

**DEPARTMENT OF ECONOMIC ANALYSIS AND RESEARCH**  
**(Evaluation Studies Division)**

**Commodity Specific Studies on Sugarcane –  
Uttar Pradesh, Karnataka and Haryana**

**Background**

**A. Introduction**

Sugarcane cultivation and development of sugar industry runs parallel to the growth of human civilisation and is as old as agriculture. Though sugarcane is considered to have spread to India from Polynesia, the importance and use of sugarcane and sugar in the country's socio-economic milieu is deep-rooted and immense. In the present scenario too, sugarcane and sugar continue to be important for India's rural economy. Sugar industry has been a focal point for socio-economic development in rural areas by mobilising rural resources, generating employment and higher income, transport and communication facilities. About 4 million sugarcane farmers and large number of agricultural labourers are involved in sugarcane cultivation and ancillary activities, constituting 7.5 per cent of rural population. Besides, the industry provides employment to 5 lakh skilled and semi-skilled workers in rural areas. Other typical features of sugar sector include, (i) sugar as an essential commodity although 75 per cent of available sugar is consumed in bulk, viz., industrial and small business segments; (ii) sugar industry has to pay higher prices (state advised prices) than the recommended statutory minimum prices; (iii) high variability in yield and area; (iv) decline in crushing period and its adverse effect on viability of sugar processing units; (v) mills not equipped to make refined sugar and (vi) lack diversification of activities in favour of co-generation and ethanol production.

**B. Production of Sugarcane and Sugar**

2. Apart from sugarcane being an important cash crop, it ranks third in the list of most cultivated crops after paddy and wheat. India is one of the largest sugarcane producers in the world, producing around 300 million tonnes of cane per annum. Production of sugar is the second largest agro-processing industry in the country after cotton and textiles. India also happens to be the second largest sugar producing country (after Brazil), contributing 15 per cent to white crystal sugar production. Further, India is the only country that produces plantation white sugar unlike other countries that produce raw or refined sugar or both.

### C. Sugar Processing

3. India has 566 sugar mills in the country, of which 56 per cent are in the co-operative sector, 34 per cent in the private sector and the remaining 10 per cent are in the public sector. These processing units are located in 80 major districts and a large number of these units are in Maharashtra (142 in the co-operative sector and 12 in the private sector during 2008-09) and Uttar Pradesh (28 in co-operative sector, 64 in private sector and 22 in public sector as at end 2005-06). The increased number of sugar factories has affected the availability of sugarcane for processing and in turn the viability. Most of these processing units work for six months in a year (September to May) and the capacity varies from 750 to 10,000 tonnes per day. For the triennium ending 1999-2000, the 367 processing units worked for an average period of 148 days whereas 425 units for the triennium ending 2004-05 worked for just 112 days. This was due to increased number of units as well as capacities. Existing prices of sugar (Rs.1,600 per quintal), molasses (Rs.3,500 per tonne), rectified spirit (Rs.25 per litre) and bagasse (Rs.1,200 per tonne) are not enough to pay farmers and is an area of concern.

### D. Commodity Specific Studies on Sugarcane

4. Recently the studies on sugarcane in Uttar Pradesh, Karnataka and Haryana were completed and individual reports have been published by the ROs. These studies have analysed the economics of sugarcane cultivation and sugar production for the reference year 2005-06. The studies have clearly brought out that **sugarcane cultivation especially in Haryana and Uttar Pradesh was not an economic proposition/ profitable venture as the returns received were insufficient to cover all costs, particularly when family labour was accounted for.** In the case of sugar processing as well, the studies observed that by and large, **sugar processing as a solo activity did not work out to be a viable proposition for the sugar mills.** Two of the three states selected for the study were from sub-tropical region (Uttar Pradesh and Haryana) and one was from the tropical region (Karnataka).

5. The presentation is divided into five sections. Section I reviews the trends in area, production and productivity of sugarcane, etc., while Sections II explains the coverage of the study. Section III discusses in detail the (i) trends in area, production and productivity of sugarcane, (ii) economics of sugarcane cultivation and (iii) sugar production in Uttar Pradesh, Haryana and

Karnataka. The issues relating to domestic marketing and trade competitiveness have been discussed in Section IV while policy issues are discussed in Section V.

## Section I Trends in Area, Production and Productivity of Sugarcane

6. India ranks second, next to Brazil in terms of area (4 million ha.) and sugar production (26.4 million tonnes). Between 1961 and 2005, the production of sugarcane increased at compound annual growth rate (CAGR) of 2.7 per cent. It was due to increase in area (1.5%) and improvement in yield (1.2%). Though the average productivity of sugarcane (62.8 MT/ha.) continues to be low *vis-à-vis* Brazil (71 MT/ha.), it is comparable to other leading sugarcane growing countries like Thailand (70 MT/ha.), China (64 MT/ha.), etc. Between the trienniums ending 1999-2000 and 2004-05, the area under cultivation, sugarcane production and sugar production increased by 19.6, 20.7 and 60.7 per cent, respectively (Table 1). The latter could be attributed to changes in usage of sugarcane from gur/khandsari to sugar production<sup>1</sup>.

**Table 1: Sugarcane in India - Some Facts**

Particulars	Triennium Ending	
	1999-00	2004-05
Area ('000 ha)	3,349	4,006 (4798.03)
Production ('000 MT)	2,08,448	2,51,613 (3,27,437.6)
Yield (MT/ha)	62.2	62.81 (68.24)
Recovery (%)	9.93	10.25
Cane crushed (% of production)	46.5	59.83
Avg. Duration (days)	148	112
Sugar Prod. ('000 MT)	9,617	15,459
Sugar factory (No.)	367	425
Avg. Crushing Capacity (TCD)	1,946	3,368

*Source: Various issues of 'Indian Sugar' of Indian Mills Association and 'Co-operative Sugar'. Figures in parentheses refer to triennium ending 2007-08 (CMIE, January 2009, pg. 348).*

7. However, **sugar recovery has stagnated at 10 per cent for the last few years *vis-à-vis* Brazil (>14%)**. The crop's performance during 1980's and 1990's followed similar trend although decline has been observed mainly since 2000 due to moisture stress, pests and diseases, high cane price arrears especially during 2002-03, etc. More importantly, after 2000-01, the

<sup>1</sup> Karnataka Report 2008, Annexure

growth rate of all parameters is negative. This is mainly on account of drought and pest infestation in major sugar producing states during 2003-04 and 2004-05<sup>2</sup> (Table 2).

