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CHAPTER II

PROFILE OF SUGAR INDUSTRY

2.1INTRODUCTION

Sugar industry is one of the most important agro-based industries in India and ranks second amongst major agro-based industries in India. This industry has a long tradition in this country; it started growing in an organized way during the 1930s after introduction of the sugar industry protection act in 1932. But the industry achieved a fabulous growth under the plan periods. While the number of sugar factories has gone up from 139 in 1950 to 400 in 1989, the corresponding sugar production has increased from 1.4 million tons to 11 million tones. However there were large variations in the pattern of growth between different states as well as between regions. In India, Uttar Pradesh share major role in sugar industry. Both in the terms of number of factories and sugar production, its share has been around 30%. In spite of this high growth rate in sugar production, since 1970s, the industry is affected with a number of problems like shortage in sugarcane supply, outdated technologies, low capacity utilization, poor financial performance, and discriminatory government policies. Most of the sugar factories have been suffered with high cost of production due to these problems. Thereby continuing increase in sick sugar factories during the last two decades.

The progress of the world is standing on three innovations namely Science, Technology and Management. The agriculture sector has been slow to adopt the use of information technology (IT), despite its potential to improve efficiency of planning and decision making. However, several IT-based projects have been started at various agricultural institutions. A vision of a computer network linking the agricultural institutions is presented. This network forms the foundation for an integrated National Agricultural Information. Information Technology based projects are currently under way at most of the institutions related to agriculture in Mauritius. In this context, the Ministry of Agriculture is computerizing the management of the agricultural sector through the Agricultural Management Information System

(AMIS) project as a means of improving access to information for policy making (NCB and WB 1993). This project, when implemented, will introduce a new point of view of the sector to the agricultural community. An information system can be defined as a structure through which the user is provided with relevant information to make a decision. Users of agricultural information include farmers, co-operative societies, non-governmental organizations, extension officers, researchers, students, educators and policy makers, all using information at different levels of detail. Agriculture throughout the world has undergone a large- scale revolution in production technology during recent decades.

2.2SUGAR INDUSTRY IN INDIA

Sugar is made from sugarcane, which was possibly discovered thousands of years ago in New Guinea. From there, the route was traced to India and Southeast Asia. It was India, which began producing sugar following the process of pressing sugarcane to extract juice and boil it to get crystals. It was in 1950-51 the government of India made serious industrial development plans and set the targets for production and consumption of sugar. It projected the license and installment capacity for the sugar industry in its Five Year Plans.

The Indian sugar industry uses sugarcane in the production of sugar and hence maximum number of the companies is likely to be found in the sugarcane growing states of India including Uttar Pradesh, Maharashtra, Gujarat, Tamil Nadu, Karnataka, and Andhra Pradesh. Uttar Pradesh alone accounts for 24% of the overall sugar production in the nation and Maharashtra's contribution can be totaled to 20%.

Types of Sugar Industry in India

The sugar industry can be divided into two sectors including organized and unorganized sector. Sugar factories belong to the organized sector and those who produce traditional sweeteners fall into unorganized sector. Gur and Khandsari are the traditional forms of sweeteners.

There are 453 sugar mills in India. Co-operative sector has 252 mills and private sector has 134 mills. Public sector boasts of around 67 mills.

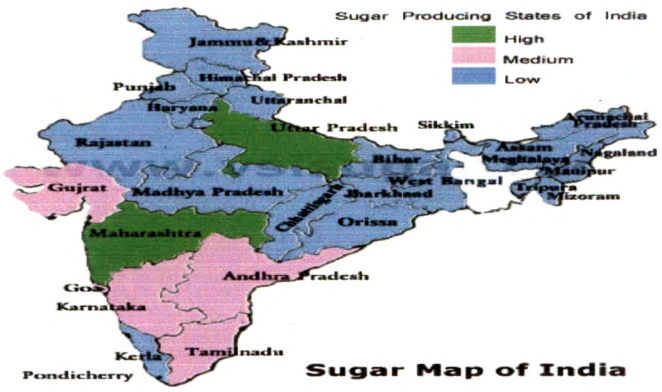
Sugar Industry in India

Sugar Industry in India is well maintained and is growing at a steady pace. India is the second largest producer of sugar over the globe. With more than 45 million of sugar cane growers in the country, the bulk of the rural population in India depends on this industry. One of the agro-based industries in India, the sugar industry is the second largest agricultural industry followed after the textile industry.

