

Sustainable Sugarcane Production: Role of Policy and Legislation in the Context of India

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ABSTRACT

This research paper offers a comprehensive analysis of the impact of policy and legislation on the promotion of sugarcane production in India. It thoroughly examines various Acts, Orders, and policies from 1932 to 2020, including the Essential Commodities Act, Sugar Control Order, and Biofuel policy etc. The study evaluates the effectiveness of these policies in ensuring the efficient use of resources in sugarcane cultivation and addresses the sustainability of the sugarcane sector, as well as the socio-economic improvements brought about by regulatory implementation in the sugar industry. It also discusses the challenges in balancing environmental, economic, and social factors within the sugarcane industry and provides policy recommendations aimed at enhancing it, such as integrating policy frameworks, supporting farmers, and offering incentives for sugar mills. This paper concludes that the legislation framed for the welfare of the sugar industry has helped this sector to grow tremendously in terms of production, productivity, and trade. It has also contributed to generating significant employment in the economy. The paper sheds light on previous literature and supports the view that such regulations have affected the free play of the sugar market and, in turn, its overall performance.

Keywords: sugarcane, legislation, socio-economic

I. INTRODUCTION

Sugarcane has been grown for human and animal consumption for centuries. In recent years, its potential for immense agro-industrial value has been increasingly exploited. This is integrated with industrial processes in sugar mills and other industries, including ethanol, power, feed, paper, board, and biobased products. The sugar industry and sugar crops have the potential to be a source of renewable energy, biofuels, bioelectricity, and biomaterials, they are also a food crop and widely recognized as a source of rural livelihoods and socioeconomic transformation in developing countries. (Soloman, 2019). India is the second-largest producer of sugarcane and sugar, and the world's largest consumer of sugar (CACP, 2020). Sugarcane is a prominent commercial crop grown in almost eleven states all over India, and engages a huge workforce in employment, along with a significant contribution to the country's growth (CACP, 2020). Sugarcane provides a huge economy to India with a lot of complexities. Therefore, the role of policy and legislation in tackling the complex nature of the sugar industry and shaping the sustainable sugarcane economy cannot be understated. Effective policies and legislation serve as the backbone for implementing sustainable practices by setting standards, providing incentives, and enforcing regulations that guide the agricultural sector towards sustainability. Sugarcane production has significant concerns regarding the economy, society and the environment. Its cultivation is associated with serious sustainability challenges, including deforestation, water depletion, soil degradation, and greenhouse gas emissions (Ricardo de Oliveira Bordonal, 2018). Sustainable practices in sugarcane production are therefore critical to mitigate these impacts, ensuring that the cultivation supports long-term ecological health, economic profitability, and social equity (Chami et al., 2020). These policies are designed not only to provide socio-economic support but also to mitigate the adverse environmental impacts and to boost the bioeconomic potential of sugarcane, proving that well-designed legislative frameworks are essential for sustainable development in agriculture.

The purpose of this research is to investigate how has the policies and legislation helped to achieve economic stability in the sugar industry, reasonable incentives to farmers and millers, and manage environmental protection. Thus, exploring the dynamic interplay between policy, legislation, and sustainable practices offers valuable insights into how sugarcane production can be transformed to meet India's goals of food and environmental sustainability.

II. SOCIAL AND ECONOMIC BENEFITS

Sustainable sugarcane production has social and economic benefits, improving livelihoods and reducing poverty in farming communities, especially in developing countries (Tornquist and Broetto, 2017). Several legislations are there to support sugarcane farmers and sugar mills, the minimum price policy, incentives for cultivation, adoption of technology and sustainable practices etc. This study investigates the role played by the acts and legislation in meeting the socio-economic welfare of sugarcane growers and sugar suppliers.

III. LITERATURE REVIEW

A. Amarender Reddy, 2011, The sugar and cane industry in India is facing challenges due to high levels of regulation, resulting in supply and demand fluctuations. To unlock the potential of small-scale farming and sugar mills, it is essential to reduce excessive controls on the sugar sector, thereby lowering production costs and enabling fair pricing based on production and international trends. While some government regulations are necessary to protect consumers' interests and small-scale farming, there is considerable room for deregulation. The introduction of futures trade has shown potential in reducing price volatility, and uniform policies across states and alignment with international prices are essential for a sustainable and competitive market. The industry needs a fair cane payment system, expanded purchasing capabilities for millers, and the discontinuation of levy sugar in favour of purchasing from the free market. These reforms are crucial for fostering a more efficient and competitive sugar industry in India.