**Table 2: CAGR for Area, Production and Productivity**

Period	Area	Production**	Yield
1980-81 to 1989-90	2.94	4.31	1.33
1990-91 to 1999-00	1.53	2.43	0.89
1996-97 to 2005-06	-0.22	-1.39	-1.17
2000-01 to 2005-06	-0.83	-2.71	-1.9
1950-51 to 2005-06	1.62	2.78	1.14

\*: In recent years, increased international prices have encouraged processing units to offer better prices so that farmers plant more area under sugarcane. At all-India level, the area under sugarcane increased from 3.66 million ha. during 2004-05 to 4.13 million ha. during 2005-06 and 4.42 million ha. during 2006-07.

\*\* : Between 1995-96 and 2005-06, the sugarcane production varied substantially across the years although the co-efficient variation was 13.5%.

Source: (a) CMIE, March 2006. (b) Indian Sugar Mills Association.  
(c) CACP website.

8. Land use statistics also indicated that over the last two and a half decades, the area under sugarcane cultivation in percentage terms increased from 1.5 in 1980-81 (2.7 million ha.) to 2 in 1990-91 (3.7 million ha) and to 2.2 in 2005-06 (4.2 million ha.)<sup>3</sup>. In the case of sugarcane production, the decadal growth rate reflects an increase from 2.19 per cent between 1980-81 and 1989-90 to 2.74 per cent between 1990-91 and 1999-2000. The period 1996-97 to 2005-06, however, shows a higher growth at 3.67 per cent<sup>4</sup>.

9. Though primarily a tropical crop, cultivation of sugarcane is distributed over two agro-climatic zones-the sub-tropical and the tropical. In India, most of the sugarcane cultivation is concentrated in the sub-tropical zone (Uttar Pradesh, Uttarakhand, Bihar, Punjab, Haryana) that accounts for 67 per cent of the area and 62 per cent of the production. Though the tropical zone (Maharashtra, Andhra Pradesh, Gujarat and Karnataka) accounts for 33 per cent of the area, it contributes 38 per cent of the production owing to high productivity.

10. The distribution of area under sugarcane cultivation indicates that large farmers (59%) contribute more area to sugarcane crop as compared to small/ marginal farmers (41%) (Table 3).

<sup>2</sup> Haryana Report, 2008, pg.10-11.

<sup>3</sup> Sources: (a) Agricultural Statistics at a Glance 2007, MoA, GoI, New Delhi. (b) Land Use Statistics, MoA, GoI, New Delhi.

<sup>4</sup> Ibid.

**Table 3: Area under Sugarcane for Different Size of Land Holdings at All-India Level**

							Per cent
<0.2 ha	0.2-0.5 ha	0.5-1.0 ha	1-2 ha	2-4 ha	4-10 ha	> 10 ha	Total
0.8	5	11.8	23.80	29.00	25.00	4.6	100.00

*Source: Uttar Pradesh Report, 2008, pg. 12*

## **Section II Coverage of the Study**

11. As already stated, sugarcane is cultivated in both tropical and sub-tropical regions of the country. Maharashtra and Uttar Pradesh, each representing one of the regions constitutes the largest producers of sugarcane in the country. The study analyses, sugarcane cultivation and sugar production in three states- Uttar Pradesh, Haryana and Karnataka. Two of the three states selected for the study were from sub-tropical region (Uttar Pradesh and Haryana) and one was from the tropical region (Karnataka). While, Karnataka represented highest compound annual growth in area between 1951-2004 (4.42%), Haryana represented stagnancy in acreage under sugarcane. Further, as of 31 March 2005, of the 197 non co-operative and/or private sugar mills, 78 were located in Uttar Pradesh followed by Tamil Nadu, Andhra Pradesh and Maharashtra. Uttar Pradesh alone accounted for 79 per cent of the sugarcane area of the sub-tropical region. Thus, the selected states represented both types of agro-climatic regions, as well as features of the sugar sector like state/s with stagnant area, fast acreage growth, existence of large number of sugar processing units in private sector, etc.

12. The **reference year** considered for the studies was **2005-06** and covered 90, 60 and 40 sample sugarcane growers in Uttar Pradesh, Haryana and Karnataka, respectively. To understand the economics of sugar processing, a sample of three sugar mills (2 co-operative & 1 private) in Haryana, six (3 co-operative, 2 private & 1 not included) in Uttar Pradesh and six (3 co-operative) in Karnataka were studied.

## **Section III Study Findings**

### **A. Area, Production and Productivity – Uttar Pradesh, Haryana & Karnataka**

13. The trends in area, production and productivity across Uttar Pradesh, Haryana and Karnataka have been analysed in this sub-section, based on the study reports of these states. These three States account for 60 per cent of the area and production under the crop. Further, these States

also reflect the different agro-climatic situations. At the state level too, the distribution of sugarcane according to size of land holding follows the all-India pattern (Table 3). In Uttar Pradesh<sup>5</sup>, large/other farmers contribute 55 per cent of the area under cultivation as against 45 per cent by small and marginal farmers (SF/MF). However, in Haryana<sup>6</sup>, SF/MF and large/other farmers contribute 67 and 33 per cent of the cultivated area, respectively.

14. Average growth<sup>7</sup> in area, production and yield for the period 1995-96 to 2003-04 reveals a decelerating (negative) growth trend at the aggregate as well as the State level (Table 4) except Haryana.