Following are the places where the sugar industries are

- Andhra Pradesh Sugar Ind.
- Bihar Sugar Ind.
- Gujarat Sugar Ind.
- Haryana Sugar Ind.
- Himachal Pradesh Sugar Ind.
- Karnataka Sugar Ind.
- Madhya Pradesh Sugar Ind.
- Maharashtra Sugar Ind.
- Chhattisgarh Sugar Ind.
- Manipur Sugar Ind.
- Orissa Sugar Ind.
- Punjab Sugar Ind.
- Tamilnadu Sugar Ind.
- Uttaranchal Sugar Ind.
- Uttar Pradesh Sugar Ind.
- West Bengal Sugar Ind.

Map 2.1 Sugar Map of India.



2.3SUGAR INDUSTRY IN MAHARASHTRA

Maharashtra Sugar Industry is one of the most notable and large-scale sugar manufacturing sectors in the country. The pace of growth of sugar manufacturing has been massive over the past few years. The latest statistics of sugar production in Maharashtra indicates that this state is doing better than the other states in the country. The Sugar industry in Maharashtra is highly popular in the cooperative sector, as farmers own a portion in the sugar factories. The Maharashtra Sugar Industry has seen a spectacular growth owing to the different conducive in the state. One of the chief crops manufactured in Maharashtra is sugarcane, with a host of sugar industries been set up over the years. The first sugar factory in Maharashtra was established in 1919. This was the Belapur sugar mills at Haregaon in Ahmednagar district. The second sugar factory was established in 1930, viz. the Walchand Sugar factory. Due to the new policy, 13 sugar factories were established in Maharashtra by the end of the Second World War. All these factories were private and joint stock companies. Before independence there was not a single cooperative sugar factory in Maharashtra. In 1948, the first cooperative sugar factory was established in Maharashtra in the Ahmednagar district, viz. the Pravara Cooperative sugar factory. In Maharashtra there are 90% of factories comes under cooperative sector and 10% factories comes under private sector. There is no factory comes under public sector. At present 172 sugar factories

are registered in Maharashtra state out of which more than 95% factories are co-operative sugar factories are situated in Western Maharashtra, Marathwada and Vidharbha. The co-operative dairy industry is related to sugar industry, as the green fodder is mainly generated from sugarcane leaves and residues. Even the industries producing chemical fertilizers are depending upon sugarcane growers. Therefore the progress of rural Maharashtra depends upon progress of sugar co-operatives.

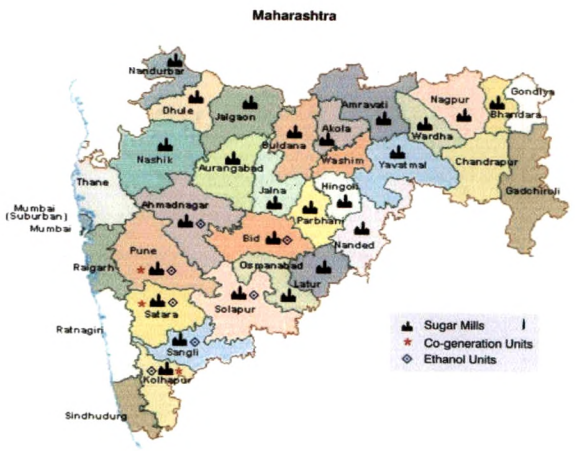
The cooperative sugar industry in Maharashtra has seen the growth route at its heights with future trading being implemented in sugar manufacturing. Till now, the concept of futures trading has not been made clear to the rural mass of the Maharashtra sugar industry. But the state is hopeful of rendering a helping hand to those who need special guidance on it. The Maharashtra sugar industry has been contributing nearly 40% of India's total sugar production. In 2001-02, sugar industry in Maharashtra produced an approximate 50-67 lakh tons of sugar, the per ton price touching Rs. 600. With innovative technologies being implemented in the Maharashtra sugar industry, the potential can be fully realized.

