Chapter - I

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DESIGN AND EXECUTION OF THE STUDY

Sugarcane is the second most important agro industrial crop in the country next to cotton. Sugarcane is a renewable, natural agricultural resource because it provides sugar besides bio fuel, fibre, fertilizer and myriad of byproducts/co-products with ecological sustainability. Sugarcane juice is used for making white sugar, brown sugar (Khandsari), Jaggery (Gur) and ethanol. The main byproducts of sugar industry are bagass, molasses and press mud. Molasses, the chief byproduct, is the main raw material for alcohol. Excess bagass is now being used in the paper industry. Besides sugar, co-generation of power using baggas as fuel is considered to be feasible in most sugar mills. Press mud is used as fertilizer by most of the farmers. It is also used as fuel in so many industries like Brick Kiln. The leaves of sugarcane are also used as fodder and in mulching which is important for increasing fertilizer status, checking evaporation, maintaining humidity and suppressing weed infestation.

Sugarcane is one of the most important commercial crops of the country and the sugar industry occupies an important place in the economy of India. India is the second major sugar producing country in the world next to Brazil. Sugar industry occupies an important place among organized industries in India. Sugar industry, is the second largest agro-based industry in India next to cotton industry. It has been instrumental in resource mobilization, employment generation, income generation and creating social infrastructure in rural areas.

Significantly, the sugar industry is scattered mostly all over in the rural India. One sugar factory provides employment to 1.4 to 1.5 lakh people directly and indirectly through allied activities.
This shows the potent scope of the sugar industry. It has changed the socio-economic condition of the rural area initiating commercialization in the agriculture. Indeed, sugar industry has facilitated and accelerated pace of rural industrialization. More than 4.50 crore farmers are engaged in sugarcane cultivation and about 5 lakh rural people have got direct employment in the industry. The Sugar industry contributes a major share in the national economy. Therefore, the expansion of sugar industry in India is an indispensable factor for the socio-economic development of rural masses and national economy of India.

1.1 EVOLUTION OF SUGAR INDUSTRY IN INDIA

In 1213 AD, the Chinese ambassador, Ch-u-ts-ai reported to Jenghiz Khan "In this century sugarcane is cultivated. The people make wine and sugar from juice." In 1498, Vasco de Gama also saw large quantities of sugar at Calicut Ludovico di Verthema, an Italian who travelled in the East in 1503-8, on seeing an immense quantity of sugar at Zibit in Arabia, a hundred miles north of Perim and a Bathacala, a little south of Goa on the Malabar Coasts recorded "a great abundance of sugar especially candid according to our way."

In Ain-i-Akbari written by Abul Fazal in 1590, cane is stated to have been of various kinds, but mainly of two sorts, one called paunda, one species is so tender and so soft, so full of juice that a sparrow by specking could make the juice flow, the other species is hard. The former was grown for eating and the latter for sugar making-brown sugar candy, common sugar, white candy, and refined sugar useful for the preparation of all kinds of sweetmeats. It is evident that cultivation of sugarcane and production of sugar was prevalent all over India since ancient period.
India has been known as the original home of sugarcane and sugar. India is the largest producer and consumer of sugar in the world, with Maharashtra contributing over one-third of country’s sugar output. Indians knew the art of making sugar since the fourth century. However, the advent of modern sugar industry in India dates back to mid 1930's when a few vacuum pan units were established in the sub-tropical belts of Uttar Pradesh and Bihar. Until the mid 50s, the sugar industry was almost wholly confined to the states of Uttar Pradesh and Bihar. After late fifties or early sixties the industry dispersed into Southern India, Western India and other parts of Northern India. The sufficient and well distributed monsoon rains, rapid population growth and substantial increases in sugar production capacity have combined to make India the largest consumer and second largest producer of sugar in the world.

1.2 DEMAND AND SUPPLY:

1.2.1 DEMAND:

Indians by nature have a sweet tooth and sugar is a prime requirement in every household. Almost 75% of the sugar available in the open market is consumed by bulk consumers like bakeries, candy makers, sweet makers and soft drink manufacturers. Khandsari sugar is less refined and is typically consumed by sweet makers. Gur, an unrefined form of lumpy brown sugar, is mostly consumed in rural areas, with some quantities illegally diverted for alcohol production. A rising trend in usage of Sugar is visualized because of greater urbanization and rising standard of living in India. Industrial consumption for sugar is also growing rapidly particularly from the food processing sector and sugar based bulk consumers such as soft drink and ice cream manufacturers.
The per capita consumption of total sugar (sugar, gur & khandasari) in the country has been increasing at a phenomenal rate.