**Table 4: CAGR in Area, Production and Productivity of Sugarcane between 1995-96 and 2003-04**

State/s	Per cent		
	Area	Production	Yield
Haryana	1.43	1.81	0.37
Uttar Pradesh	0.97	-0.15	-1.11
Karnataka	-3.81	-6.72	-3.02
All-India	-0.38	-2.09	-1.72

15. Marginal increase in area under sugar cane in Uttar Pradesh and Haryana could be attributed to relatively higher State advised prices than the minimum statutory prices. For instance, state advised price for sugar cane was Rs.123 per quintal in Haryana during 2005-06 as against the minimum statutory price of Rs.80. However, during 2008, sugarcane acreage contracted by 16.7% to 44 lakh ha. (as against 53 lakh ha. during 2007) and the decline was more in Uttar Pradesh as well as Maharashtra. In Uttar Pradesh, the decline was a result of the shift towards paddy cultivation<sup>8</sup>.

16. The variability in terms of coefficient of variation for area, production and yield was substantial for Karnataka than the all-India estimates (Table 5). The level of variation observed was least in Uttar Pradesh (< all-India). The variability in terms of area under cultivation was associated with the increase or decrease in sugarcane production, which further impacted the capacity utilisation of the sugar mills. This therefore, highlights the need for bringing about

<sup>5</sup> Uttar Pradesh Report, 2008, pg. 12.

<sup>6</sup> Calculated on the basis of sample farmers covered. Haryana Report, 2008, pg.6.

<sup>7</sup> CAGR computed from the data provided in Table 3.4, pg 11 of Haryana Report. Area considered in '000 ha., production in '000 tonnes and yield in kg/ha.

<sup>8</sup> CMIE, September 2008, p. 37

stability in the cultivation/production process of sugarcane. Similarly, the variability in yield points out the need for taking effective measures towards improving and stabilising productivity. The sugar recovery percentage which is lesser than Brazil's (>14%) is witnessing stagnation over the last few years. The improvement in sugar recovery may help in improving export competitiveness as well (*discussed in Section IV*).

17. Average yield of sugarcane at the aggregate level is 67.4 quintal per ha. although it varies substantially across the States and is higher in the tropical region (Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Orissa and Kerala) than the sub-tropical (Uttar Pradesh, Bihar, Punjab & Haryana, West Bengal, Assam, Uttarakhand, and part of Madhya Pradesh). These variations are attributed to the agro-climatic conditions of the states/regions. The yield of sugarcane in the tropical and sub-tropical region was 73 MT/ha. and 57 MT/ha., respectively, for the triennium ending 2004-05.

**Table 5: Extent of Variability in Sugarcane Cultivation during the period 1996-97 to 2005-06**

Coefficient of Variation	Area	Production	Per cent
			Yield
Haryana	12.72*	12.91	2.89*
Uttar Pradesh	5.23*	5.73	3.63
Karnataka	26.22	34.65	13.81
All-India	6.17	8.47	5.62

*Source:* (i) *Handbook of Statistics on the Indian Economy, 2006-07, RBI, pg 51-63.*  
(ii) *Karnataka Study Report, 2008, pg. 22.* (iii) *Haryana Study Report, 2008, pg.11*  
\*: For the period 1996-97 to 2003-04.

18. Greater investment in R&D need to be encouraged to evolve disease/pest resistant varieties, adoption of water management and improved farm practices by the farmers to enhance and stabilize the cane productivity.

## **B. Economics of Sugarcane Cultivation in Selected States**

19. The economics of sugarcane cultivation in the selected states (Uttar Pradesh, Haryana and Karnataka) varied substantially, depending upon its agro-climatic conditions, nature of crop (planted or ratoon), variety grown, input use, etc. Being a water-intensive crop, availability of adequate water was a crucial factor, which was determined by the amount of rainfall received

and extent of irrigation available. This affected the cost of cultivation. The cost-return analyses of sugarcane cultivation in these three States have been presented in Table 6.

**Table 6: Economics of Sugarcane Cultivation**

Particulars / Crop Type	Uttar Pradesh		Haryana		Karnataka	
	Planted	Ratoon	Planted	Ratoon	Planted	Ratoon
<b>1. Cost of cultivation (Rs./ha.)</b>						
1.1. Seeds	8075.37	0.00	11485.50	0.00	10977.79	1270.22
1.2. Fertilizers	4499.75	5149.85	8274.50	7163.00	13637.02	12676.11
1.3. FYM	1494.47	0.00			11607.22	7245.05
1.4. Irrigation	2495.66	3393.90	2964.00	3087.50	54.20	0.00
1.5. Hired Labour	3683.14	1312.61	19513.00	23465.00	15872.24	14672.99
1.6. Cost A1	35664.16	24295.17	52652.99	44966.35	-	-
1.7. Cost A2	35664.16*	24295.17*	56357.99	48609.60	81355.16	59706.82
<b>1.8. Total Cost (A2+FL)</b>	<b>56417.37</b>	<b>45906.53</b>	<b>61174.49</b>	<b>54661.10</b>	<b>84078.97</b>	<b>65304.87</b>
2. Yield (Qtl./ha.)	572.64	600.21	602.68	518.70	994.67	1030.98
3. Price realised (Rs./qtl)	102.05	102.05	111.00	111.00	113.32	113.32
4. Value of Output (Rs.)	58438.40	61251.43	66897.48	57575.70	112717.88	116832.49
5. O/P value at farm gate [4- marketing cost] (Rs.)	52939.54+	54570.48+	59858.18	51584.72	102058.40#	105953.79#
<b>6. Net Returns (Rs./ha.)</b>						
6.1. Over cost A1 (5-1.6)	17275.38	30275.31	7205.19	6618.37	102058.40@	105953.79@
6.2. Over cost A2 (5-1.7)	17275.38	30275.31	3500.19	2975.12	20703.24	46246.98
<b>6.3. Over Total Cost (5-1.8)</b>	<b>-3477.83</b>	<b>866.94</b>	<b>-1316.31</b>	<b>-3076.39</b>	<b>17979.42**</b>	<b>40648.92**</b>

Cost and income calculations @ 1ha.=2.47 acres.