T. Rajula Shanthyl and S. Ramanjaneyulu, 2014, The limited potential for expanding sugarcane cultivation in India has led to a focus on increasing productivity through innovative technologies. The Sustainable Sugarcane Initiative (SSI), particularly bud chip planting, has gained traction among cane growers for its potential to reduce cultivation costs and increase yields. A study in Andhra Pradesh revealed that farmers appreciate SSI for its reduced seed rate, potential for intercropping, and overall cost savings. However, challenges such as the availability of specific sugarcane varieties, skilled labour, and planting materials remain. Comparisons with conventional planting methods have shown significant benefits, including the opportunity to grow profitable intercrops. Embracing SSI and similar technologies could be the key to meeting the growing demand for sugarcane.

P. Asha Priyanka et al., 2016, The article categorizes various committee reports on the Indian sugar industry from 1974 to 2013 and explains their importance in the partial decontrol of the sugar sector in 2013. A comprehensive examination of the reports reveals that partial decontrol was a long-awaited and highly recommended measure by policymakers and committee heads. Most committees highlighted at least one issue that was decontrolled starting in 2013. Although the government still retains control over major sugar export and import policies, whether the liberalization of certain aspects of the sugar industry will lead to the anticipated recovery from the industry's debts is a crucial area of research. The sugar sector in India continues to be heavily regulated by the state through various laws, resulting in negative impacts on sugarcane price determination and productivity. State intervention also leads to unfair distribution of aid, regional discrepancies, and the emergence of financially troubled sugar mills. To address these issues, it is recommended that the disparity between the Fair and Remunerative Price and the State Advised Price be minimized, and prices of sugar for commercial and household purposes be differentiated. The government should consider reducing its involvement in the sugar sector, similar to Brazil's model, and mandate sugar mills to set aside a portion of profits as reserves. Furthermore, the state should reassess its intervention role, consider the needs and repercussions before providing aid or regulations, and promote sustainable development by refraining from imposing taxes on sugarcane by-products and offering subsidies on ethanol.

Abnave Vikas B and M Devendra Babu, 2017, The sugar sector in India continues to be heavily controlled by the state through various regulations, resulting in adverse effects on the industry. Despite efforts to promote sugarcane cultivation, the sector's productivity has remained stagnant. State intervention in price fixation and by-product control has led to issues such as the inequitable distribution of assistance, regional inequality, and the rise of sick sugar mills. To address these challenges, it is recommended to reduce the gap between Fair and Remunerative Prices and State Advised Prices. Distinguishing prices of sugar for commercial and household uses, and following Brazil's minimal state intervention approach could also be beneficial. Additionally, making it compulsory for sugar mills to maintain reserve funds and revising the role of state intervention in the sugarcane sector could help improve the industry's sustainability. Furthermore, providing subsidies on ethanol and introducing measures to ensure green development, such as revising the taxation on sugarcane by-products, would contribute to the sector's growth. It is important for the state to carefully consider the consequences of its interventions and provide support that aligns with the long-term sustainability of the sugarcane and sugar sector.

Ricardo de Oliveira Bordonal, 2018, Brazil has experienced a significant increase in sugarcane production to meet the growing global demand for bioenergy. However, the environmental impacts of this expansion need to be carefully managed to ensure sustainability. While sugarcane expansion has not directly contributed to deforestation, it has led to changes in land

use and competition with food production. Non-burning sugarcane harvesting has proven beneficial, but concerns regarding soil compaction have emerged. Sugarcane demonstrates high nitrogen use efficiency, but attention must be given to mitigating nitrous oxide emissions, especially when straw mulching is combined with nitrogen fertilizer and vinasse application. Recent advancements have resulted in reduced water consumption, positioning sugarcane ethanol as a favourable option in terms of water footprint. Moving forward, it is crucial to focus on adopting best management practices and optimizing the production chain to further enhance the environmental benefits of sugarcane ethanol. By consolidating these efforts, the vast potential of sugarcane production can be realized, contributing to greater sustainability in the bioenergy sector.