Most Popular sugar factories in Maharashtra

- Adivasi S.S.K. NavapurNandurbar Vibhag Ltd (Tal. Navapura, Dist. Nandurbar)
- Bahganga Sahkari Sakhar Karkhana Ltd. (Bhum, Dist.- Usmanabad)
- Chhatrapati Sambhaji Raje Sakhar Udyog Ltd. (Sambhajinagar (Aurangabad))
- Sonhira Sahakari Sakhar Karkhana Ltd (Vangi, Tal. Kadegaon, Dist. Sangli)
- Dongarai Sagreshwar Shetkari SSK Ltd (Kadepur (Raigaon))
- Gurudatta Sugars Limited (Takliwadi, Tal. Shirol, Dist. Kolhapur)
- Jai Mahesh Sugar Industries Ltd. (Pawarwadi, Tal. Majalgaon, Dist. Beed)
- Khandoba Prasanna Sakhar Karkhana Ltd. (Tal. Karad, Dist. Satara)
- Mahadik Sugar And Agro Product (Radhanagri, Dist. Kolhapur)
- Nira Bhima S.S.K. Ltd. (Tal. Indapur Dist.Pune)

- Priyadarshini Shetkari SSK Ltd (Shivaji Chowk, Udgir, Dist. Latur)
- Saibaba SSK Ltd (Tal.Jintur, Dist.Parbhani, At Mankeshwar, Teh.Jintur, Dist.Parbhani)
- Sarvodaya S.S.K. Ltd (Karandwadi, Tal. Walwa, Dist. Sangli)
- Shree Ambadevi SSK Ltd (Nityanandnagar, Dahigaon (Recha) Road, Tal. Anjangaon, Dist. Amaravati)
- Sidhapana S.S.K. Ltd (Patoda Dist. Beed)
- Yogeshwari Sugar Industries limited (Limba, Tal. Pathri Dist. Parbhani)

Map 2.2 Sugar Map of Maharashtra



Sugar Map of Maharashtra

2.4PROFILE OF SONHIRA FACTORY

2.4.1Introduction

Sonhira Sugar factory was placed in Vangi, Tal- Kadegaon, Dist. - Sangli, which is located in an area which is perennially draught stricken. The Sangli district comes in Kolhapur region of Maharashtra. The surrounding and climate of Vangi village is suitable for this Sugar factory. In earlier stage many governmental schemes implemented in this area, including that of percolation and irrigation tanks and the likes.

2.4.2Establishment

Sonhira Sakhar Karkhana Ltd; Vangi Tal-.Kadegaon, Dist. Sangli in Maharashtra was registered in March 1994 and registration no. is SAN/KHR/PRG (A) S/46/1994. The work of erection of the factory was started in January 1999 and the factory started sugar production in February 2000.

2.4.3Organization Detail

Dr. Patangrao S. Kadam had concern for the rural people and therefore he started planning in socio- economic sector right from 1971 in the drought prone areas of Khanapur and Palus Talukas in the western part of Sangli District.

Dr. Patangrao Kadam reviewed the situation and showed way to his thousands of followers. Since last 30 years, he has been relentlessly trying to bring changes in social and economic conditions of the people of this area.

"Sonhira" Sugar Factory is an important milestone in Agro-industrial transaction conceived by Dr. Patangrao Kadam. Sonhira is like a KALPAVRUKSHA for the people of the area around which he has visualized the flow of economic opportunities. Dr. Patangrao Kadam had identified a number of interconnected plans and programs which include production of spirit and other chemicals from molasses, Co-generation of electricity from Bagasse, Sugarcane development and research project, agricultural information services for farmers. Sonhira has got power to change the social, economic environment of the area.

Sonhira Sakhar Karkhana Ltd; Vangi, Tal- Kadegaon, Dist. Sangli, is operational from 1999 by Founder Chairman Dr. Patangrao Kadam, Minister for Co-operation, Maharashtra State. This plant is working excellent and the performance of this plant is really very good. This place is well connected by railways on Mumbai- Kolhapur main line and Karad station is around 25 km from this plant. This place is easily accessible by road and National / State highway between Kolhapur-Pune-Mumbai as well as Pune–Bangalore National Highway area is nearby.

The licensed capacity of the Factory is 2500 TCD. However, Sonhira Sakhar Karkhana Ltd; Vangi is able to crush now an average of 3500 TCD, Fully

utilizing their resources effectively. Sonhira have their own cultivation land for cane production and they are spread out to approximately 8000 hectares. The yield is around 5 lakhs of tones per annum and this is likely to be increased to 7-8 lakhs per annum shortly. With the increase in yield, the cane crushing per day will also be increased. Commissioning of a sugar factory within such a short time is a mind-boggling achievement. This unit is located on a sprawling piece of land of 181 acres. It has 16,000 registered A-class members, 15,000 registered B-class members hailing from 98 villages in Khanapur, Kadegaon and Palustalukas of Sangli district.