1 Tonne / MT= 10 quintals (qtl).

FL: Imputed value of family labour.

Cost A1 includes paid-out cost on all inputs.

Cost A2: Cost A1 + Rent on leased-in land.

FYM: Farm Yard Manure.

\*: No cost incurred on leased-in land in UP.

+: Harvesting & transportation cost considered.

#: Cost of harvesting & transportation charges not included as they were borne by the farmers in Mandya district while the same were borne by sugar mills in Belgaum district of Karnataka.

\*\* : Above normal rainfall received by the sample districts during the reference year (2005-06).

@: CACP data also showed that the ratio of returns to cost of cultivation was 1.40 at all-India level as against 1.21 observed in Karnataka for planted crops and 1.62 for ratoon crops.

Source: NABARD's Commodity Specific Study Reports of Uttar Pradesh, Haryana & Karnataka, 2008.

20. The cost of cultivation without accounting for family labour ranged between Rs.35,664/ha. (Uttar Pradesh) and Rs.81,355/ha. (Karnataka) for planted crop and between Rs.24,295/ha. (Uttar Pradesh) and Rs.59,707/ha. (Karnataka) for ratoon crop. **If only the paid-up costs are considered, then the returns realised for both planted and ratoon crops are positive.** However, **after accounting for imputed value of family labour**, the cost increased by an average of 8 per cent for both types in Haryana and Karnataka, while in Uttar Pradesh an average increase of 75 per cent was observed. **Sugarcane cultivation** in this case turned out to be

**unviable.** In both situations, the cost of cultivation of ratoon crop was lower than the planted crop owing to lesser expenditure on inputs.

21. The returns, based on the analysis, reveal that sugarcane does not work out to be a profitable venture, especially in Haryana (both crops) and Uttar Pradesh (planted), particularly when family labour was accounted for. Across the states, cost of hired labour, especially in Haryana made substantial difference to the cost of sugarcane cultivation. As per CACP, value of by-products constituted 4 per cent of the gross value of sugarcane. Further, in Uttar Pradesh, labourers harvested the produce in return to the fodder portion of the crop. The farmers sell the sugarcane mainly to the sugar mills at the State advised price although sugarcane can be sold to the private crushers for production of gur. However, price available from this source is not guaranteed. The returns were however, quite high in the case of Karnataka. The reasons for such variations have been discussed in Table 7.

22. By and large, sugarcane production was not an economic proposition if all the costs were accounted for. Relatively better returns in Karnataka were due to above normal rainfall and high variability in area, production and yield has to be kept in view while interpreting the results.

### **C. Economics of Sugar Production in Selected States**

23. The state of sugar processing industry in the country too is not encouraging. The results of the analysis (Table 8) clearly indicate that solo processing of sugar does not work out to be a viable proposition for the sugar mills as the net returns range from negligible (Uttar Pradesh) to negative (Karnataka). Capacity utilization of sugar factories in Karnataka was 146, 77 and 71 per cent during 2002-03, 2003-04 and 2004-05 as the sugar production varied from 18.68 lakh tones during 2002-03 to 10.40 lakh tones during 2004-05<sup>9</sup>.

24. At present, the sugar mills **operate on an average for 148 days**. This was happening because of an increase in number of units and capacities<sup>10</sup>. Deceleration and variability in area

<sup>9</sup> Karnataka Report, 2008, Pg. 114.

<sup>10</sup> Installed capacity of sugar mills at all-India level increased at compound annual growth rate of 3.3% between 2000 and 2005, whereas the capacity utilisation declined from 112% in 2000 to 105% in 2002 and increased to 115% in 2003 but declined substantially to 72% and 67 % in 2004 and 2005, respectively, - Report of the Working Group on Agricultural Marketing Infrastructure and Policy Required for Internal and External Trade for the XI Five Year Plan 2007-12, Agricultural Division, Planning Commission, GoI, January 2007, pg. 30.

under sugarcane adversely affected the working period of the sugar mills. Further, to enable minimum capacity utilisation by the mills, the radial distance between sugar mills should be increased from 15 km to 25 km<sup>11</sup>.

**Table 7: Variations in Returns over Cost- Reasons**

State/s	Study Observation/s
Haryana	<ul style="list-style-type: none"> <li>▪ Availability of canal water was not timely and uniform. Farmers had to resort to tube well irrigation thus inflating production cost.</li> <li>▪ Farmers sourcing seeds from other farmers/sugar mills reported poor quality &amp; low cane production.</li> <li>▪ Leasing-in of land practised in all farm categories- small, marginal &amp; large &amp; increased production cost.</li> <li>▪ Over usage of urea &amp; under usage of super phosphate contrary to the prescribed amounts.</li> <li>▪ For both planted &amp; ratoon crops, farmers recovered only the cost of cultivation &amp; family labour was not rewarded.</li> <li>▪ Intercropping with wheat yielded net return upto Rs.1724 (including family labour).</li> <li>▪ Bank loan constituted 48% of cost of cultivation if imputed value of family labour is considered and 53% if family labour is excluded.</li> </ul>
Uttar Pradesh	<ul style="list-style-type: none"> <li>▪ Expenses on pesticides &amp; chemicals were not high during reference year as it was a normal year.</li> <li>▪ More area under sugarcane &amp; better price realisation by farmers in western UP due to presence of more pvt sugar mills with higher crushing capacities.</li> <li>▪ Harvesting cost lower in Azamgarh as labourers harvested crop in return for fodder portion of the cane.</li> <li>▪ Prices realised by farmers, generally below SAP owing to, (i) diversion of cane to gur/khandsari units; (ii) irregularities in distribution of cane cutting orders by mills / diversion of cutting orders of SF to large farmers, especially in the case of co-op mills &amp; societies.</li> <li>▪ Use of non-listed varieties having higher yield but low recovery adversely affected the returns from sugar production.</li> </ul>
Karnataka	<ul style="list-style-type: none"> <li>▪ Rainfall during reference year was above normal (by 28% in Belgaum &amp; 63% in Mandya). Resultantly water availability for irrigation was quite adequate.</li> <li>▪ Black cotton soil with suitable drainage facilities helped in high sugar recovery (11.54% in Belgaum).</li> <li>▪ Lower cost of production in case of ratoon crop was due to lower level of input use.</li> <li>▪ Harvesting and transportation charges to the mill were borne by the mill in Belgaum.</li> <li>▪ Bank loans to sugarcane growers constituted only 1/3<sup>rd</sup> of the cost of cultivation.</li> </ul>

<sup>11</sup> Reports of The Commission for Agricultural Costs and Prices for the Crops Sown during 2007-2008 Season, Department of Agriculture and Cooperation, Ministry of Agriculture, GoI, pg. 10.