1.2.2 SUPPLY:

The quantum of sugar produced by a mill is determined by the factors like daily crushing capacity, duration of crushing season and percentage of sugar recovery. The crushing season in the country starts from October and reaches its peak in January before finally ending in March or April of the next year. But based on cane availability, the start of the crushing season may postpone by one to one and a half months in different states in India. Example: In eastern UP crushing season starts only in November every year, about a month later than normal.

The period of November to March (150 days) is an ideal one for sugar recovery in general, more particularly in Bihar and Uttar Pradesh. From April onwards, sugar recovery shows a downward trend and in June, the percentage of sugar recovery comes down to lowest levels. The months of April, May and June are very hot in Uttar Pradesh, Bihar and Punjab. This period, would thus, accentuate the drying of sucrose content and leads to a lesser recovery of sugar. Indian sugar industry has grown horizontally primarily because of Government policy to support small size sugar factories by excluding them from the requirement of supplying sugar at lower prices for the public distribution system. The sugar production in the country fluctuates widely based on sugarcane availability in the country. S-30 grade sugar has the maximum production in India constituting around 72% of the total production. The remaining 24% is of M-30 and the rest is from L-30 and the other different grades under 29 series.
1.3 INDIAN SUGAR ECONOMY

The Indian Sugar industry is the second largest agro-processing industry in the country, next to cotton textiles. Located in rural areas they have an intrinsic symbiotic relationship with the rural masses and serve as nerve centre for rural development. Sugar industry covers around 7.5% of total rural population and provides employment to half a million people. This industry utilizes around 4 million hectares of land for sugarcane cultivation with about 45 million farmers engaged in sugarcane cultivation in India.

The sugar industry in India is subject to numerous controls at various levels starting from procurement of sugarcane to sugar distribution, pricing and the use of end-product sugar.

Sugar prices are closely monitored by the government and controlled by a set of measures like the release mechanism and levy allocation. The sugarcane prices are fixed by the Central or State Governments to ensure a remunerative return to the farmers. The Government of India fixes Statutory Minimum Price (SMP) for sugarcane. Moreover, certain State Governments like Uttar Pradesh insist for an even higher payment in the form of State Advised Price (SAP). In the seasons 2006-07 and 2007-08 sugar production skyrocketed to record levels due to the irrational and unchecked increase in sugarcane prices by the State Government in Uttar Pradesh due to political considerations. A unique situation existed where the cost component of raw materials was more than the selling price of sugar. Acknowledging the financial difficulties being faced by the sugar industry, the Government of India took a number of initiatives to help the industry tide over the financial crisis.
The Government of India extended interest free loans to the sugar mills equivalent to the excise duty payable in the seasons 2006-07 and 2007-2008 on sugar for payment of cane arrears and other statutory liabilities. In order to encourage export of sugar, the government agreed to offset the higher freight costs incurred by the Indian sugar industry by extending subsidy of Rs 1,350 per tonne to mills located in the coastal areas and Rs 1,450 per tonne to mills situated in the interiors till September, 2008. As a result, India is exporting about 4.2 MT of sugar in 2007-08 compared with 1.7 MT of the previous year. The Government of India created a buffer stock of five million tonnes in the year 2007 to ensure availability of sugar in the domestic market. However, with effect from 1st May 2008, 2 million tonnes has been liquidated and the remaining stock of 3 million tonnes has ceased to exist from 31st July 2008.

At present Indian sugar industry contributes 15% of global sugar production. While its share in global sugar consumption is around 13.4%. India is exporting around 4.23 million tonnes of sugar in 2007-08. This year, for the first time, sizeable quantity of raw sugar was exported by India. Major destinations are Dubai, Bangladesh, Malaysia and China. Though India is second largest sugar producer in the world, it is not a regular exporter of sugar due to the famous Indian sugar cycles and sharp volatility in production levels.

After a massive increase in sugar production in 2005-06 and 2006-07, sugar production upward trend reversed in 2007-08 and was lower at 26.50 million tonnes. The reasons for the reversal of trend can be attributed to the dispute in sugarcane price, large sugarcane arrears, delay in crushing and lower yields. This downward trend in sugar production is likely to continue during 2008-09 as the area under plantations has fallen significantly and poor monsoons in Maharashtra.
India’s sugar production is expected to fall as much as 20% as growers are reducing agricultural inputs as well as shifting to other crops. In spite of that, the modern sugar industry has contributed to the socio-economic development of the well being of the local people.

