CHAPTER IV

HISTORY AND PROCESS OF SUGAR INDUSTRY IN INDIA

4.1 INTRODUCTION

Sugar is made from sugarcane, and was discovered thousands of years ago in New Guinea. And then the route was traced to India and Southeast Asia. India was the first to begin the production of sugar following the process of pressing sugarcane to extract juice and boil it to get crystals. The government of India in 1950-51 made serious industrial development plans and set many targets for production and consumption of sugar. The plans laid by the government projected installment capacity for the sugar industry in its Five Year Plans. India is well known as the original home of sugar and sugarcane. Indian mythology supports the fact it contains legends showing the origin of sugarcane. Today India is the second largest producer of sugarcane next to Brazil. The sugar industry's contribution to the rural economy has significant social and economic impact for the nation as well. The sugar industry is a green industry and is largely self-sufficient in energy needs through utilisation of bagasse for generating electricity and steam. Sugar industry is probably the only industry in the country which utilizes all its by-products commercially by value addition thereby contributing towards the renewable power generation and green bio-fuel namely, Ethanol. The National Policy on Bio-fuels, approved by the Government, has targeted for a 20 percent ethanol blending programme by 2017.

4.2 HISTORY

Around 327 B.C. sugarcane was an important crop in the Indian sub-continent when Alexander the great, invaded India. The traditional sweeteners of India like Gur & Khandsari are consumed mostly by the rural population in the country.

1 Media Release Mumbai, 14th October 2011.
The first Sugar Company in India was set up in 1903 with a modest cane crushing capacity with a few vacuum pan units established in sub-tropical belts of Uttar Pradesh and Bihar. The first sugar manufacturing company for the production of white sugar was set up by the Dutch in 1840, in north Bihar. The first successful sugar company was established in 1903 by the British. When the modern sugar industry was set up, it faced intense competition from the factory made white sugar. India was the first to begin with the production of sugar by the process of pressing sugarcane to extract juice and boil it to get crystals. In the early 1930’s nearly 2/3rd of sugarcane production was used for the production of alternate sweeteners like Gur & Khandalsari. Because of the better standard of living and higher incomes, the sweetener demand has shifted to white sugar. Nearly 1/3rd of the sugarcane production is used by the Gur & Khandalsari sectors².

In the year 1930 there was an advent of modern sugar processing industry in India which was started with the grant of tariff protection to the sugar industry. In the year 1930-31 the number of sugar mills increased from 30 to 135 with production of 100000 million tons of sugar and they found adverse competition from Japanese sugar which was ruling the Indian market. And in the year 1935-36 the production was increased from 1.20 lakh tons to 9.34 lakh tons under the dynamic leadership of the private sector. In the year 1950-51 the era of planning for industrial development began and the Government laid down targets of sugar production and consumption. In the year 2010-2011 the number of sugar mills increased to 527 mills which are in operation with the production capacity of 239.807 million tons³. Indian Sugar Industry generates power for its own requirement and even gets surplus power for export to the grid based on byproduct bagasse. Indian sugar production is poised to increase to 29.8 million metric tons (raw value basis) in the marketing year 2012-2013 (October-September) due to an

²  http://www.indianmirror.com/indian-industries/sugar.html
³  Indian sugar mills association,2011
expected increase in sugarcane production. Anticipating surplus sugar production and strong export demand for 2012-2013, India will continue to be a net exporter of sugar for the second consecutive year, with exports likely to reach as much as 2.5 million tons. Continued strong demand from bulk consumers will push sugar consumption to 26.5 million tons\(^4\).