**Table 8: Economics of Sugar Production**

<b>Particulars</b>	<b>Karnataka</b>	<b>Haryana</b>	<b>Uttar Pradesh</b>
A. Crushing capacity (TCD)	4,519.22	9,911.88	4,629.98
B. Average days of working (No.)	132 <sup>+</sup>	150	146
C. Average sugarcane crushed ('000 MT)	596.54	1,482.02 <sup>#</sup>	674.03 <sup>#</sup>
D. Sugar Recovery (%)	11.7	10.4	9.3
E. Sugar Production ('000 MT)	69.55	1672	349.02
F. Price of sugar realised (Rs./qtl)	1,623 <sup>*</sup>		1,935
G. Income from by- products (Rs./qtl)	76		
<b>H. Total Income [F+G] (Rs./qtl)</b>	<b>1,699</b>	<b>1,855.23</b>	<b>1,935<sup>**</sup></b>
I. Cost of sugar production (Rs./qtl)	1,725	1,703.83	1,928.90
<b>J. Net Income Realised [H-I] (Rs./qtl)</b>	<b>(-) 26</b>	<b>151.40</b>	<b>6.10</b>
K. Financial Rate of Return (%)	Negative		

*TCD: Tonnes crushed daily. #: Worked out using the formula= working days % crushing capacity.*

*\*: Actual price realisation may be lower because of accumulation of sugar stock at factory level as 38 to 69 per cent of sugar produced was not sold but for analysis purpose average price realized was taken in the study. Further, the study has indicated falling trend in free sugar prices which is an area of concern.*

*+: Karnataka Report, 2008, pg.43.*

*\*\* : Worked out assuming price retail sugar @ Rs.20/kg. Income from sale of by-products not considered.*

**Source:** NABARD's Commodity Specific Study Reports of Uttar Pradesh, Haryana & Karnataka, 2008.

25. A look at the existing sugar marketing and procurement mechanism will probably help us to understand the dismal situation of sugar mills in the country. Some have been discussed below.

- a. Marketing of sugar like sugarcane is highly controlled and subject to government restrictions. No producer/ importer/ exporter of sugar can sell/ dispose of/ deliver any kind of sugar except under and in accordance with the direction issued by the Government.
- b. The profitability of sugar mills is affected by the ratio of free sale quota to levy quota. Though this ratio has been considerably reduced to 10:90, the sale of free sugar is subject to monthly release system.
- c. Sugarcane alone accounts for 60 per cent of the cost of sugar production. Though the Central Government fixes the Statutory Minimum Price (SMP) for sugarcane, the mills have to procure sugarcane at State Advice Prices (SAPs) fixed by the State governments. As the SAPs are invariably higher than the SMP, it affects the viability of processing.
- d. There is a visible difference in the plant size and operational efficiency of the mills in the private and the co-operative sector. For example, the co-operative mill at Sathion,

Azamgarh (UP) has reached junk level<sup>12</sup>. Similarly, the co-operative mill at Kaithal (Haryana) had high production cost owing to a very limited period of operation (56 days) and low volume of cane purchased and crushed. *Au contraire*, the private mills were comparatively more efficient and had lower operational costs<sup>13</sup>.

- e. To achieve operational efficiency, availability of sugarcane is required throughout the season and requires proper management of raw material. It is however, difficult to ensure owing to farmers harvesting more than the quantity ordered to clear their fields or diverting cane to gur/khandsari units.

26. **The studies observed that sugar processing, as a solo activity did not work out to be a very profitable activity for the sugar mills.** This was owing to factors such as, cost of procuring sugarcane (at SAP in most states), conversion cost of sugar, restricted release of sugar, etc. The profitability of the mills was further affected by restricted opportunities for diversification. Two areas of diversification that can be seriously considered towards improving the financial situation of the mills are ethanol production and co-generation. Further, **delayed payments by sugar mills and fall in crude oil prices may reduce the incentive to plant sugarcane and may compound the problem of viability of sugar mills.**

### ***Ethanol Production***

27. Though produced from both cane and corn, sugarcane is the most efficient source of ethanol production owing to very high yields (approx 7,000 litres per ha.). Ethanol is also an efficient bio-fuel and has witnessed increasing demand over the last few years owing to spiralling prices of petrol & diesel. While use of pure ethanol as fuel requires specially designed/ modified engines, ethanol blended petrol (EBP) do not have any such requirements. Till date, Brazil is the largest producer and consumer of ethanol. Diversification into ethanol production would allow Indian sugar mills to earn a steady income irrespective of the fluctuations in sugar prices. However, except for Brazil, no other major ethanol producer has been able to produce ethanol at

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<sup>12</sup> UP is planning to privatise / completely sell-off 33 state-owned sugar mills in an effort to reduce the burden of the loss-making units. All the 33 mills are owned by the UP State Sugar Co-operation Ltd.; *The Financial Express*, January 15, 2009, pg. III.

