveals that the Paper Industry had managed the WC satisfactorily. The accounts payable period has a signifi cant negative relationship with ***EBIT***, which indicates that by deploying payment to suppliers, they improve the ***EBIT***. **Chinta Venkateswara Rao *et al*., (2010)**, in their study, "Financial management focus on working capital utilization in the Indian Cotton Textile Industry: Methodological Analysis," analyzed the trends and patterns of efficiency of ***WC*** utilization in respect of size of firms of cotton textile sector in India by the application of three indices viz., *Performance Index* ***(PI)****, Utilization Index (****UI****),* and *Efficiency Index* ***(EI)*****.** The study reveals that Linear Growth Rate (***LGR***) of ***PI***, ***UI*** and ***EI*** in respect of ***WC*** efficiency for small size firms is significant while in the case of the medium size firms, the trend of ***UI*** alone is significant. The trend of ***PI***, ***EI*** and ***UI*** for large size firms is insignificant.

After a thorough understanding of the various studies undertaken by different authors and the research techniques used for analyzing the data on working capital management determinants, efficiency, and working capital utilization, relationship with cash conversion cycle with firm size and profitability, the Researcher has taken up the work of analyzing data to study the impact of working capital management ratios on profitability with regard to listed Sugar Industry in India.

5. Significance of the Study

The study proposes to identify the impact of ***WCM*** on profitability through empirical analysis across Sugar Industry in India. Efficient Management of ***WC*** is a fundamental part of the overall corporate strategy in creating the shareholders' value. Today, management of ***WC*** is one of the most important and challenging aspects of the overall financial management. Optimization of ***WC*** balance means minimizing the ***WC*** requirements and realizing maximum possible revenues. Efficient ***WCM*** increases firm's growth opportunities and returns to shareholders. Very few studies have been made on ***WCM*** relating it to profitability, that too in Sugar Industry in India. Therefore, the present study is a maiden attempt to analyze the impact of ***WCM*** on Profitability of Sugar Industry in India.

6. Objectives of the Study

- To analyze the growth trend of returns on investment (profitability) of sugar industry in India over the period under study.
- To analyze the determinants of profitability by examining the sensitivity of returns on investment (profitability) to changes in the level of working capital of the corporate firms in sugar industry in India.

7. Hypotheses Development

- ✓ **NH^1:** There is no significant relationship between current ratio, liquid ratio, inventory turnover ratio and profitability**.**
- ✓ **NH^2:** There is no significant relationship between working capital turnover ratio as well as debtors' turnover ratio and profitability.
- ✓ **NH^3:** There is no significant relationship between cash turnover ratio and profitability.

8. Research Methodology

The purpose of the present study is to contribute to a very important aspect of financial management known as ***WCM,*** with reference to Sugar Industry in India. The study tries to provide new insights into the existing literature in the field of finance, particularly the impact of ***WCM*** on profitability. This research deals with the analytical framework of data analysis, which describes the industry and variables included in the study, the distribution patterns of data and statistical techniques employed in investigating the relationship between ***WCM*** and profitability.

8. a. Data Collection and Period of the Study

Since the study is based on financial data, the main sources of data were financial statements such as balance sheets, income statements of listed corporate firms for the period from 2005-2010, which were collected from secondary sources i.e., annual reports of the company, CMIE prowess database and from different websites concerned.

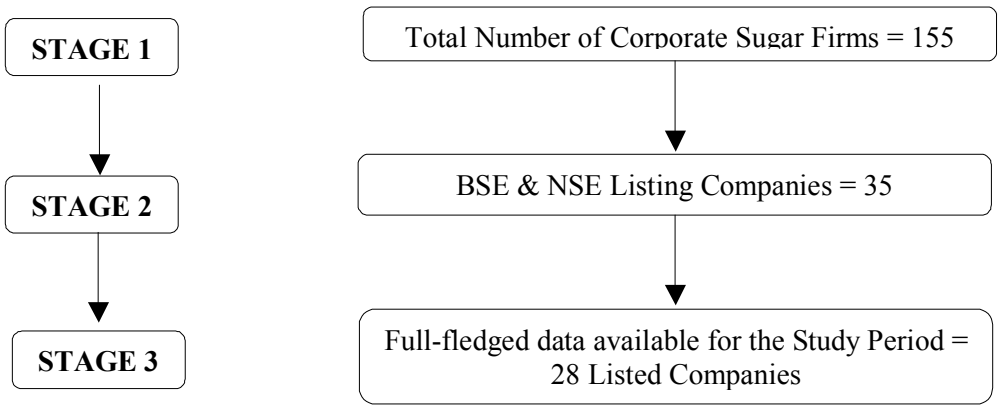
The data used for the study are related to the selected Sugar Industry in India for a period of five years, on a year to year basis, ranging from 2005-2010. There are two basic reasons behind the selection of the period as the period of study:

- This period relates to the post- liberalization era of the Indian Economy.
- This is the period for which the maximum financial data were available in the database.

8. b. Sampling Design

The study followed multi-stage sampling technique for ultimate corporate firms' selection as described in the following paragraph. The total number of firms under the Sugar Industry incorporated in India are 155, out of which, 35 firms have listing-flag with *Bombay Stock*

Multi-Stage Sampling Technique



Exchange as well as with National Stock Exchange. However, full-fledged data required for the study were available for 28 corporate firms only. Hence the final sample units constitute 28 corporate firms of Sugar Industry in India.

8. c. Research Methods

***WCM* Measures (Ratios)**

For measuring the ***WCM***, simple mathematical tool, viz ratio, was extensively used. The ratios relating to ***WCM,*** which have been computed and used for the analysis, are shown in **Table-2**.

Regression Analysis

$ROI = b_0 + b_1CR + b_2QR + b_3WCTR + b_4DTR + b_5CTR + b_6INV$

Where b_0 = constant

$b_{1.....}\ b_6$ = estimated coefficients

CR = Current Ratio

QR = Quick Ratio

WCTR = WC Turnover Ratio

DTR = Debtors Turnover Ratio

CTR = Creditors Turnover Ratio

INV = Inventory Turnover Ratio

9. Analysis and Interpretation

Chart-B shows that there was a steep fall in profitability of Sugar corporate firms during the year 2007-08 and afterwards there was a rise in the profitability during the following years. Some sample units recorded negative value in the year 2008 and 2009 because the sugar prices doubled over the years. Particularly in 2008-2009, a larger part of the sugarcane was used for making gur than in the earlier years so that the world sugar production went down when compared to the earlier season. The world sugar balance for the period from October 2008 to September 2009 puts world production at 16-16.5 million tonnes, which was lower than the world consumption of 20-22 million tonnes. Thus, the distinctive global surplus phase ended and the market moved into a deficit phase during this period.

Table 3 shows that the overall profitability of sample units in Sugar Industry was quite good and the mean profitability of most of the companies was positive over the years under study. Even though EID Parry recorded the highest mean profitability (13.51), its Compounded Annual Growth Rate (***CAGR)*** was negative [-0.050] because its profitability was fluctuating over the period under study. Bannari Amman Sugars Ltd and Ponni Sugars Ltd, recorded the next most highest mean profitability (10.46 and 10.11) and the ***CAGR*** was positive (0.017 and 0.144), indicating that the corporate firms were able to maintain better profitability level without any fluctuation over the years of study.

The deviation of profitability was higher in EID Parry (13.51) from the highest mean profitability when compared with the other companies. The KM Sugar Mill shows the next highest deviation due to a lot of fluctuations and negative values over the period 2008-2009 and its mean profitability and ***CAGR*** was negative. It is better to have lesser deviation in the profitability level.

The Descriptive Statistics (*see* **Table- 4**) shows that Debtors' Turnover Ratio (***DTR)*** recorded the highest mean value. The standard deviation from the mean was also high. The ***DTRs*** also recorded higher standard deviation, indicating that the debt collection period varied highly within the industry. Creditors' Turnover Ratio (***CTR***) also registered high standard deviation but the Current Ratio (***CR)*** and the Quick Ratio (***QR)*** recorded low standard deviation from the mean value, indicating that there was not much of variation in the level of ***CAs*** and Quick Assets (***QAs)***

