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INDIAN SUGAR INDUSTRY: TOWARDS INDEPENDENCE FOR MANAGEABILITY

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ABSTRACT:

The South Asian region, including India, is an important sugar producing country with a strong presence in the global sugar scene. India has a rich history of sugarcane and sugar production since ancient times, and this business is growing rapidly to find a place among the world's sugar producing countries. The creative new intercessions for the improvement of sugar cane, creatures and leaders helped the company to progress towards better and bio-based, useful, management and manufacturing companies, then gradually become private. The company also meets its social responsibility by promoting the overall prosperity of its partners. This has helped the Indian sugar industry to align with the 2030 agenda for realistic growth targets.



KEYWORDS: Indian sugar industry, conceptual progress, trust, sustainability, growth, SDGs.

INTRODUCTION

India is the main sugar supplier in the South Asian region and has maintained record sugar production in the recent past. It has facilities for the field supported by modern research and development methods. This has helped the company overcome many difficulties, whether in terms of creativity, management or other related areas. In fact, even from the earliest times, as recorded in ancient books, India produced sugarcane and cultivated the plant. The company has the capacity to transfer approximately 3500 MW of capacity to the public matrix. The sugar industry has gradually become a sugar industry by introducing sugar, bioelectricity, bioethanol, biomanure, bio-NGV and synthetic materials. The Indian sugar industry has skillfully served the country's sugar and energy needs and is generally confident, leading the way for other countries to build a profitable, productive and sustainable industry. economy (Solomon 2014).

INDIAN SUGAR INDUSTRY: THE ERA OF INDEPENDENCE

Sugarcane has been cultivated in India since the Vedic period although there is no record of a well-functioning sugar industry during that time. The Atharva Veda (1500-800 BC) contains various references to sugarcane in India, while famous historians such as Herodotus refer to the harvest in their works. Ibn Battuta and Francois Bernier are other famous researchers who discovered the development of sugarcane in Kerala and Bengal. Tamil texts also have some references to sugarcane. The process of

boiling sugar cane to extract sugar was first discovered in the first century BC. Notices of the establishment of the first sugar industry can be found sometime in 1610 in Masulipatnam on the Coromandel Coast and in Surat in 1912. There is a vague history of the introduction of sugar mills in Orissa in 1824 by the French. In 1904, the present sugar factory was established at Saran in Bihar, with the establishment of a large industrial factory (Mishra 2018). The presentation of the company during the period requires great progress. With the establishment of the Board of Revenue in 1931-1932, the pioneer government ordered the importation of 185% valorem improvement in sugar from Java and this led to a significant increase in the number of sugar factories in the country. The number of factories increased from 29 to 137 places between 1931-32 and 1936-37. There was an increase of more than 300% in their number, with about 140 manufacturing plants in 1946-47. An expansion in sugar production was also seen from 1.61 lakh tonnes to 9.5 lakh tonnes during this period. Sugar manufacturing recorded a CAGR of 11.62% during the period. The common industry share increased with a construction rate of 1.61% and an increase of 0.75% for sugar recovery. There is a significant increase in various variables such as sugarcane land (CAGR 0.67%), tree production (1.01%) and fruits (1.09%) (Reviewed in Mishra 2018). Release time