<sup>13</sup> Yamunanagar Sugar Mill in Haryana is a private mill with 150 crushing days, lowest production cost (Rs.1527/qttl) and highest net returns (Rs.339/qttl) vis-à-vis Kurukshetra and Kaithal Co-operative Mills, respectively. *Haryana Report 2008*, pg. 26. Average cost of sugar production of co-operative mills in Uttar Pradesh was higher (Rs.1,834 to Rs.1,929/quintal) than the private mills (Rs.1,624/quintal); *Uttar Pradesh Report, 2008*, pg 47.

competitive prices compared to gasoline without some form of subvention. **Ethanol could be competitive without subsidies if crude oil prices exceed US\$ 60 per barrel<sup>14</sup>**. Currently, the prices of crude oil have declined from more than \$100/barrel to less than \$40 dollars/barrel. This has affected the process of diversion of sugarcane for ethanol production, which can also affect the price of sugar in international markets.

### ***Bagasse-based Co-generation***

28. The principal fuel utilised by sugar mills to generate steam is bagasse (fibrous waste left over after recovery of sugar juice). One tonne of sugarcane produces approximately 33 kg of bagasse<sup>15</sup>. As only 20-30% of bagasse is required to meet the steam and power requirements, the remaining is wasted<sup>16</sup>. The mills can therefore, consider utilising the bagasse left after meeting their internal energy requirements, for co-generation purposes. This would also open up an additional income stream for the mills. Sugar mill co-generation is advantageous as it would entail low capital & near zero-fuel costs, use of indigenous ‘non-polluting’ fuel, improving viability & fuel efficiency and minimal transmission & distribution costs. Indian sugar mills have the potential of generating about 4000 MW power through co-generation. Technical & viability estimates suggest that mills with capacity of at least 1200 TCD based on annual crushing season of 180 days of cane can diversify into co-generation. A total of 47 mills with capacity of 723.86 MW power generation have been brought on the Power Purchase Agreement (PPA) list. However, the growth potential is constrained because of (i) low up-take in co-operative mills (constitute 56% of installed capacity in the country), (ii) high interest cost of capital from banking and non-banking financial institutions and (iii) poor financial position of mills. Further, low/ non-existent buyback rates acts as a dampener for mills in providing electricity to the grid.

## **Section IV Domestic Marketing and Trade Competitiveness of Sugar**

29. *Sugar falls within the purview of essential commodities and therefore, involves controlled and monitored pricing.* The Indian domestic sugar market is one of the largest markets in the world in volume terms and therefore, the demand for the domestic and not the international market drives sugar production in India. Being an essential commodity, the production and

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<sup>14</sup>Haryana Report, 2008, pgs 30-31.

<sup>15</sup>Ibid.

<sup>16</sup>Ibid.

marketing of sugar is regulated under the Essential Commodities Act. Thus, the release of sugar for domestic market as well as export is governed by monthly release quotas of the mills. While, during the liberalisation period, the share of levy sugar<sup>17</sup> has consistently been decreased, owing to the quotas, the mills are not yet able to sell/export their entire stock. As a result, mills store sugar stocks for long period of time, which in turn adversely affects its quality and thereby the price realised. The CACP, also recommended that the Government should (i) review the functioning of release mechanism so as to bring transparency and efficiency and (ii) allow the market to determine sugar prices so as to ensure a good return to the industry as well as a remunerative price to the farmers.

30. The trends in sugar exports<sup>18</sup> also reveal a fluctuating share in agriculture exports (Table 9). The coefficient of variation reveals a variability of 78.4 per cent in the case of sugar exports *vis-à-vis* exports of agriculture and allied products. This is primarily owing to the fact that marketing of sugar continues to be highly regulated.

**Table 9: Trends in Sugar Exports**

Particulars	(Rs. crore)						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07 <sup>P</sup>
Sugar & Mollases	505.1	1781.9	1814.5	1236	155.1	597.9	3184.7
Agri & Allied Products	27288.2	28144	32473.3	34615.7	38078.1	45220.1	56628
Share of sugar in agri exports (%)	1.9	6.3	5.6	3.6	0.4	1.3	5.6

**Source:** Handbook of Statistics on the Indian Economy, 2006-07, RBI, pg 210.

P: Provisional

31. As indicated in the first paragraph, India is the only country in the world to produce 'plantation white' sugar while other countries produce either raw or refined sugar or both. Sugar processing units are not equipped for producing refined sugar (phospho flotation) or for processing of raw sugar, and therefore import of raw sugar and processing the same and ensuring operations of the unit throughout the year becomes infeasible. At present mills can import raw

<sup>17</sup> Refers to the quantity procured by the government at levy prices. Fixed at 10% of the total sugar production of the mill since 2002.

<sup>18</sup> Exports of sugar and molasses during 2002-2005 were to the tune of Rs.1814 crore, Rs.1236 crore, Rs.155 crore and Rs.384 crore - Report of the Working Group on Agricultural Marketing Infrastructure and Policy Required for Internal and External Trade for the XI Five Year Plan 2007-12, Agricultural Division, Planning Commission, GoI, January 2007, pg. 215.

sugar at zero duty against advance licenses only if they reprocess it into white (refined) sugar for exports within 24 months of the license being issued<sup>19</sup>.

32. The study conducted by Dr. Bhalla<sup>20</sup> also indicated that India did not have advantage in sugarcane cultivation or sugar production at current domestic and international prices. Similar views have also been expressed by the 'Commission for Agricultural Costs and Prices', as India continues to be an *ad hoc* exporter of sugar<sup>21</sup>. This was owing to the lack of alignment between sugarcane and sugar prices<sup>22</sup>. It leads to cane payment arrears and induces cyclicity, which causes to destabilise the revenues of the sector. Over the last decade, on an average, mills have struggled to generate return on invested capital over and above their cost of capital, owing to high mandated cane prices (constitute nearly 63% of the cost) and volatile sugar prices<sup>23</sup>.