4.2.1 First setback

The invention of manufacture of cane sugar granules from the sugar cane juice in India a little over two thousand years ago, followed by improvements in refining the crystal granules in India in the early centuries AD. The first cycle of reversal was seen during the period 1939-44 and it continued till 1950-51 for various reasons when the output fluctuated between 0.89 and 1.1 million tons mainly on account of instability of cane supplies caused by weather conditions. Preference of farmers to essential food crops which gave them higher return. Food production became a priority during the war period\(^5\). Around 600 A.D the Chinese emperor, Tsai-Hang sent an emissary to Bihar – where sugarcane was cultivated for making sugar – to learn the art of making sugar. Therefore it is from India that the art of making sugar went to Persia and subsequently to the world over. India has been known as the original home of sugar and sugarcane and also the sugar manufacturer.

4.2.2 Before Independence

The history of sugar industry in India began in 1903 when a sugar factory was set up in Bihar and UP. There was no increase in the growth of sugar industry in India before independence. But the modern factory system for making white sugar from sugarcane was introduced for the first time in India by a Dutch in north Bihar in 1840. The government tariff production in 1932, there were only 21 sugar factories and it produced 1-lakh tons of sugar. Later in the year 1939-40 the sugar

\(^4\) India sugar annual report, 2012
\(^5\) Economic and social development department, 1997
industry stood up to 138 factories and they produced 12 lakh tons of sugar and it became self-sufficient. In the year of 1950-51 there were 139 factories out of which three were co-operative mills and 136 were joint stock companies.

4.2.3 After Independence

There were rapid changes in the economic development due to five-year plan enforcement of the industries act 1951. The government took several steps to increase sugar industries in India and the industrial revolution took place only after Independence. The act of 1951 brought two significant changes

- A large proportion of the capacity licensed after 1952 went to the tropical belt i.e., Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh and Kerala.
- The government encouraged co-operative societies and there were significant developments in this sector. The level of production was not stable for long period due to the conditions laid by the government policy. The growth of the Indian sugar industry in an organised manner had its beginning, when the Government of India passed the Industrial Policy Resolution on April 6, 1948, followed by the Industrial Act, 1956, wherein the principle of Cooperation was assigned an important role for the country’s economic development.

4.2.4 Exploitation leading to land reforms

Most of the new mills were set up by private rich industrialists in North Indian states. They owned sugar cane farms and also purchased cane from small farmers, and the rich individuals are mill owners. The exploitation of small farmers by sugar mills, led the Government to take various measures. First was policy of land reforms. Ceiling was put on holding by an individual including a sugar company. This led to disinterest of private sugar mills first step was in Maharashtra and in Western India. 50 years later this sector produced 60 percent of country's production. Success was attributed to stable alliance amongst small/medium/large cane growers and mills where they are partners.

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6 National Federation of Cooperative Sugar Factories Ltd
4.2.5 SUGAR ACTS & ORDERS

The government of India closely monitors sugarcane and its production as they have a substantial effect on the lives of the people. The industry is governed by a variety of regulation imposed by the central and the state government. Some of the acts and orders could be.

- **Essential Commodities Act, 1955:** The objective of the EC Act is to control the production, supply, distribution and trade and commerce in the essential commodity.

- **Sugarcane (Control) Order, 1966:** Sugarcane (Control) Order, 1966 provides for price (SMP) for sugarcane purchased by sugar mills during each sugar season (Clause 3), payment of interest at 15% per annum on amounts due beyond 14 days of delivery of sugarcane at factory gate (Clause 3(3-A)), payment of additional cane price to the growers (Clause 5-A) regulation of distribution and movement of sugarcane (Clause 6), licensing of power crushers and khandsari units and regulation, issue of directions to producers of khandsari sugar (Clause - 8), power to call for information etc. from producers (Clause - 9), power to entry, search and seizure (Clause 9-A) and delegation of powers conferred by the Sugar (Control) Order, 1966 to any officer or authority of the central or state government.

- **Levy Sugar Supply (Control) Order, 1979:** Levy Sugar Supply (Control) Order, 1979, provides for powers to issue direction to producer or dealer for supply of levy sugar requisitioned by the central government through an order made with reference to section 3(2) (f) of the E.C. Act, 1955.