The period of independence also saw a great development in the field of sugar plantations. The research and development department has reached a new level by creating new research associations. A special project has been launched to overcome the upcoming difficulties such as the outbreak of diseases and problems in this crop. The development of developed varieties of sugarcane with useful characteristics, the use of new agro-methods in crop production and advice, automation of sugarcane fields, updating and improving the slaughter of sugarcane, etc., in addition to promoting the general improvement of natural workers and efficiency. By the end of the last century, the country's sugarcane area had expanded to 4.4 million hectares, and the yield reached 68 t/ha. Sugar production in 2000 was 18.2 million tons. Other advances in the various structures and advancements reminiscent of ICT-enabled advancements for the sugar sector have led to a rebound in sugar production, producing a record of 33 million tonnes in 2018-19 (Anon. 2021). Promising compounds such as Co 0238 which contributed to a 102% increase in sugar recovery in the period from 2012 to 2019-2020 (Slam and Hemaprabha 2020) show how much progress has been made in the sugar field. Little by little, many creative media, economic and promising such as the improvement of the establishment process, the organization of the asset of the advisory system, the plan of the critical tree coverage, the innovation of the data, the application based on the PC/ mobile phone for agribusiness authentication, automation. and other materials are used effectively in sugarcane development conditions. Modern advances have been made in the area of control, allowing the sugar control unit to work more efficiently, while at the same time making improvements. The move to the "Green Brilliant Sugar-Agro Complex" emphasizes the provision of electricity in the environment and other bio-based materials, which characterize today's sugar production process.

As part of their professional work, these institutions promote a high quality of life for the beneficiaries through their many training services. These companies adapt to the principles of the Green Green Tribunal (NGT), thus working in a safe and clean environment. The productivity of the area gained through the expansion and various exercises also made the open way of the company good. This has also created an element of trust in the public. This area has helped to change the program quality, infrastructure readiness and business age and duration are key in meeting social responsibility (Solomon et al. 2019) and improving the practical goals for promoting the 2030 agenda. This is true in India, but also in many developing countries around the world where sugarcane, especially those in South Asia, is a major commodity in the global market.

COMMUNICATION SYSTEM FOR TRUST IN INDIAN SUGAR INDUSTRY

Cane style upgrades are still open

Sugarcane diversification is a critical aspect of sugarcane research and development in India. The country has a few research associations, various sugarcane research institutes under the State

Farming Colleges (SAUs), etc., which are clearly responsible for the sector and the needs of other countries.

The plants developed at SBI, Coimbatore have spread to few parts of the world. Coimbatore plants (Co sticks) have been known to succeed in about 28 sugarcane developing countries of the world, either as parent clones to produce regionally specific varieties, or like the open variety. Therefore, the country as a whole has many varieties of the best sugar cane with beneficial qualities, and we do not submit ourselves to other developing countries for the right variety of sugar cane that can react in our interests. Producing good fruit

The creation of quality seeds in rural areas is carried out by research associations and even more so in the fields of cattle breeders. The company is independent in terms of obtaining valuable seeds of various developed species, in the interests of partners. The research team under ICAR and the Sugar Association are making the availability of valuable seeds available to the growers. Seed nurseries in farmers' fields, seed communities for the production of valuable seeds of developed varieties, programs to promote entrepreneurs, etc., are among the measures taken to guarantee access the seed of the developed variety.

Advances in Sugarcane Production

The Sugarcane Research Institute has produced many remarkable advances in the field of sugarcane development and efficiency, efficient economic management, management systems, effective intervention, management of invasive and disease, post-harvest management. garden, etc. used by sugarcane growers. The State Sugarcane Development Branch promotes these, along with other schemes and supports available to growers. Good agricultural practices through clear site management represent an important part of climate-centered creation. In the case of sugarcane creation, it starts with the planning of the field and planting, using the establishment plan in mind and using it to establish things. These units that many sugar producing companies have established in their areas make sugarcane growers and different partners independent of the requirement, since these natural fertilizers can make compost more valuable. A significant number of sugar producers and related research groups have a food profile sector in which they use the results of sugarcane production and microbial cultivation to provide themselves with bio-composts; therefore, dependence on different hot spots for these bio-supplements is eliminated. The general exercise as a wood producer and SHG can take on the role of working in such things that can overcome many difficulties in situations where the limits and standards are order and development of products, people and transportation.

Water Frameworks to Improve Water Availability

Sugarcane is a crop that requires good water supply during the early stages and proper water management can help improve water availability. A few of the more frequent methods are the jumping water system and the small water system. It is estimated that of the entire floodplain in India, less than 20% is under low water. 27 states have less than 30% of open livestock land under limited water systems and a couple have only 15% of all open land under limited water systems. Generally, about 32% of water savings can be achieved through small water systems, and a 48.5% increase in wages for the farmer.