With the commissioning of this factory, the economic profile of this region has undergone a dramatic change. The cash crop economy is paying good dividends to the farmers. A large number of new jobs have been created for the people in the region and the ancillary industries and service units that have become a source of livelihood for hundreds of Families, have also been commissioned.

Climatic conditions like maximum temperature, humidity, rainfall etc. are much conductive to grow good quality sugar cane. Yield sugar cane per hector, as also the recovery in cane is high in this belt.

The facility area for the factory is economically backward area of Kadegaon Taluka, Sangli Dist., of Maharashtra. In general, the selection of site for the factory is very good and there is an assured supply of sugarcane for the factory.

2.4.4Objective of the Factory

Each Factory has its own objectives and these objectives end towards management direction or decisions. Before taking any course of action the objectives must be clearly defined and well understood. The clearly defined objectives and goals lead towards continuous growth & progress.

The aims & objectives of the factory are listed below:

1) Maximum production in less period of time.
2) Reduce faults in the sugar production processes.
3) Reduce wastage and get maximum throughput.

4) To give knowledge of improved modern methods of agriculture & to supply needs, fertilizers & agriculture equipment to cane producer members at low rate.
5) Good atmosphere at working place.
6) Best quality sugar production.
7) Use latest technology in the industry.
8) To conduct cultivated & educational program for farmers & employee.
9) To purchase operate and hire the means of transporting.

2.4.5 Departments:

Following are the departments in the Sonhira Sahakari Sakhar Karkhana:

1. **General:**

   This is the main administration department and divided into three sub departments.

   a) General administration

   b) Watch & Ward

   c) Guest house.

2. **Finance:**

   This is heart of the Sugar factory and all financial activities are initiated as well as completed in this department. There are eight sub departments under Finance department as given below:

   a) Share accounting
   b) Cane accounting
   c) Store accounting & Costing
   d) Financial accounting
   e) Deposit accounting
   f) Harvesting Billing
   g) Transport Billing
   h) Sugar & By-Product Sales.

3. **Agriculture:**

   This is the department which helps farmers in harvesting as well as transporting sugar cane. This department is divided into four sub departments.

   a) Cane Development & Planning

b) Harvesting
c) Weighbridge
d) Transport Scheduling.

4. **Human Resource Management:**

This department looks after employee related activities and further subdivided into four sub departments.

a) Selection & Appointment
b) Attendance System
c) Payroll System
d) Personnel Information System.

5. **Engineering & Manufacturing**:

This department is divided into nine different sub departments.

a) Laboratory
b) Plant maintenance
c) Cane feeding
d) Juice weighing
e) Boiler atomization
f) Boiling house
g) PH. Control system
h) Plan atomization
i) Centrifugal atomization
j) Sugar weighing system...

6. **Purchase & Store**:

In this department keep an inventory of raw material as well as new produced products. This department is also divided into four sub departments.

a) Inventory management
b) Production planning
c) Sugar godown
d) Sugar weighing system...

7. **Civil:**

This department looks after new development in construction field and further divided into two sub departments.

a) Civil & Irrigation

b) Sanitation

8. **Distillery:**

   This department looks after distillery by product developed by Sugar Factory.

9. **Co-generation:**

   This department looks after electricity generation which can be utilized by Sugar factory and other plants.