33. The Haryana study has indicated that during 2001, international price of sugar was just 62 per cent of cost of sugar production and thus made it uncompetitive in the international market. (*Haryana report, 2008, Pg.56*). The study by IIM during 2001 also indicated that sugar industry was not export competitive due to higher than the statutory minimum prices paid to the farmers. As per the details available, exports, imports and export price of sugar have varied substantially (Table 10) and in fact, in nominal terms, the export price/quintal has declined between 2001 and 2005. As per the policy in vogue, importers can purchase duty free sugar if they sell the entire quantity abroad after processing and are not permitted to sell the volume locally

34. The country's export competitiveness is further affected owing to the inefficiency in production of the sugar mills in terms of capacity utilisation, technology available and maintenance. Most of the sugar mills that happen to be in the co-operative sector are under utilised and almost reaching a state of junk (e.g: Sathion Co-operative Sugar Mill in Uttar Pradesh), thus leading to considerable increase in cost of sugar production.

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<sup>19</sup> *Business Line, 13 January 2009.*

<sup>20</sup> *Globalisation and Indian Agriculture, 'State of the Indian Farmer', Vol.19, Ministry of Agriculture, GoI.*

<sup>21</sup> *Reports of The Commission for Agricultural Costs and Prices for the Crops Sown during 2007-2008 Season, Department of Agriculture and Cooperation, Ministry of Agriculture, GoI, pg. 6.*

<sup>22</sup> *KPMG Analysis, 2007.*

<sup>23</sup> *Ibid.*

**Table 10: Price of Sugar in International Market**

(Rs. crore)

Year	Exports	Imports	Export Price/Quintal
2000-01	431	31	1272
2001-02	1728	33	1187
2002-03	1769	33	1064
2003-04	1217	63	1013
2004-05 <sup>@</sup>	67	255	1098

*Source: Karnataka Report, 2008, page 115.*

*@: Price of sugar in international market improved from an index of 100 in 2004, to 138 in 2005 and to 206 in 2006. However, it declined to 141 in 2007 but again improved to 189 in 2008. (RBI Bulletin, November 2008, pg. 1040)*

35. However, Karnataka study (Pg. 81) has brought out that during 2006, one of the sugar mills exported sugar and realized Rs.1810/ quintal as against domestic price realisation of Rs.1,743/quintal. Similarly, XI Plan's working group on "Agriculture, Marketing Infrastructure and Policy required for Internal and External Trade" indicated that sugar price realization during 2005-06 was better than 2002-03 as unit value was 17.58 during 2005-06 as against 11.51 during 2002-03. However, a caution has been added in the report that global prices of agricultural products are highly volatile (Pg. 218).

36. With respect to sugar imports, it is proposed to ease out the 'grain-to-grain' norm, so that the re-processed white sugar can be sold in the domestic market first. The re-export obligation – 1MT of white sugar for every 1.05 MT of raw imported – can be met separately on a 'tonne-to-tonne' basis. These could involve processing domestically sourced cane rather than the originally imported raw. Further, deferment of existing white sugar re-export obligations (against past advance licenses) has also been provided till end-December. Effectively, it means mills will not be allowed to discharge their outstanding export obligations under the advance license scheme, estimated now at around 7 lakh MT. The whole emphasis is on conserving whatever sugar is available, by liberalising imports and bottling up exports<sup>24</sup>.

37. **But how viable are raw sugar imports?** Currently, the March No. 11 contract at the New York Intercontinental Exchange is quoting at about 12 cents/pound or \$265/tonne. Adding

<sup>24</sup> *The government's decision comes in the wake of domestic shortage and hardening prices of sugar. With output for 2008-09 (October-September) variously estimated at 180-190 MT, along with opening stocks of 80-100 MT and consumption of 230 MT, the current season is expected to close with 30-60 MT, which will barely meet 2-3 months' domestic requirement. It is this shortage perception that has led to a firming of spot sugar prices by about Rs.1,500/MT over the last one month alone. And, it is also driving the Government's proposed move to permit duty-free raw sugar imports on a 'tonne-to-tonne' basis till the end of this season and restrict exports to the extent possible. Source: Business Line, 13 January 2009.*

freight of \$30/ tonne from Brazil would take the landed cost at Indian ports to roughly \$295 (Rs.14,340/MT). If one also factors in the costs at the port (Rs.750-1,000, inclusive of bagging), transport to factory (Rs.500-1,000 depending upon location) and conversion (Rs.1,500-2,000 depending on whether in-house baggase or costlier coal is used as fuel), **the effective mill-gate price of the processed white sugar would be well above Rs.17,000/MT**. This is **less than the Rs.17,900-18,000/ tonne ex-factory price in Maharashtra**. But then, any large-scale imports by India may drive up world prices as well, thereby changing the equation. As of now, it looks as though imports would be viable only for coast-based factories and refineries, especially those catering to the deficit Kolkata and eastern region markets<sup>25</sup>.

**38. Thus the issue of export competitiveness and import of raw sugar needs further analysis for taking policy decisions.**

## **Section V            Policy Issues**

39. Sugarcane constitutes an important commercial crop accounting for 4.83 million ha. and production of 345.31 million tonnes during 2006-07<sup>26</sup>. India also happens to be one of the largest producers and consumers of sugar. However, both sugarcane cultivation and sugar production revealed unviability in their operations. Further, the analysis of ratios between returns and cost of cultivation (representing paid-out cost only) of sugarcane between 2001-02 and 2007-08 showed substantial variability, as it was 1.35, 0.91, 1.15, 1.15, 1.39, 1.98 and 2.32 during the past seven years. To enable growth and development of the sugar industry in the long-run, the following proposals may be considered.

- Greater investment in research and development for improved seed varieties, adoption of water management practices, improved farm practices including ratoon crop management to improve productivity in terms of yield and sucrose content/recovery.
- Conflict between cane prices (SMP & SAP) need to be sorted out and a consensus needs to be arrived at between the Centre and the States, such that the prices are remunerative for the farmers but not restrictive for the millers. If necessary, the difference between the SMP and SAP can be subsidised by the Government.