- **Sugar (Packing and Marking) Order, 1970:** Sugar (Packing and Marking) Order, 1970 provides markings to be indicated on sugar bags. Unless otherwise permitted by central government, sugar is required to be packed in jute bags.

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7 Indian Sugar Sector Network Report, SINET, Nagapur, India.
conforming to Indian standard specifications. Sugar meant for the purpose of export and small consumer packs of 5 kg and below have been exempted from the compulsory use of jute bags.

- **Sugar Cess Act 1982:** The Sugar Cess Act 1982 was enacted to provide for the imposition of a cess on sugar for the development of sugar industry and for matters connected therewith.

- **Sugar Development Fund Act 1982:** The object of the Sugar Development Fund, 1982 (briefly the SDF Act) in the formation of the Sugar Development Fund to be applied for the purpose of rendering financial assistance through loans at concessional rates for rehabilitation and modernization of sugar factories as well as for sugarcane development and for encouraging research aimed at development of sugar industry by making grant.

- **Sugar Development Fund Rules 1983:** The Sugar Development Fund Rules, 1983 were made in exercise of the powers conferred by Section 9 of the SDF Act, 1982, to provide for (a) the manner in which any loss or grants out of the fund and the terms and conditions thereof, (b) the manner and form in which applications are to be made; (c) the composition of the committee and the procedure to be followed by it in the discharge of its functions and (d) the form in which and the period within which statistical and other information may be furnished by sugar factories.

- **LSPEF Act, 1976:** Levy Sugar Price Equalization Fund Act, 1976 (Amended upto 1984) The Levy Sugar Price Equalization Fund Act 1976 (briefly LSPEF Act) was enacted to provide for the establishment, in the public interest, of a Fund to ensure that the price of levy sugar may be uniform throughout India and for matters connected therewith or incidental thereto.
4.3 LOCATION

Dr. M.Mehta\(^8\) describes that “the location of the sugar industry is greatly influenced by the character of local distribution of sugarcane within the country and since such distribution depends entirely on physical and geographical factors, nature plays a dominant role in determining the location of sugar industry”. The top ten major sugar producing states are Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Tamil Nadu, and UttaraKhand. The sugar producing states in India is represented in Chart 4.1.

4.4 TARGET OPPORTUNITY

The growth in domestic and international markets, the sector would need to produce at least 28.5 million tons of sugar by 2017. Increase in sugar production would be primarily through productivity improvements and increment in milling capacity of existing mills. The sector has the potential to improve sugarcane yields by 10 percent and also improve the recovery by 50 basis points by 2017. This would enable the sector to produce additional 4.1 million tons of sugar. To meet the targeted demand, the area under cane would need to increase by 0.2 million hectares. This would be possible by better utilization of existing cane demarcated areas. A greater increase in farm productivity will also enable the target demand to be met, without any increase in cane acreage. In order to crush the additional cane, the crushing capacity would need to increase by 0.23 million total crushing capacity per day by 2017\(^9\). This can be met through expansion of the existing units rather than new mills being established.

\(^8\) M.Mehta, Sivayaa K.V, and Das, V.B.M, Indian industrial economy, S. Chand & Co Ltd., NewDelhi., p.465

\(^9\) The Indian sugar industry sector, 2007
CHART 4.1

SUGAR PRODUCING STATES IN INDIA

INDIA

Total Numbers of Sugar Mills = 662
Total Sugar Production (2010-11) = 250
Figure in Lakh Tonnes

Source: ISMA, 2011
### 4.5 CHALLENGES OF INDIAN SUGAR INDUSTRY

India ranks first in sugar consumption and second in sugar production in the world. Indian sugar industry has been facing raw material, and resource as well as infrastructural problems. Globalization has brought a number of opportunities but at the same time posed certain challenges before sugar industry. 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 the 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 a large-scale. India has to gear up to the new challenges of higher cane and sugar production to meet the future requirement. With the present trend of sugarcane and sugar production India will be hard, to sustain effort and is needed to increase the present trend of cane production to a level that India becomes a sugarcane surplus country. Government controls on domestic sales and exports make commercial planning very difficult. The strong refining and inventory financing capacities needed to smoothen the sugar cycle.