10. **E.T.P.:**

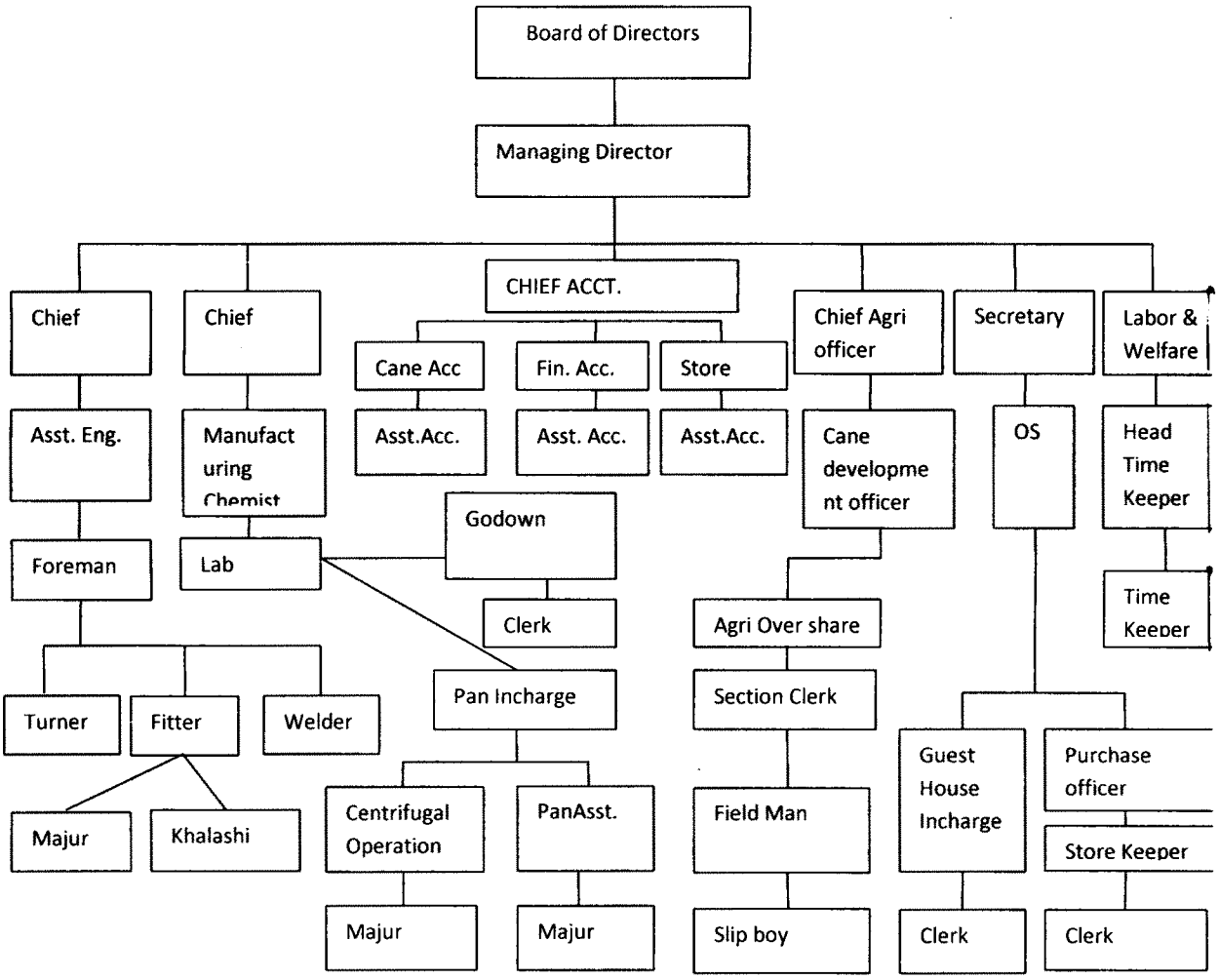
    This department looks after effluent treatment plant. The effluent contains several pollutants, which can be removed with the help of an effluent treatment plant (ETP). The "clean" water can then be safely discharged into the environment.

11. **Vehicle:**

    This department mainly looks after transportation facility.

2.4.5 Organizational Chart:

Fig. no. 2.1. Organizational chart of Sugar factory.



2.4.7 Procedure of working:

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 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.

For sugarcane, the process of refining is carried out in 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.

Beet sugar processing is similar, but it is done in one continuous process without the raw sugar stage. The sugar beets are washed, sliced and soaked in hot water to separate the sugar containing juice from the beet fiber. The sugar-laden juice is then purified, filtered, concentrated and dried in a series of steps similar to cane sugar processing.

For the Sugar Industry, capacity utilization is conceptually different from that applicable to industries in general. It depends on three crucial factors the actual number of ton of sugarcane crushed in a day, the recovery rate which generally depends on the quality of the cane and actual length of the crushing season.

The quality of the cane that a factory receives depends on its location and is outside its control. The length of the crushing season also depends upon location with the maximum being in south India.

Sugarcane in India is used to make sugar, khandesari or gur. However, sugar products produced worldwide are divided into four basic categories: granulated, brown, liquid sugar and invert sugar.