Daniel El Chamiet al., 2020, The paper present a systematic review of the impact of sugarcane production on various ecosystems using the ecosystem services framework. The literature reviewed indicates that sugarcane production, like other agricultural systems, relies on practices and techniques to minimize negative impacts and maximize positive effects on ecosystems. However, the reviewed literature did not sufficiently consider the interconnected effects of sugarcane production on ecosystem services and did not account for existing trade-offs. In conclusion, while the evidence suggests that sugarcane production interacts with a range of ecosystem services, the reviewed literature failed to adequately assess these interactions and their impact on human well-being. It is worth noting that in 2018, the first studies linking ecosystem services and sugarcane agro-systems began to emerge, and future trends indicate a growing focus in this area. Therefore, a follow-up review conducted 5-7 years later could provide a more comprehensive understanding of the trade-offs associated with ecosystem services. Based on these findings and the encountered limitations, further research based on the Millennium Ecosystem Assessment (MA) framework is recommended for the sustainable development of the sugarcane sector, especially in geographic locations where studies are lacking. This approach would allow for an integrated and coherent evaluation of sugarcane production.

IV. DISCUSSIONS

Policy and Legislations

State intervention plays a crucial role in India's sugarcane sector, and therefore no discussion would be complete without considering the role of the State in the sugarcane sector. The relevancy of government interference in the sugarcane sector is linked with various factors that affect the process of this industry. Since the time before independence, the sugar industry was under government control, Sugar Industry (Protection) Act, of 1932, Sugarcane Act, 1934, and Sugar Factory Act, 1938 were there to protect the sugar industry and getting self-sufficiency. By 1930-31, India had 29 sugar factories and produced 10000 MT of sugar, which was quite low and Japanese sugar industries were dominant in the Indian market (Kansal, S. 1997). To protect the indigenous sugar industry, Sugar Industry (Protection) Act, 1932 was passed and the act shall be for 14 years with performance review conditions. This also empowered the government to levy additional duty on imports, if the imported sugar prices make domestic industry ineffective. This helped the country to achieve self-sufficiency within four years and the number of sugar factories increased to 130 in number. In continuity with this U.P. government enacted Sugar Cane Rule, 1934, which was followed by Bihar and Orissa. These protectionist policies helped the Indian sugar industry to increase its production from 0.17 MnT to 0.95 MnT and the rate of expansion of the overall industry was 460% till 1938-39 with the production touching 1.28 MnT (Kansal, S. 1997).

After this phase of the boom, the industry faced setback. Several reasons were there like the exploitation of farmers, harsh weather conditions, farmers' preferences for other essential commodities, instabilities in the country's politics etc. This created the instability in sugarcane supply, and output remained fluctuated between 0.89 to 1.1 MnT (Kansal. S. 1997). This situation continued till 1950-51.

Post-independence the State has taken several initiatives like setting up committees, making policies like sugar pricing, levy sugar, licencing policy etc. Essential Commodity Act (1955), Sugar Control Order (1966), State Advisory Prices (1970), Jute Packing Materials Act (1987), Delicensing Sugar Sector (1998), Ethanol Blending Programme (2012), Scheme for Extending Financial Assistance to Sugar Undertaking (2014) etc. are various acts and initiatives taken by government for the welfare of sugar industry. The initial Acts has helped achieve India 3.54 MnT of sugar by 1965-66, the third five-year plan (Kansal. S. 1997). Until this plan, the sugar industry was under the full control of the government. In 1967, the partial decontrol was announced. This gave freedom to the mills to produce and sell more at market price and to provide better payment to the farmers. In 1971, govt. decontrolled sugar and this led to a crash in domestic sugar prices and production fell by 32% with 3.1 MnT (Kansal, S. 1997). This resulted in the recontrolling of sugar in July 1972 and decontrolling in 1978 again. During this period, the sugar production varied between 3.9 MnT in 1979-80 to 8.7 MnT in 1981-82. And production fell to 5.5 MnT in 1983-84, causing losses and delays in cane payment (Kansal, S. 1997).