Fruit Storage is Critical

The use of synthetic and inorganic plant protection products has not been particularly effective in controlling severe disease and stress caused by sugarcane insects. For this reason, along with the progress of various defenses developed against live loads, organized management, including parasites and disease control, is an important process in this harvest. The use of bio experts for biotic stress management has saved millions of rupees in the public purse. Many sugar companies and research and development groups have their own collection centers for bio experts, to support them and deliver them directly to the fields or distribute them to farmers. The business to work in the collective of

professionals responsible for living things has led to the establishment of a large number of business people in rural areas.

Automation of Sugarcane Fields

Perhaps the most desirable process improvement that can add confidence to the sugarcane development sector, especially following the restrictions related to the coronavirus pandemic, is automation, which can improve manual transmission and create culture and procedures. A good estimate shows that sugarcane development usually requires 375 labor hours/ha of seed (Singh et al. 2020). Modern programs organized and implemented in sugarcane development can help reduce labor costs through proper and accurate field operations, subsequently supporting field performance in adverse conditions. It can also block people's requests. In fact, even in the most common cases, automation can overcome unemployment and high costs of hard work, thus making it effective to develop a work-oriented culture.

Our extensive inventory of farm machinery allows us to be confident in the performance of a wide range of farm machinery. Indian planters have ties with foreign partners and sugar factories in many countries around the world are benefiting from the expertise of sugarcane manufacturers and automation. Therefore, this has helped our motor manufacturers to improve their capabilities and break new ground, thereby increasing the status of Indian autos. Hence, trust through alliances and joint efforts is well recognized by the motor, by the Indian sugar industry.

ICT is Planting Sugarcane

India is a huge developing country and a land with different regions with different climates and different things. Therefore, the requirements for a good harvest will change slightly in these areas. Clear regional packages are required, and these should be designed in a way that is easy to understand. The use of new information and communication technology (ICT) has been a very important step to improve the efficiency and productivity of this production. It also works by using good and valuable resources such as human resources, materials and water, thus addressing the issue of carrying capacity.

An extremely critical headway in the sugar business has been the GPS-based sugarcane crop region review started by the Indian Sugar Plants Affiliation (ISMA) and different offices. From 2011 onwards, ISMA has been doing sugarcane region overview and assessment utilizing GPS. This aides in ideal and more exact assessment and furthermore decreases the necessity of manual mediation. Rather than at least 4-5 faculty required for sugarcane region study pre-2011, the GPS-based hand-held machine can work even with a solitary administrator (<http://www.indiansugar.com>).

Process Designing/Apparatus

India has a cosmic system of hardware assembling and introducing organizations who have areas of strength for an of very proficient and experienced specialized specialists, working with an effective organization at the homegrown and global level. These assembling units are spread all over India and are to a great extent liable for establishment and dispatching of sugar plants, refineries, co-age plants and other subordinate offices for the sugar business. They comprise a portion of the world's driving providers of turnkey sugar industrial facilities, processing plants, refineries, ethanol plants, power transmission frameworks, water and waste-water treatment plants, makers of steam turbines, and so forth. These designing units have transformed establishment and dispatching of cutting edge sugar industry related offices both inside India and in nations abroad and other related groups).With their skill and tremendous involvement with their field, these organizations have a boundless organization all over India and furthermore in different nations, where they take up consultancy, establishment and charging of the most recent mechanical offices for the sugar business. To specify a couple, the Uttam Sucrotech Worldwide Pvt. Ltd., the worldwide arm of Uttam Sugar Gathering, has projects in Kenya, Indonesia, Sudan, Uganda, Columbia, Ethiopia and numerous different nations.