Table-5 shows that ***CR*** experienced significant positive coefficient (5.263) at 5% level with Return On Investment (***ROI)***, indicating that higher ***CR*** increased the ***ROI*** and vice versa, whereas ***QR*** experienced significant negative coefficient (-10.582) at 5% level with ***ROI***, indicating that maintaining assets in terms of ready cash, did not help in increasing profitability. Hence it is better for the Sugar Industry to maintain a lesser amount of ready cash and to invest the money for productive purpose, which ultimately increases the profitability. ***INV*** also recorded significant positive coefficient (1.11) at 5% level with ROI, which shows that as the inventory decreased, the profitability of the industry also increased over the period of study. Hence, **NH^1: "There is no significant relationship between current ratio, liquid ratio as well as inventory turnover ratio and profitability,"** is rejected ($5.263_{0.05}$ with positive relationship, $-10.582_{0.05}$ with negative relationship and $1.11_{0.05}$ with positive relationship respectively for current ratio, liquid ratio and inventory turnover ratio with profitability).

Working Capital Turnover Ratio ***(WCTR)*** recorded significant negative coefficient (-0.036) at 5% level with ***ROI***, which means that companies maintained a larger proportion of net ***WC*** when compared to the sales. Debtors' Turnover Ratio ***(DTR)*** recorded highly significant negative coefficient (-0.020) at 1% level with ***ROI***, indicating that longer the period between credit sales and cash collection, greater profitability of the industry. Hence, **NH^2: "There is no significant relationship between *WCTR* as well as *DTR* and profitability,"** is rejected ($-0.036_{0.05}$ and $-0.020_{0.01}$ with negative relationship respectively for DTR as well as WCTR with profitability).

CTR recorded insignificant positive coefficient (0.*014)* with profitability. Hence **NH^3: "There is no significant relationship between cash turnover ratio and profitability",** is rejected.

The overall regression model fit, which is represented by $\mathbf{R^2}$, is above 50% (0.51), which shows that the explaining variables determine more than 50% of the changes in profitability. F stat (3.642*) is significant @ 5% level, indicating that the variance in the dependent variable is explained by the variance in the independent variable.

10. Limitations and Scope for Further Studies

- The analysis was limited to five years only (i.e. from 2005- 2010) and hence a detailed trend covering a longer period could not be made.
- The study was based on secondary data which were collected from CMIE Prowess.

The quality of the study depends purely on the accuracy, reliability and quality of secondary data source.

- ❖ The study was limited to 28 corporate firms of Sugar Industry in India and hence the accuracy of results is purely based on the data of sample firms for the study.

WCM is an important component of corporate financial management but it has not been recognized in financial literature unlike capital structure, capital budgeting and dividend policies. Because of this reason, the valid research relating to ***WCM*** is found to be scanty in India. Hence there is much to be done about ***WCM*** in India and the following areas offer scope for further studies.

- Further research could be carried out on the same area with a larger number of sample companies, lengthening the years of study, by referring to other data source like Capital Plus etc.
- Study on small and medium sized companies could be undertaken by taking large sample, covering more number of years.
- Also studies of ***WCM*** in different sectors and companies between sectors and cross sectors would add to the existing literature.

11. Concluding Remarks

There is a significant positive coefficient between ***CR*** and ***ROI*** (5.263), ***INV*** and ***ROI*** (*1.110)* at 5% level. Also there is a significant negative coefficient between ***QR*** and ***ROI*** (-10.582), ***WCC*** and ***ROI*** (-0.036) at 5% level. ***DTR*** recorded highly significant negative coefficient (-0.020) at 1% level with ***ROI***. ***CTR*** registered insignificant positive coefficient (0.*014)* with profitability. The overall regression model fit, which is represented by $\mathbf{R^2}$, is above 50% (0.51). After the downtrend in the last two years of the study period, the Sugar Industry in India is poised to reap a rich harvest in the season beginning October 2010. The sugar production in the country experienced an increase in 2010-11 against 19 million tonnes in 2009-10. The production of sugarcane is cyclical in nature. Hence the sugar production is also cyclical as it depends on the sugarcane production in the country. Dual Pricing System is adopted in Sugar Industry in India, which includes sugar price in the public distribution system and the free sale sugar price. The sugar corporate firms are overburdened with surplus inventories that most of them do not have adequate storage facilities, capacities and cash flows, which have led them to resort to distress sale of sugar, which only brings down the prices. There are more by-products produced by sugarcane like ethanol, molasses (used by breweries), biogases (used by co-generation plants) and the remaining are utilized by the gur and khandsari sectors.