1.4 CHALLENGES FOR INDIAN SUGAR INDUSTRY

Indian sugar industry contributes 15% of global sugar production. While its share in global sugar consumption is around 13.4%. Its share in global sugar trade is below 3%. Indian sugar industry has been facing shortage of raw material, and resource constraint and infrastructural problems. Globalization has brought a number of opportunities but at the same time posed certain challenges before sugar industry. Most of sugar units in India utilize production capacity below 50%.

Low capacity utilization and inadequacy of raw material lead to closure of 100 sugar factories in India. Mounting losses and decreasing net worth of sugar factories have been responsible for sickness of sugar industry. Sickness in sugar industry has reached to an alarming proportion. Indian sugar industry has been cash striven for decades. Low cash inflow due to piling stocks leads to serious financial crisis and finally to closing sugar factories. Sugar prices have been a political issue rather than economical issue. Many a times it worsens economy of sugar factories. The main concern of sugar industry in India is fluctuations in sugarcane production due to inadequate irrigation facilities, lower sugarcane yield, and frequent droughts in tropical and sub-tropical areas where sugarcane is grown on large scale. In addition, sugarcane yield has been lower (59 Mts per hectare). Sugar recovery is also lower in comparison with other sugar manufacturing countries.
This leads to escalation of production costs and weakness competitive edge of the industry. Most of sugar mills in India are having daily sugarcane crushing capacity of 1250 tonnes. These mills cannot have economies of scale so they have to incur high production costs. Indian sugar industry is characterized by high production costs. Therefore, daily crushing capacity should be extended to 2500 tonnes. Obviously, this industry has a great challenge of existence in global market. In recent years, sugarcane production in India has decelerated to a great extent due to water and power shortage. Special attention is to be given on water resource management. All the area under sugar cultivation should be brought under drip irrigation to conserve water as well as fertilizers. Adequate and regular power supply to sugarcane growers and sugar factories would increase production and productivity. To enhance share of Indian sugar industry in global trade, quality and quantity of sugar needs to be enhanced.

1.5 SUGAR POLICY OF THE GOVERNMENT

Sugar is a controlled commodity in India under essential commodities Act, 1955. Government of India initiated de-licensing policy in sugar industry on 11th September, 1998 in view of globalization process, and since then this industry has experienced significant changes. De-licensing of sugar industry has led to mushrooming growth of sugar mills. During 1988-89 to 1991-92, government had introduced partial control in accordance with levy-free sugar ratio was 45:55. It was 40:60 during 1992-93 to 1996-97. Decontrol of sugar trade got momentum in due course and at present (2005), levy free sugar ratio is 10:90. The Committee appointed by Government of India under chairmanship of S.K. Tuteja recommended decontrol of free sale sugar by October, 2005.
Central government announced statutory minimum prices (SMP) of sugarcane and on this basis state governments fix state advised prices (SAP). Unfortunately, SAP is being used as a political tool and has been main concern of sugar mills as it results in escalation of production costs.

1.6 FUTURE OUTLOOK

The sugar industry seems to be finally coming out of the worst ever recession that it had met over the past few decades. After successive years of surplus production and uninhibited capacity addition, the sugar output in India has started declining. While it may be still premature to comment on the production estimates for 2008-09, it is evident that production will not exceed consumption as the area under sugarcane plantation has fallen significantly. This development has witnessed a smart rally in sugar prices that have come back to the levels that were prevailing in 2006.

There is still uncertainty about the sugarcane prices as the matter is under litigation and will have a significant impact on the profitability of the industry. The sugarcane price for 2008-09 is yet to be determined. Furthermore, with the fall in sugarcane production, prices of byproducts such as molasses and bagasse have also started strengthening. The growth of sugar demand by food industries and other non-household users, estimated to account for about 45% of total consumption, could provide additional impetus to longer-term market growth. Although gur and khandsari are still consumed in rural areas, demand for white sugar is expected to continue to increase. Indian sugar industry can be a global leader provided it comes out of the vicious cycle of acute shortages and surplus of sugarcane.
A stable long term policy is needed in which the shackles are removed which constrain this industry from growing in a healthy manner. Against the backdrop of skyrocketing crude prices policymakers have become aware of the sugarcane as an energy crop and are encouraging the sugar mills to go integrated and produce ethanol and power.

1.7 STATEMENT OF THE PROBLEM

Though India occupies a prominent position in sugar production in the world, its share in the global trade is just 3%. The total quantity of sugarcane crushed is disproportionate to the expected capacity of the existing sugar mills in India. Globalization has offered a number of opportunities to sugar industry and at the same time it poses certain challenges for it. Most of the sugar units in India utilize 50 per cent of its production capacity. Low capacity utilization and inadequacy of raw material led to the closure of approximately 100 sugar factories in India. Indian sugar production is much lower than the installed capacity. The production ratio of our country is much lower than few countries like Australia and Brazil. The low output and consequently the low profit, in course of time, result in incurring losses and closure of mills.