Limit Building

The whole Research and development organization of the sugarcane and sugar research associations are exceptional with the ordinary as well as the cutting edge advances to give expertise and information upgrade to the understudies, sugarcane ranchers, sugar plant work force and different partners. Preparing in sugarcane creation and the executives rehearses, business advancement for various innovations like seed creation, utilization of bio-control rehearses, ranch apparatus related advances, ability improvement in refined strategies including research facility examinations, sub-atomic science related methods, and so on, are given by these associations according to the interest at normal spans.

Broadening in Sugar Industry: A Stage Towards Confidence

Sugarcane and other sugar crops like sugar beet and sweet sorghum are astounding biomass feed stocks for sustainable fuel and efficient power energy, aside from a few other primary and results. The significant benefit with the sugar crops including sugarcane over the grain crops is the less degree of handling expected because of the fermentable sugars present in their juice. The fluctuating sugar advertises, the interest for elective bio-based energizes and expanded purchaser requests for bio-based items are critical variables that drive the worldwide sugar industry towards enhancement for manageability.

Sugarcane-Based Bio-Processing Plant

The biorefinery idea is acquiring significance in India with extraordinary speculation potential and has been distinguished as one of the most encouraging courses for financial supportability, work and production of new ventures. The impending idea of bio-processing plant with sugarcane as the feed stock is a fantastic method by which different bio-items can be coordinated into a similar actual space. The cycles for creating sugars, biofuels, co-age, bio-based items a few synthetic substances (sugar-based or ethanol based) can be embraced inside a similar space utilizing various sciences. The biomass can be changed over into high worth synthetic compounds that can supplant the oil based items. A common illustration of a sugarcane based treatment facility is introduced here, and many sugar plants are delivering these worth added items

The Indian sugar industry like other moderate sugar delivering nations is progressively executing supportable ways of creating and supply normal sugars (Eggleston and Lima 2015, for example, raw sweetener, jaggery, raw crude/earthy colored sugar, syrups following a roundabout methodology which traverses the whole item life cycle.

Sugarcane Industry and Carbon Impressions

A few examinations have been completed everywhere., esp., in the sugarcane developing nations like Brazil about the supportable green innovations concerning CO₂ discharges, carbon and water impressions, methane emanations, and so forth, that can be taken on in sugarcane horticulture. Sugarcane development and handling rehearses as a way towards decrease of carbon impressions has expected extraordinary importance in the current situation of natural well disposed economical choices. Land the board, supplement the executives, plant buildup consolidation and green gather are a portion of the practices which stand out of specialists in such manner (Solomon and Swapna 2019). Assessment of C impression in the sugar creation chain has been accounted for under various circumstances in significant sugar delivering nations/districts like Brazil, Australia and Philippines (Rein 2010; Renouf et. al. 2010; de Oliveira Bordonal 2018; Mendoza 2014, 2017). In India, sugarcane-based editing framework (Sugarcane-Ratoon-Wheat) was seen to sequester 1.42 mg/ha/yr carbon and with the buildup joining alongside use of Trichoderma, a sequestration up to 2.45 mg/ha/yr of carbon could be accomplished (Shukla et al. 2017). A more extended manageability of soil C level, crop efficiency and creation productivity was recorded by the gathering under these circumstances. BONSUCRO through its Better Sugarcane Drive Guidelines have likewise assessed net carbon impression for sugar creation. As a base worth, inside unambiguous circumstances and with the

supposition of 10 MW power traded from co-age, an expected worth of 307 kg CO₂ same/ton of sugar (0.31 g CO₂ eq/g of sugar) created has been accounted for by this gathering. Hiloidhari et al. (2021) recognized a portion of the circumstances that can prompt better ecological cordial creation rehearses in Maharashtra in India. The fossil fuel byproduct/carbon impression values are found to rely upon the country/district of study and the factors utilized in the assessments. Expanding the productivity of horticultural activities in the field and handling in the manufacturing plants utilizing bio-escalated practices will perpetually prompt diminished carbon impression.