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<sup>25</sup> *Ibid.*

<sup>26</sup> *Handbook of Statistics on the Indian Economy, 2006-07, RBI, pg 51-53.*

- Regulations with respect to sugar exports need to be made less stringent. Exports need to be allowed in situation of sugar surplus and imports of raw sugar allowed in case of deficits to help bridge the supply gap. However, **the latter requires changes in technology to be adopted by the sugar mills**, as some of the mills in operation are not equipped to make refined sugar.
- The monthly release mechanism needs to be removed and levy sugar (10%) should be discontinued as 3/4<sup>th</sup> of total sugar production is consumed by industrial and business segments and high income households<sup>27</sup>. The processing of molasses and bagasse can generate additional revenue of 17 per cent. This may, however, call for substantial credit support for diversification of activities.
- At present, the sugar mills **operate on an average for 148 days** (Table 8). This was happening because of an increase in number of units and capacities<sup>28</sup>. Deceleration and variability in area under sugarcane adversely affected the working period of the sugar mills. Further, to enable minimum capacity utilisation by the mills, the radial distance between sugar mills should be increased from 15 km to 25 km<sup>29</sup>.
- Delayed prices by sugar mills and fall in crude prices are likely to reduce the acreage under sugarcane. During 2008-09, area under sugarcane has declined by 17 per cent. Further, no significant increase in sugarcane prices for past couple of years has adversely affected area under the crop. The issue is getting compounded owing to fall in crude prices. The latter has discouraged use of sugarcane for bio-fuels.
- Cyclicity management<sup>30</sup> practices may be put in place. This will provide opportunities to minimise arrears and reducing need for governmental support. Government/s can create strategic stocks of sugar. Not only will it aid in maintaining a buffer, it would also help in reducing glut. This would also enable in addressing the variability in sugar prices and better price recovery

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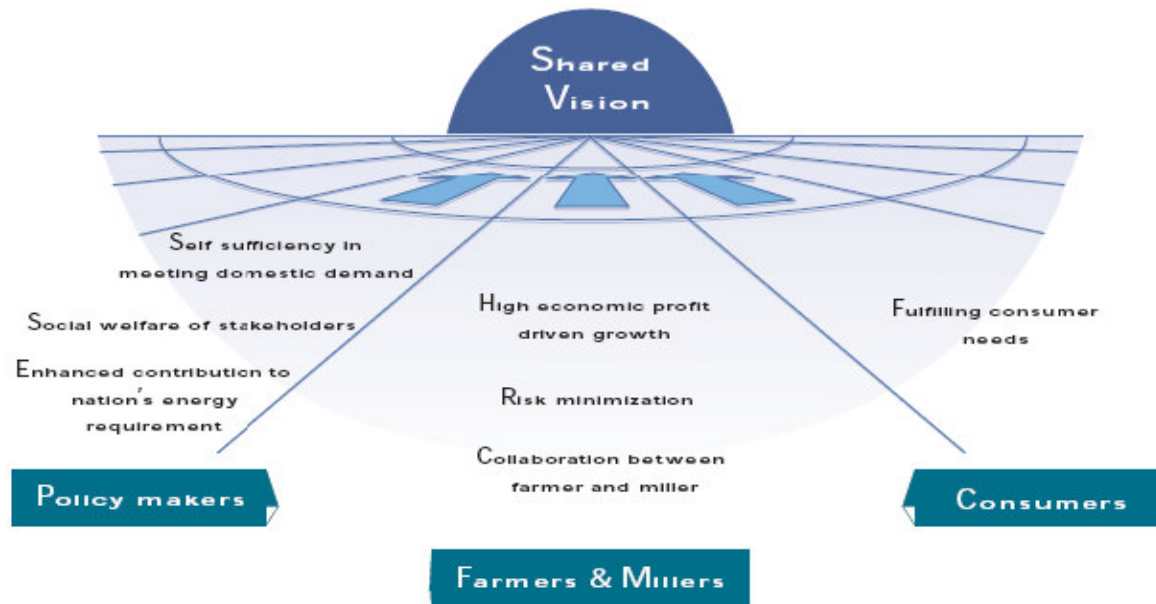
<sup>27</sup> KPMG Analysis, 2007.

<sup>28</sup> Installed capacity of sugar mills at all-India level increased at compound annual growth rate of 3.3% between 2000 and 2005, whereas the capacity utilisation declined from 112% in 2000 to 105% in 2002 and increased to 115% in 2003 but declined substantially to 72% and 67 % in 2004 and 2005, respectively, - Report of the Working Group on Agricultural Marketing Infrastructure and Policy Required for Internal and External Trade for the XI Five Year Plan 2007-12, Agricultural Division, Planning Commission, GoI, January 2007, pg. 30.

<sup>29</sup> Reports of The Commission for Agricultural Costs and Prices for the Crops Sown during 2007-2008 Season, Department of Agriculture and Cooperation, Ministry of Agriculture, GoI, pg. 10.

<sup>30</sup> Cyclicity management refers to cane and sugar price alignment.

40. Of **prime importance**, however, is **improving cane productivity and sugar recovery**. In absence of improvement in farm practices, sugarcane cultivation may have horizontal growth at the expense of other crops. We therefore, need to work towards a developmental model that would enable a positive effect on the various stakeholders, be it the cultivators, the millers, the consumers or the policy makers (diagram)<sup>31</sup>.



## Conclusion

41. To address the issues discussed above, adequate financial and credit support would be mandated. The sugar industry would require overhauling, in terms of upgrading technology, putting in place cyclicity management practices<sup>32</sup>, marketing, etc., and would require access to cheap funds. This is truer in the case of co-operative mills. Private mills have better access to cheaper source of funds (from the market), viz., IPO/ECB/Right Issue, etc., unlike the co-operative mills. This would therefore, require necessary amendments by the Government in the Co-operative Act to enable co-operative mills to be eligible for and have access to cheaper investible funds in the market.

<sup>31</sup> Diagram source: KPMG Analysis, 2007.

<sup>32</sup> Cyclicity management refers to cane and sugar price alignment.

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