Indian sugar industries are also not able to compete with other countries in the global market in spite of hard work. The leading producers of sugar among the states in India are the state of Uttar Pradesh, Bihar and Tamil Nadu. The production of sugar by Tamil Nadu is about 10% of the India’s production. Income generated from sugarcane sale proceeds in Tamil Nadu exceeds approximately Rs 400 crores a year. At present 31 sugar mills are functioning in the state. Of these, 14 are in private sector, 3 in public sector and 14 in cooperative sector.
The average area under sugarcane cultivation in Tamil Nadu during the period from 1983-84 to 2003-04 was 187 thousand hectares, which accounts for nearly 6% of the country’s sugarcane area. The annual growth rate of sugarcane area in Tamil Nadu is 2.44% which is more than growth rate India is (1.37%). The average annual sugarcane production in Tamil Nadu during the same period was 18,930 thousand tonnes which accounts for nearly 10% of the Indian sugarcane production. The average yield of cane per hectare in Tamil Nadu is 100.5 tonnes which is almost 1.5 times the country’s average yield. However, the growth rate in Tamil Nadu is below the all India level. It can also be seen that the acreage and production of sugarcane in Tamil Nadu fluctuated more widely than the all India level. Tamil Nadu also faces almost all the earlier mentioned problems in addition to other difficulties such as inadequate power supply, insufficient supply of raw material, water management, perennial labour problems, and non-utilization of modern methods of crushing and technology. In Tamil Nadu, Thanjavur district contributes a significant share in the production of sugars.

Thanjavur district is situated in the fertile soil of Cauvery delta of Tamil Nadu. Thanjavur district, which is a prime delta area in cavery basin, faces problems in the production of sugar. The existing four mills in Thanjavur district both private and public sector, suffer from various problems. A number of micro and macro studies have been undertaken by the researchers and scholars on various aspects of sugar industries. Finance is the major problems faced by the sugar industry now a days.
The Central Government has given, to some extent, relief in the form of new package to this industry in order to overcome their problem. This is a burning problem faced by all the sugar industries at present. Few attempts have been made to explore the performance and find out the main reasons for the poor performance of sugar industries in Tamil Nadu particularly in Thanjavur district. In the light of this, an attempt has been made by the researcher to analyze the performance of sugar industries in Tamil Nadu in general and Thanjavur district in particular.

1.8 OBJECTIVES OF THE STUDY

The main objectives of the study are
1. To analyze the performance of the sugar industry in the study area.
2. To evaluate the financial performance of selected sample study units
3. To examine the present position of selected sample study units
4. To identify and examine the problems of sugar industry in the study area.
5. To suggest appropriate measures for further development of sugar Industry in India

1.9 DATA BASE AND METHODOLOGY

The study is an evaluation study based on analytical techniques. The study is based on primary and secondary data. The secondary data were collected from the records of various departments of the study units and in addition to this, the annual reports of the selected sample units were also used as the source of secondary data. Personal interview and observation techniques have been used for the collection of the primary data. The researcher has visited each of the units in and around the factory in order to ascertain the facts and collect the figures pertaining to the study.
Three private sector and one public sector sugar factory have existed in Thanjavur District. Among the existing factories one public sector namely Arignar Anna Sugar Mill, Kurungulam and one private sector namely Thiru Arooran Sugar Mill, Thirumandankudi have been purposively selected. The present study covers a period of five years from 2001-2002 to 2005-2006.

The study covers mainly the following aspects of financial performance analysis. (1) Analyzing the short-term solvency position (2) Long term solvency position and (3) Profitability. Statistical techniques such as Average, Trend percentage, Standard Deviation (SD), Coefficient of Variation (CV) and coefficient of correlation have been used for analyzing the data.

**1.10 OPERATIONAL DEFINITIONS**

**1.10.1 Sugar**

The main product of Sugar industry is white Crystal Sugar. A typical White Crystal Sugar contains sucrose (97.5%) reducing sugar (0.86%) other organic compound (0.46%) ash (0.43%) and water (0.75%). Sugar Cane contains 11 to 15% sucrose out of which only 8 to 11% is crystalizable. The remaining sucrose goes into by-product along with others viz. Glucose and Fructose.