### 4.6 MANUFACTURING PROCESS

Sugar (sucrose) is a carbohydrate that occurs naturally in every fruit and vegetable. It is a major product of photosynthesis, the process by which plants transform the sun's energy into food. Sugar occurs in greatest quantities in

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12 Narendra Murkumbi, “Indian challenges for new decades”, president ISMA.
sugarcane and sugar beets from which it is separated for commercial use. The natural sugar stored in the cane stalk or beet root is separated from rest of the plant material through a process known as refining. The basic process is: Sugar cane must be crushed to extract the juice. The crushing process must break up the hard nodes of the cane and flatten the stems. The juice is collected, filtered and sometimes treated and then boiled to drive off the excess water. The dried cane residue (bagasse) is often used as fuel for this process. The remaining liquid is allowed to set into a solid mass known as Jaggery or Gur.

For sugarcane, the process of refining is carried out in the following steps:

- Pressing of sugarcane to extract the juice.
- Boiling the juice until it begins to thicken and sugar begins to crystallize.
- Spinning the crystals in a centrifuge to remove the syrup, producing raw sugar.
- Shipping the raw sugar to a refinery where it is washed and filtered to remove remaining non-sugar ingredients and color.
- Crystallizing, drying and
- packaging the refined sugar

The Process of sugar manufacturing from sugarcane to sugar is presented in Chart 4.2

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13 A Premier Indian International company, 2003
CHART 4.2
SUGAR MANUFACTURING PROCESS

Source: ISMA 2011
From the chart 4.2 it is inferred that the harvested crops of sugarcane are transported to sugar mills where the mechanical part of the sugar manufacturing process begins. Stalks of sugarcane are usually cleaned of any organic matter, such as dirt or insects, and then washed to make them as sanitized as possible before they are physically changed. This cleaning process is usually done with the aid of a machine, such as a high pressure water jet, and combing drums that sift out larger objects, like rocks. They are cleaned and milled in order for the juice to be extracted. The juice is then both filtered and purified before being boiled. As the juice thickens, it crystallizes, becoming raw sugar. The raw sugar is then spun quickly in a centrifuge, or rotation chamber, in order to fully remove all of the juice and wetness. After raw sugar is created, if the product is being sold as raw sugar, it may be packaged and sent to grocery stores and retail venues for sale. If it is meant to be transformed into refined sugar, it will be sent to a sugar refinery. At a refinery, the raw sugar will be cleaned and drained once again. The refining step of the sugar manufacturing process will then remove all color and non-sugar particles left within the product. Modern sugar mills with co-generation meet their entire energy needs, both thermal and electro mechanical from these bagasses fired boilers-steam turbine units. The units depend on grid supply or diesel generators for mechanical or electrical power or both when grid power or both. When grid power supply is erratic and diesel generators are kept as standby power sources. From the sugarcane the following contents is prepared\textsuperscript{14}:

\begin{itemize}
  \item 100 kgs of sugarcane gives approximately 10 kgs of sugar, 5-6 kgs of molasses, 33 kgs of bagasse, and around 4 kgs of press mud.
  \item 100 kgs of molasses gives 22-25 litres of alcohol.
  \item 100 kgs of bagasse can generate approximately 35 units of power.
\end{itemize}

\textsuperscript{14} ISMA, Database and news article.
4.7 SUGARCANE INDUSTRY BY-PRODUCTS

The sugar industry is diversifying into multiple by-products, to enhance the value addition for every million tons of cane that is crushed. Dr J P Sharma\textsuperscript{15} stated that the by-products have become immensely important for the industry and tremendous progress. The following Chart 4.3 represents the By-products from the sugarcane.