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Table - 1

Production and Consumption of Sugar in India (in million tons) durin 1999-2000 to 2009 – 2010

Year	Production	Consumption	% of consumption to Production
1999-2000	20.22	17.30	85.56
2000-2001	20.48	17.85	87.16
2001-2002	20.48	19.76	96.48
2002-2003	22.14	20.26	91.51
2003-2004	15.15	19.12	126.20
2004-2005	14.17	20.39	143.90
2005-2006	21.14	19.87	93.99
2006-2007	30.78	22.43	72.87
2007-2008	28.63	23.50	82.08
2008-2009	15.95	24.20	151.72
2009-2010	20.54	23.50	114.41

Source : Ministry of Agriculture, Indian Corporate sugar firms Association

Table - 2

***WCM* Measures (Ratios) with Elements of Ratios and Description of Ratios**

***WCM* Measures (Ratios)**	**Elements of Ratios**	**Description of Ratios**
Current Ratio (CR)	Current Assets / Current Liabilities	**Current assets** include cash, accounts receivables, inventory, marketable securities, prepaid expenses and other liquid assets that can be readily converted into cash. **Current liabilities** include short term debt, accounts payable, accrued liabilities and other debts.
Quick Ratio (QR)	Quick Assets / Quick Liabilities	For calculating quick assets, stock and prepaid expenses are excluded from current assets in order to have high degree of liquidity of current assets. **Quick liabilities** are calculated by eliminating bank overdraft from current liabilities
Debtors' Turnover Ratio (DTR)	Net Credit Sales /Average Debtors	The trade debtors for the purpose of this ratio include the amount of Trade Debtors & Bills Receivables. The average receivables are found by adding the opening receivables and closing balance of receivables and dividing the total by two.
Inventory Turnover Ratio (INV)	Net Sales / Inventory	Net sales is the amount of sales generated by a company after the deduction of returns, allowances for damaged or missing goods and any discounts allowed. Average inventory is the median value of an inventory throughout a certain time period. The basic calculation for average inventory would be: (Current Inventory + Previous Inventory)/2.
Cash Turnover Ratio (CTR)	Net Sales / Cash Balances	Net sales is 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. The cash balance is the closing balance of cash.
WC Turnover Ratio (WCTR)	Net Sales / Net WC	Net sales is the amount of sales generated by a company after the deduction of sales returns, allowances for damaged or missing goods and any discounts allowed. A company uses ***WC*** (current assets - current liabilities) to fund operations and purchase inventory
Return on Investment (ROI)	PAT / Average Total Assets	**PAT** is the net profit earned by the company after deducting all expenses like interest, depreciation and tax. Average total assets is the average of the aggregate assets during a two year period, i.e., Total Assets (current year) + Total Assets (previous year) / 2. Total assets include all gross investments, cash and equivalents, receivables, land and building, plant and machinery, furniture and fittings and intangible assets.

Table - 3
Return on Investment [Profitability] of Sugar Industry over the Period of Study