**1.10.2 Baggase**

Baggase is the first by-product. The fibrous residual matter left out after extraction of sugar cane juice is known as Baggase. It contains about 48.50% moisture, 48.0% sugar and other minor constituents. It has been used as fuel in Boiler to raise Steam. Nowadays it can be used for paper production.
1.10.3 Paper Production from Baggase

Baggase is used as a raw material in the paper industry. Cuba leads in this industry. A fungus degrades the fiber to cellulose, hemi-cellulose, and lignin. It is done in huge fermentation vessels where the fungus is inoculated. After this enables dissolution of lignin's. The fibrous matter is washed followed by pulping in impression digesters using sodium sulphide. Sodium sulphide liquor for about 4 hours. The pressure is released in tanks, followed by straining and washing to remove the pith. The digested, washed pulp is now suitable for mixing with other bamboo pulps to be used for paper making.

1.10.4 Filter cake:

It is obtained from the cane juice, which is used as manure. In the process of clarification, the hot limited juice is delivered to large settling tanks. It consists of large tank with centrally placed slow moving agitator. Horizontal compartments or trags enable mud to slow down, and each having over flow take off for clarified juice. The muds separating in the settling tanks are pumped to rotary filters aid. The pH of the mud to be filtered will be around 7.5. The temperature of sludges is maintained around 60°C to enable effective here. The cake is rich in protein and waxes.

1.10.5 Molasses

Molasses is one of the important by-products, its production depends on the total quantity of cane crushed as well as quality, which varies from region to region. The increase in the percentage of sucrose in molasses greatly affects the final quantity of sugar.
Molasses is the final effluent obtained in the preparation of sugar by repeated crystallization. It is the heavy viscous liquid from which no further sugar can be crystallized by the usual methods.

1.10.6 Blackstrap Molasses

Molasses is called as blackstrap molasses because of its dark brown viscous nature. It must not contain less than 40% of total sugar as invert. The components of molasses include major components (water, sugar, non-sugars), minor components (trace elements, vitamins, growth substance). Water Commercial molasses have an average water content of 20%. The original end-products in the factory contain 12-17% water. The principal sugar present in the molasses are sucrose, glucose and fructose, the later two making up the major portion of the reducing sugars. The alkaline degradation of sucrose leads not only to glucose and fructose but also to Psicose and other carbohydrates. Molasses sometimes contain another non-reducing sugar namely the traccharide ketose.

1.10.7 Crushing cane

The cane after weighing is unloaded into the Cane Carrier. Before crushing the cane in the Mills, it is to be prepared i.e., to be disintegrated into small pieces so as to enable the Mills to extract more juice. This is done by two or three sets of revolving knives called Cane cropper, Cane Leveller and Cane Cutter. The prepared canes will be like loose wool mat. This prepared cane is passes through the Mills. Each Mill will have 3 Rollers. In each Mill, the Juice in cane is squeezed out twice i.e. in between top and feed rollers and again in between top and
discharge roller. Thus in a 12 rollers tandem, this cane is pressed for 8 times and in 18 rollers tandem 12 times.

To get more sugar out of cane, water is added before last Mill. This is called imbition water and is weighed before adding. This will dilute the juice in the cane so that the cane when passing through the mill will yield more sugar. The juice extracted from the Mill House is sent to the Boiling House for processing. The bagasse coming out of last mill is sent to Boilers to produce steam.

1.10.8 Boiling house operation

The juice from Mill house called mixed juice is weighed in juice Weighing Scale to know the quantity of juice. After weighing, the juice is received in tank for pumping. Here, the filtrate juice from vacuum filter is mixed with it.

1.11 LIMITATION OF THE STUDY

The study is confined to 5 years’ (2002-2006) performance of the study units. This period is not very sufficient to reach a confirmed decision. The data used in this study are collected from published annual reports of the company. These data are grouped and sub-grouped according to the requirement. Ratio analysis technique of financial management has been used for analysis and interpretation of the data. Past performance of the selected sample units may or may not be sustained in the future. The study is limited as it is carried out in two sugar company in Thanjavur district namely Arignar Anna sugar mill, Kurungulam and Thiru Arooran sugar mill, Thirumandankudi. Thus, its findings cannot be generalized. The sample size and purposive sampling strategy limit the
generalizability of study. The present study is restricted to sugar industry only and it has not focused on cane growers and cultivators in the study area.

1.12 CHAPTER SCHEME

This study is organized into six chapters.

- Chapter I describes the empirical aspect of this study, including objectives, methodology used to collect data, sample parameters and limitations.
- Chapter II examines the state of the existing literature. This chapter reviews the literature relating to sugar industry.
- Chapter III describes an overview of the sugar industry.
- Chapter IV analyzes the financial performance of the selected study units.
- Chapter V investigates the problems of sugar industry in the study area.
- Chapter VI summarizes the findings of the study and presents suggestions to take appropriate measures for further development of the sugar industry in India.