\textbf{CHART 4.3}

\textbf{BY-PRODUCTS FROM SUGARCANE}

Source: Klynveld Peat Marwick Goerdeler (KPMG) Research, 2007

\textsuperscript{15} J P Sharma, “Sugar tech 2012”, confederation of Indian industry, August 31\textsuperscript{st} 2012.
From the chart 4.3 it is inferred that the molasses is used primarily in the production of alcohol. It accounts for 4.3 to 4.7 per cent per ton of sugarcane crushed. Gur as sweetener has better nutritional profile than white sugar. It is possible to refine the process and the product for greater competitiveness and realize export potential. Energy efficient furnaces, concentration pans, clarificants, moulds and storage are needed for Gur. Khandsari units used open pan in place of vacuum pans for concentration and the sugar obtained is of lower quality compared to white sugar from mills. Large numbers of sugar mills are using outdated processes and equipment; some of them not only use entire bagasses but also use wood. Bagasses is the fibre (30 to 33 percent per ton of sugarcane crushed) formed from crushing sugarcane is called as bagasses, which is used as a combustible in furnaces to produce steam, which in turn is used to generate power. The press mud accounts around 3 to 5 percentage per ton of the sugarcane crushed. Sulphination press mud is mainly used as fertilizer.

4.8 BUSINESS OPERATIONS OF FARMERS AND MILLERS

It is most imperative that industry leaders and the government work together on a plan for sustainable development of sugar industry from a new perspective. This would help generate surplus so that the industry, farmers, consumers and other stakeholders benefit. But unfortunately the sugar industry has no control over its own fate due to various controls of the Indian sugar sector. A reasonable link between cane and sugar price can play a major role to curb cane arrears. Ensuring long-term cane area reservation can help establish better farmer miller relationship. Industry is regulated to facilitate the relationship between growers and millers and to protect the Industry against trade measures, which exist on the world market. The following Chart 4.4 represents the business operations of farmers and millers.


17 President, Sugar Technologists Association of India (STAI), The Economic times, August 2012
Source: Indian sugar industry, 2007
From the chart 4.4 it is inferred that the marketable raw sugar product results from joint efforts of both farmers and millers. There is no market for sugarcane, only for products of its manufacture. Millers and farmers are therefore equally dependent on each mill area for economic profitable outcomes. The risk of cane availability is significant for mills, and is influenced by the farmer-miller relationship and hence there is no economic alternative to constructive cooperation between farmer and miller. The key controllable risks for farmers are the risks related to off-take of cane and non-payment of dues by the mills. The farmer miller relationship can have a significant impact on both these risks. Farms and mills must be geographically co-located. Sugarcane is a giant sweet grass that once cut must be treated within 16 hours or its sweetness will fade away and therefore its commercial value will deteriorate. For this reason a farmer and a nearby mill is wholly co-dependent. Cane cannot be economically transported beyond a time-and-cost-limited geographic radius, Farmers seek to ensure that a mill will accept the cane they grow and harvest over the season for optimum farm proceeds, to a schedule that averages crop and climate event risks between farmers. For mills, the drivers for economic profits are the sugar prices in domestic and international markets and by-product realizations. On the other hand, a mill seeks to ensure that cane farming is the most profitable use of land in its feeder area, and that its milling capacity is adequate to ensure that the cane continues to be grown in sufficient quantity by its supplying farmers, in order for the mill to remain economically viable. The inventory cost has a negative impact, and also influences the extent of price risk. The mill efficiency influences the milling costs, hence the overall economic profit. There are interdependencies between farmer and miller business drivers. A high cane price benefits farmers, but leads to lower profits for mills, for a given sugar price. Cane price and mill realization, if misaligned, can lead to arrears, that would negatively impact both the mills and farmers. Higher mill efficiency on the other hand leads to better recovery, with the benefits being shared by both farmers and millers.