S.NO	COMPANY NAME	Mar-06	Mar-07	Mar-08	Mar-09	Mar-10	MEAN	SD	CAGR
1	Dalmia Bharat Sugar & Inds. Ltd.	6.8	11.98	11.89	3.95	2.82	7.49	4.31	-0.161
2	Dhampur Corporate sugar firms Ltd.	8.59	12.52	-4.95	0.25	3.32	3.95	6.86	-0.173
3	Dharani Sugars & Chemicals Ltd.	2.73	7.66	-3.4	2.64	5.95	3.12	4.23	0.169
4	Dwarikesh Sugar Inds. Ltd.	14.81	7.08	-1.15	-3.05	3.02	4.14	7.13	-0.272
5	Empee Sugars & Chemicals Ltd.	8.14	15.5	0.55	-0.44	0.1	4.77	6.95	-0.585
6	Indian Sucrose Ltd.	11.51	3.24	-0.73	1.93	1.72	3.53	4.68	-0.316
7	Jeypore Sugar Co. Ltd.	10.49	3.11	-1.25	0.53	3.36	3.25	4.47	-0.204
8	K C P Sugar & Inds. Corpn. Ltd.	18.26	7.12	2.09	3.54	7.66	7.73	6.34	-0.159
9	K M Corporate sugar firms Ltd.	7.26	8.41	-16.67	-6.04	2.27	-.95	10.47	-0.207
10	Kesar Enterprises Ltd.	0.04	6.1	-8.14	1.44	3.26	.54	5.36	1.411
11	Khaitan (India) Ltd.	1.14	1.32	-0.26	-0.19	-3.27	-.25	1.84	-2.235
12	Oudh Corporate sugar firms Ltd.	2.74	10.42	-4.62	-0.51	1.9	1.99	5.51	-0.071
13	Ravalgaon Sugar Farm Ltd.	3.8	-3.95	1.87	8.81	9.18	3.94	5.43	0.193
14	Sakthi Sugars Ltd.	2.63	7.77	2	-3.96	4.08	2.50	4.25	0.092
15	Shree Renuka Sugars Ltd.	12.43	10.49	5.82	6.04	5.12	7.98	3.27	-0.163
16	Thiru Arooran Sugars Ltd.	2.59	3.77	-3.53	0.4	7.93	2.23	4.23	0.251
17	Ugar Sugar Works Ltd.	4.6	0.41	2.46	2.77	-3.42	1.36	3.06	-1.942
18	Upper Ganges Sugar & Inds. Ltd.	4.16	8.26	-5.7	-0.86	0.84	1.34	5.26	-0.274
19	Uttam Corporate sugar firms Ltd.	14.02	5.91	-4.63	-6.01	-4.46	.97	8.72	-1.795
20	Bannari Amman Sugars Ltd.	11.62	12.17	4.49	11.38	12.65	10.46	3.37	0.017
21	Ponni Sugars (Erode) Ltd.	12.46	5.12	-1.74	10.28	24.45	10.11	9.70	0.144
22	Rajshree Sugars & Chemicals Ltd.	10.47	5.85	-0.92	3.53	5.92	4.97	4.14	-0.108
23	Bajaj Hindusthan Sugar & Inds. Ltd.	-6.87	0.31	-2.88	-4.71	3.02	-2.23	3.94	-1.848
24	E I D-Parry (India) Ltd.	11.55	10.4	-1.17	37.81	8.95	13.51	14.49	-0.050
25	Parrys Sugar Industries Ltd.	7.22	5.09	1.4	0.1	-8.48	1.07	6.05	-2.033
26	Prudential Sugar Corpn. Ltd.	7	1.59	-12.13	0.11	-1.04	-.89	7.00	-1.683
27	Venus Sugar Ltd.	4.56	0.8	-13.56	-6.31	-9.83	-4.87	7.47	-2.166
28	Wahid Sandhar Sugars Ltd.	10.88	1.26	0.8	0.83	1.98	3.15	4.35	-0.289
29	AVERAGE	7.34	6.06	-1.93	2.30	3.18			

***SD** – Standard Deviation; **CAGR** - Compound Annual Growth Rate*
***Source:** Computed results based on compiled data collected from CMIE prowess Pvt. Ltd*

Table - 4

Descriptive Statistics of Listed Sugar Corporate Firms in India

Variables	N	Minimum	Maximum	Mean	SD
ROI	28	-4.868	13.508	3.38957	4.046534
CR	28	.772	2.486	1.33493	.454576
QR	28	.066	1.872	.43614	.364071
WCC	28	-49.727	232.889	9.6142	47.269052
DTR	28	2.580	572.652	69.82379	121.092163
CTR	28	9.050	364.220	67.63179	72.941777
INV	28	1.473	13.074	4.33757	2.775484