Granulated: Granulated sugar is the pure crystalline sucrose. It can be classified into seven types of sugar based on the crystal size. Most of these are used only by food processors and professional bakers. Each crystal size provides unique functional characteristics that make the sugar appropriate for the food processor's special need.

The process of making sugar contains a lot of steps.

Sugarcane is a perennial herb belonging to the grass family. Native to tropical and subtropical regions of the world, this tropical grass is 10-24-feet tall. Bears long, pointed leaves, and has several stalks. The segmented stalks have a bud at each joint and as the plant matures, small flowers appear.

Planting:

Sugarcane cuttings are planted in fields by workers or mechanical planters. In order for the cane to grow, the seeds must be planted in well-drained soil. Typical cane soil is made of a mixture of silt, sand, clay particles and organic matter. Canes are spaced at least 4-feet apart and lined in rows and covered with soil. Fertilizers are applied from the time of planting up until the beginning of the ripening period. Cane fields are also routinely weeded to provide for optimum growth of the cane. Depending on the region where the crop is planted, cane seasons last from 8-22 months. In the United States, sugarcane is grown in Florida, Hawaii, Louisiana and Texas.

Collecting the Harvest

Mature canes are gathered by a combination of manual and mechanical methods. Canes are cut at ground level, its leaves are removed and the top is trimmed off by cutting off the last mature joint. Cane is then placed into large piles and picked up, tied, and transported to a sugar factory.

Cleansing and Grinding

Stalks are thoroughly washed and cut when reaching the sugar mill. After the cleaning process, a machine led by a series of rotating knives, shreds the cane into pieces. This is known as "grinding." During grinding, hot water is sprayed on to the sugarcane to dissolve any remaining hard sugar. The smaller pieces of cane are then spread out on a conveyer belt.

Juicing

The shredded pieces of sugarcane travel on the conveyer belt through a series of heavy-duty rollers, which extract juice from the pulp. The pulp that remains or "Bagasse" is dried and used as fuel. The raw juice moves on through the mill to be clarified.

Clarifying

Carbon dioxide and the milk of a lime are added to the liquid sugar mixture and it is heated to the boiling point, as the process of clarifying begins. As the carbon dioxide travels through the liquid it forms calcium carbonate, which attracts non-sugar debris (fats, gums, and wax) from the juice, and pulls them away from the sugar juice. The juice is then pushed through a series of filters to remove any remaining impurities.

Evaporation:

The clear juice which results from the clarifying process is put under a vacuum, where the juice boils at a low temperature and begins to evaporate. It is heated until it forms into thick, brown syrup.

Crystallization

By evaporating what little water is left in the sugar syrup, crystallization takes place. Inside a sterilized vacuum pan, pulverized sugar is fed into the pan as the liquid evaporates, causing the formation of crystals. The remaining mixture is a thick mass of large crystals, which is sent to a centrifuge to spin and dry the crystals. The dried product is raw sugar, still inedible.

Refinery

Raw sugar is transported to a Cane Sugar Refinery for the removal molasses, minerals and other non-sugars, which still contaminate the sugar. This is known as the purification process. Raw sugar is mixed with a solution of sugar and water to loosen the molasses from the outside of the raw sugar crystals, producing a thick matter known as "magma." Large machines then spin the magma, which separate the molasses from the crystals. Crystals are promptly washed, dissolved and filtered to remove impurities. The golden syrup which is produced is then sent through filters to remove the color and water. What's left is concentrated, clear syrup, which is again fed into a vacuum pan.

Separation and Packaging

Once the final evaporation and drying process is done, screens separate the different sized sugar crystals. Large and small crystals are packaged and shipped, labeled as white, refined, sugar.

SUGAR FACTS

REFINED: white sugar is 99.9- percent sucrose.

WHITE sugar is pure sucrose, containing no preservatives or additives.

2.4.8 Future Plans

Sonhira Sahakari Sakhar Karkhana has proposed to establish a 20MW co-generation plant (based on bagasse), Ethanol plant 30 KLPD and Bio-gas plant as well. They are also committed to improve the performance of Sonhira SSK. They have semi-atomized systems which they are planning to fully atomize in future.

2.5CONCLUSION

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 yield. Maharashtra being an agro based state in India always remains a strong follower of cooperative movement. Sonhira Sahakari Sakhar Karkhana is one of the largest sugar factories in the Maharashtra and its entire profile including capacity, future plans, etc. have been reviewed and discussed.