Progress towards a "Green Brilliant Sugar-Agro Complex" with an accentuation to create efficient power energy and other bio-based items, aside from sugar is the sign of the present-day sugar processing plants. Further developed advances like GREEN innovation (Extraordinarily Diminished Energy and Hardware Needs) for sugar refining (Tongaat Hulett Treatment facility, South Africa) are being rehearsed by the sugar plants. The capability of significant worth expansion through a superior use of side-effects is likewise being taken up by the sugar plants, for instance, bagasse for co-age, molasses as a wellspring of ethanol, usage of vinasse/spent wash for bio-power and furthermore for soil wellbeing the board, to give some examples. A bio-treatment facility with the command of "Abundance from squander" urges the sugar factories to use "everything under the sun from the sugarcane plant" to be handled for an improved productivity and manageability of the business.

The Indian sugar industry has been utilizing these methodologies both in the field as well as the plant trying to bring down the carbon impressions. A few motivators and orders are set up to work with such maintainable exercises pointed toward lessening the carbon-impression from the sugar business. Such bio-concentrated creation and the board methods, carbon sequestration, miniature water system rehearses, coordinated supplement and irritation/illness the executives, green gathering, item expansion and other energy proficient handling rehearses are every one of the a piece of our endeavors towards a decrease in carbon impressions.

Asset Supportability

The business is committed and prepared to assembling items utilizing bio sustainable unrefined components and afterward guaranteeing that the full worth of natural substances is expanded. This beginnings with the preparation of proficient assembling processes that empower financial manageability for the sugar plants through higher item yields and ecological maintainability utilizing less assets and low outflows and waste. All deposits and co-items (bagasse, molasses, PMC and cellulosic buildups) are utilized as feedstock for another worth added item all through the worth chain (bio-energizes/bio-power/biochemicals/bio-plastic/drugs/feed/grub/paper/sheets/shaped products). The spent wash created in refineries consumed in an incinerator kettle helps in gathering the steam and power prerequisites of the refinery. Also, the debris from the kettle is utilized to make blocks, further benefiting to lessen the ecological contamination and removal issue and all the more critically diminishes the expense of development. The remainder of the spent wash is utilized in the assembling of bio manure by using press-mud got from sugar factory (utilizing air turners), in this way prompting zero fluid release.

Ecological Maintainability

Indian sugar industry have conquered different difficulties to turn out to be second biggest maker of sugars on the planet, be that as it may, in course of doing as such, huge adverse consequences were caused onto the climate, esp. on to the water assets. To defeat these effects and to advance reasonable practices, Focal Contamination Control Board (CPCB) of India presented a sanction and natural remuneration plan for the sugar businesses. The CPCB rules is being continued in all the sugar and refinery units which has brought about critical decrease in freshwater utilization, emanating age, and biochemical oxygen request load. Also, reception of water gathering works on, reusing of PMC through bio-fertilizing the soil and CNG creation, utilization of slime to fill low lying regions, and utilization of involved oil with bagasse in boilers are other critical moves in the line of ecological supportability and prudent activity of sugar businesses after the execution of sanction. The result of

these drives has been exceptionally compelling in limiting the contamination load from sugar enterprises and in saving the groundwater assets and advancing ecological supportability. Our sugar plants and refineries have embraced Zero Fluid Release (ZLD) framework, a high level wastewater treatment innovation to reuse, recuperate and once again utilize the treated wastewater and gushing, guaranteeing no release of wastewater to the climate. Efficient power energy sources like bio-ethanol, bio-power and bio-CNG are being advanced by Legislature of India through utilization of molasses, stick juice, bagasse, biomass and PMC. There are upwards of 275 bagasse based power co-age plants which are intended to meet their own power necessities as well as product the excess capacity to network, giving genuinely necessary capacity to the local area and towns close by. This cycle really mitigates fossil fuel byproducts, and the business procures Carbon Credits under the Unified Countries System Show on Environmental Change (UNFCCC).