***Source**: Computed results based on compiled data collected from CMIE prowess Pvt. Ltd*

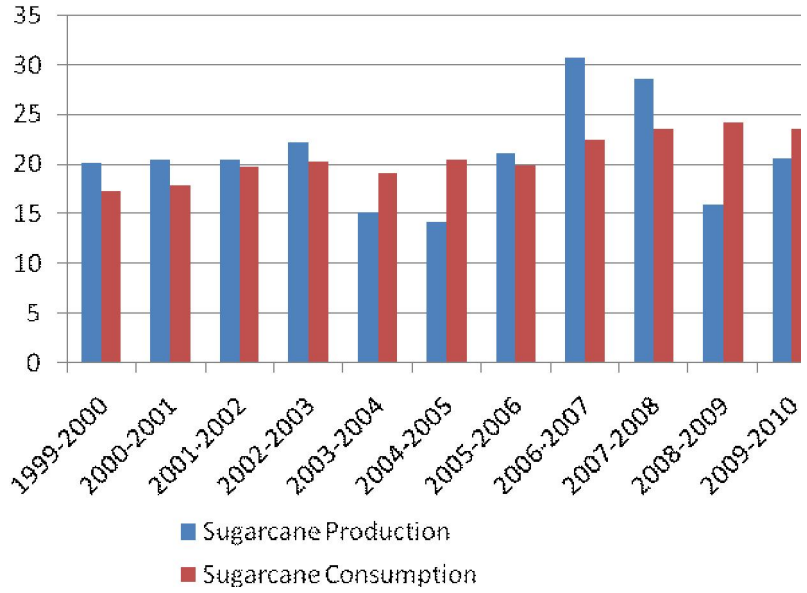
Table - 5

Regression Results of Listed Corporate Sugar Firms in India

Variables	B	't'	Sig.
(Constant)	-3.048	-1.249	0.225
CR	5.263*	2.799	0.011
QR	-10.582*	-2.556	0.018
WCC	-0.036*	-2.341	0.029
DTR	-0.020**	-3.238	0.004
CTR	0.014	1.381	0.182
INV	1.110*	2.423	0.025
R^2			0.510
Adjusted R^2			0.370
F statistics			3.642* (0.012)

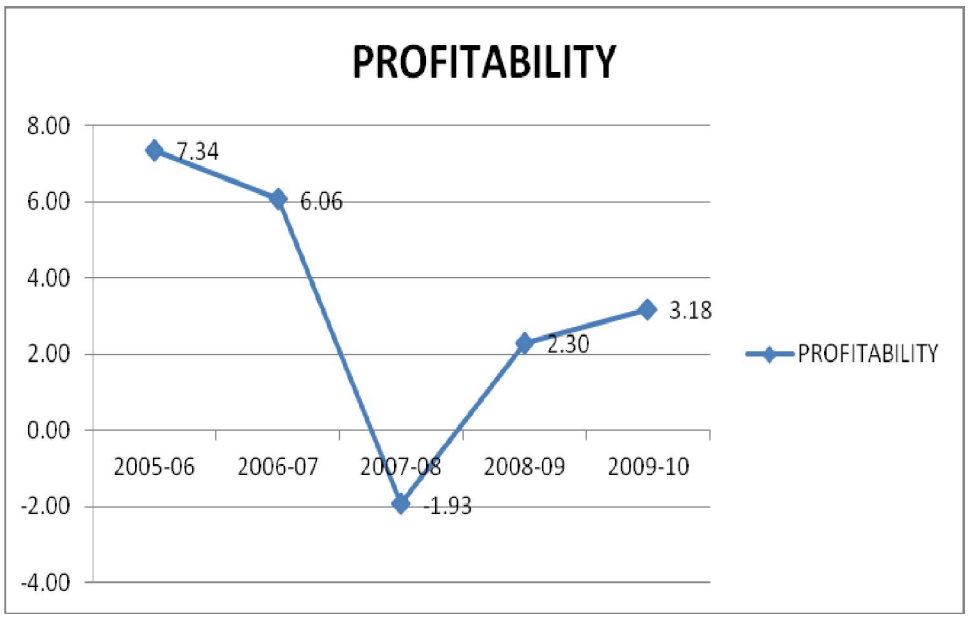
**Significant at the 0.01 level (2-tailed); *Significant at the 0.05 level (2-tailed).

Chart – A: Production and Consumption of Sugar in India during 1999 – 2000 to 2009 - 2010 (million tons)



Source: Ministry of Agriculture, Indian Corporate sugar firms Association.

Chart – B: Trend of Profitability of Sugar Industry in India over the Period of Study



Source: *Computed results based on compiled data collected from CMIE prowess Pvt. Ltd.*