The Sugarcane Development Fund (1982) was established to facilitate research and development and to promote overall progress in the sugar sector. As per the Sugar Cess Act (1982), a cess of 24 per quintal was levied from March 2008 on all sugar produced and sold by the sugar mills (Vikas, A. et al. 2017). To support the Jute industry, it was mandated that sugar

should only be packed in jute bags according to the Jute Packing Materials Act (1987). A significant step towards delicensing the sugar sector was taken in 1998 when the licensing requirement for new sugar mills was eliminated. A Sugar Stabilization Fund was created by the state to stabilize sugar prices and ensure better prices for sugarcane growers during periods of low sugar prices in the market. In addition to this, the Central Government initiated the fixation of fair and remunerative price (FRP) from 2009-10, which is determined based on the cost of sugarcane production, inter-crop price parity, recovery, sugar prices, availability of sugar, and margin, to provide reasonable margins to sugarcane growers considering the risks and profits involved. To improve the prices of sugarcane by-products and reduce pollution, the Ethanol Blending Programme was launched in 2012. The Central Government partially accepted the Rangarajan Committee's recommendation in April 2013 and announced partial decontrol of the sugar sector. To facilitate the clearance of sugarcane arrears and ensure timely settlement of sugarcane prices, the Central Government introduced a new interest-free loan scheme (Scheme for Extending Financial Assistance to Sugar Undertaking) for sugar mills in January 2014. Additionally, in February 2014, the State notified a Scheme for Marketing and Promotion of Raw Sugar Production and announced subsidies to encourage sugar export and elevate domestic sugar prices using the Sugar Development Fund.

The sustainability and future viability of the sugar industry have also been addressed from time to time. For this diversification in the sugar industry has been encouraged through value-addition and ethanol generation. The first ethanol blending policy in India was announced in 2002 and later modified in 2009 as the National Policy on Biofuel. This policy envisaged an optional target of 20% blending for ethanol and bio-diesel by 2017. Later the 2009 policy was revised and a New biofuel policy was announced in 2018, with an indicative blending target of 20% ethanol in petrol and 5% biodiesel in diesel by 2030.

A brief overview of important regulations related to the sugarcane and sugar industry is given in Table 1.

Table 1: The Acts and legislations related to the sugarcane and sugar industry

| Act/ Legislation | Year | Purpose | Outcome | Year of modification |
|--|------|---|--|----------------------|
| Sugar Industry Protection Act | 1932 | To protect the interest of the indigenous sugar industry. | Self-sufficiency within four years. The number of mills increased to 130 by 1934-35. Production increased to 0.95 MnT | - |
| Sugarcane Rule (Enacted by U.P. followed by Bihar, Orrisa) | 1934 | To protect the interest of sugarcane growers | Self-sufficiency in 1935. The rate of expansion of industry was 460% and continued till 1938-39. Production of sugar increased to 1.28 MnT | - |
| Sugar Factory Control Act | 1938 | To abolish middlemen | No middlemen exist between cane growers and mill except mill officials. | - |
| Sugarcane (control) order | 1950 | To fix uniform minimum prices | Every year the central government fixes FRP before sugar season starts | 2009-10, 2016, 2018 |
| Industries Development and Regulation Act | 1951 | To regulate the sugar sector by the Government of India | - | - |
| Sugarcane (Regulation of supply and purchase) Act, U.P. | 1953 | Declaration of reserved area for purpose of supply to the sugar factory | - | - |
| Essential | 1955 | to impose a levy | Central Government | 1991;1996; 2013 |

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|-----------------------------------|---------|--|---|---------------------|
| Commodities Act | | quota at lower prices than the market price | has abolished levy on sugar produce after 1st October 2012. Procurement for PDS operation is being made from the open market by the states/UTs and the Government is providing a fixed subsidy at ` 18.50 per kg. | |
| Sugar (Control) order | 1966 | To promote the sugar industry and fair prices to growers by fixing the minimum price payable by mills. Also regulate the production, sale and stock of sugar | Protect farmers' interests and maintain sugar production | 2004-05; 2009, 2013 |
| Statutory Minimum Price (SMP) | 1965 | Fixed based on input cost to better incentivise the farmers | Diversion of sugarcane to Khandsari and gur resulted decline in sugar production and cane production as well | - |
| State Advisory Prices (SAP) | 1970 | To divert sugarcane from Gur and Khandsari units to the sugar industry | State Advisory price is always higher than FRP | - |
| Levy Sugar Supply (Control) order | 1979 | To direct sugar mills to supply levy sugar at a fixed price | Protect the interest of farmers and households | - |
| Sugarcane Development Fund | 1982 | to establish research and development and to achieve overall development of the sugar sector. | During the period from 1982-83 to 2015-16 (up to 30.11.2015), a net cess of ` 8,785.75 crore was collected. | 2021, |
| Jute Packing Materials Act | 1987 | to promote the Jute industry. | The compulsory packaging of sugar in jute bags has been relaxed further. And only 20% of the production is to be mandatorily packed in jute bags | 2012 |
| Delicensing Sugar Sector | 1998 | to solve the problem of surplus sugarcane production. | Increased in installed capacity of sugar mills by 7% annually between 1998-99 to 2011-12. | - |
| Fair and Remunerative Price | 2009-10 | to provide reasonable margins to the sugarcane | So far only Karnataka & Maharashtra have | |