Reasonable Valorisation

The manageability technique is an intrinsic piece of sugar industry field-tested strategy and reliable with its obligation to add to the general public. The sugar business is an empowering agent of further developed manageability across esteem chains and makes numerous bio-based items through esteem expansion. The business is creating a scope of sustainable items that have lower ecological effect as well as perform same or better than existing materials. The utilization of assets to make green power (bio-ethanol and bio-power), that likewise relieve ozone depleting substances, and the assembling of biofuels and synthetics from ethanol additionally presents a model regarding how a yield, for example, sugarcane can be utilized to make a large group of important items, utilized in various applications. Late EBP of Legislature of India, where sugar industry is providing a significant piece of ethanol shows that petroleum products have another option and the green fuel created from sugarcane is an instances of this model. The business R and D is participated in creating imaginative ways for additional valorizing lingering biomass by flowing which incorporates the recuperation of silicon from bagasse cinders, creation of bio-plastic and bio-manure, and valorization of biogenic CO₂ sources.

Social Manageability

Every one of the key partners straightforwardly associated with sugar esteem chains viz., ranchers, ranch laborers, sugar factories, stick social orders, Stick Advancement and Sugar Industry Divisions, organizations purchasing sugar, common social orders and worker's guilds are straightforwardly or by implication related with the sugar units of their area. Sugarcane creation in the order region is the immediate obligation of stick improvement division wherein countless ranchers including ladies ranchers are related. Sugar plants work numerous innovation empowered stick assortment focuses across the towns and give helpful transportation and strategies to the ranches of the accomplice ranchers, so the agrarian produce can be moved effortlessly and no additional expenses are brought about by the ranchers. This assistance empowers ranchers to focus on their creation exercises while the business deal with the accumulation of their agrarian produce. The collected sugarcane is accordingly moved to the assembling and handling units. The sugar plants are answerable for dealing with the cultivating local area according to the Organizations Act, 2013 by carrying out CSR strategy. The CSR exercises of sugar factories are centered around various areas with principal accentuation on advancement of instruction, expertise improvement, medical services and preventive medical care, orientation value and enabling ladies (Solomon et al. 2019). During Coronavirus pandemic, the business has worked intimately with government emergency clinics, schools, police headquarters and different foundations to aid the battle against the pandemic. Many factories had organized sanitizers, worked with organization rescue vehicle for moving impacted patients, sorted out for RT-PCR/arbitrary tests and offered other required types of assistance.

CONCLUSION

The worldwide business sectors are in a progress stage with a persevering drive to work on the productivity alongside manageable turn of events. Quick development and developing success has

provoked an expansion in interest for every one of the assets, including food, feed and energy. A lion-portion of this request is constantly coming from the Asian nations, with the quickly developing economies like India ready to take a quantum jump regarding financial development. Subsequently, the Asian nations and the South East Asian locale all in all, are the main players in driving the worldwide financial development. With a quick creating economy, the interest for food, fuel, feed and different items and assets will be more, which requires an expansion in accessibility of these assets. This requires a reasonable use of assets alongside the requirement for independence. The unanticipated difficulties like the continuous pandemic additionally offer adequate extension to rebuild the business with a base degree of reliance on different sources with joint efforts and linkages to reinforce the independence. The sugar business is an ideal illustration of an arising maintainable framework with more than adequate roads to become independent. The creative advancements in the sugarcane and sugar creation framework alongside the degree for expansion has made the worldwide as well as the nearby sugar businesses, the banner conveyors of the idea of supportability and productivity with confidence. This is clear from the wonderful development of the Indian sugar industry from the mid 30 s till date and its change into a significant sugar delivering country with a solid worldwide presence. The Indian sugar industry specifically, is a long ways ahead in this excursion and can possibly loan some assistance to the sugar creating nations of the locale so the sugar business in the Asia and South East Asian District can be pioneers in their walk towards a confident, practical, bio-based economy.

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