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|--|------|---|---|------|
| | | growers. | passed state acts to implement this recommendation. | - |
| Ethanol Blending Programme | 2009 | to get better prices from sugarcane byproducts and reduce pollution and dependency on imports. | The State Governments have already been requested to reconsider the regulatory controls on the movement of molasses which can be used for producing ethanol. | - |
| Scheme for Extending Financial Assistance to Sugar Undertaking | 2014 | to facilitate clearance of sugarcane arrears and timely settlement of sugarcane prices. | The Central Government announced ` 6000 crore interest free loan for the sugar mills | - |
| Scheme for Marketing and Promotion of Raw Sugar Production | 2014 | to utilize incentives provided under the scheme by the sugar mills for making payments to the sugarcane growers. | About ` 183.87 crore was disbursed to sugar mills during the Financial Year 2014-15 and about ` 99.67 crore was released during the 2015-16 sugar season up to 31.12.2015. | - |
| Sugar Price (Control) Order | 2018 | To determine the minimum support price for sugar. And to inspect, entry search and seizure of sugar mills, godowns etc. | - | - |
| National Biofuel Policy | 2018 | To fix the ethanol blending target of 12% and 20% by 2025 and announced various schemes for financial assistance to sugar mills for contributing to ethanol production. | Sugarcane juice and molasses are used as raw materials for the ethanol industry. This not only increased ethanol availability but also handled the problem of surplus sugar | 2022 |

Data Source: Kansal, S., 1997 and Vikas, A. B. & Babu. D., 2017

The above table briefs the important regulations related to the sugar industry in India. All these legislations have imparted significant contributions to the growth of the agriculture sector in India and also improved the socio-economic status of the people involved in sugar industry. As of September 2019, there are 746 sugar mills, out of which 529 mills were in operation in 2018-19 (CACP 2020-21). This has, directly and indirectly, affected the livelihood of around 50 million people in India and contributed Rs. 68053 crores to the economy, about 5.1% to the value of output from the crop sector in 2017-18 (CACP, 2020-21). These regulations must have helped the industry to enhance the production of cane with a good rise in its productivity. The Minimum support price system resulted in reasonable payment to farmers and has helped making price

balance for raw-material and output. The export profile of the industry has improved severalfold with financial aid and incentives.

Other than the socio-economic parameters, we cannot ignore the environmental concerns related to sugarcane cultivation and the sugar industry. Sugarcane is a water-guzzling crop and witnessed depletion in water table level. Also, the sugar factor requires a huge amount of water for sugar conversion, which further deteriorates the situation. Soil health, water and air pollution are other related problems of this industry. Various government reports have shown concerns about the environmental aspect of sugarcane and sugar cultivation. These are several recommendations also from annual CACP reports and also in the NITI Aayog Report of 2020. Expansion of drip irrigation, recycling baggase, crop diversion etc are the recommended suggestions (NITI Aayog Report, 2020).

V. CONCLUSION

The sugar industry has played a significant role in India's agricultural sector. Its reforms started with the Sugar Industry Protection Act in 1932, aiming to shield the local industry from competition, particularly the Japanese sugar industry. In 1932, it had a total production of 0.95 million metric tons. Over the years, India's sugar production has grown significantly, reaching 32.4 million metric tons in 2017-18, making it the second largest producer of sugar and sugarcane after Brazil (CACP, 2020-21). The industry has undergone various regulations and de-regulations, which have helped address economic and social issues. These regulations have aimed to support both sugarcane growers and sugar mills financially, legally, and morally. However, some studies suggest that while these regulations have provided stability, they have also restricted the industry's growth potential by creating barriers in the sugar market. State regulations and controls in the sugarcane sector are seen as unsustainable in India and have led to income uncertainty for both sugarcane growers and sugar mills. (Vikas, A. et al., 2017). The government should carefully consider the requirements and outcomes before implementing regulations in the sugarcane industry providing the current situation of the sugar market globally. It is important for the government to consider the broader impact which contributes to market balance and environmentally friendly practices.

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