

RESEARCH ARTICLE

Economic appraisal of a co-operative mill and a private sugar mill in Punjab - a comparative study

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Abstract

The present study was conducted in Amritsar district of Punjab with the objectives to examine the physical and financial performance of sugar industry in cooperative vis-a-vis private sector. Secondary data were collected from selected sugar mills and Punjab State Federation Cooperative sugar Mills from 2012-13 to 2021-22. Relative comparison on the physical performance of the two sugar mills i.e Ajnala co-operative sugar mill and Rana sugar mill were made in respect of four parameters viz total sugar crushed, sugar recovery, total sugar production and total molasses produced. It was observed that for both the mills, rate of growth was significant for all four physical parameters but average sugarcane crushed, recovery percentage, sugar production and molasses production was much higher for privately owned Rana sugar mill in comparison to Ajnala cooperative sugar mill for the study period. Except for total sugarcane crushed, the extent of instability in the other three parameters of physical performance was large for Rana Sugar mill vis a vis Ajnala cooperative sugar mill. Moreover, the different types of profit margin ratios for the Ajnala cooperative sugar mill were negative, whereas such ratios for the Rana Sugar mill were positive. The physical and financial parameters of co-operative and private sugar mills clearly indicated the fact that private sugar mill is performing better than cooperative sugar mill. The average cane crushed for Rana Sugar Mill was 187.85 lakh qtl while for Ajnala cooperative sugar mill it was 19.70 lakh quintal. It was due to higher mill capacity, longer duration of crushing and more cane availability with Rana Sugar mill. To increase crushing capacity of the co-operative mills timely payment to cane farmers should be made and latest machinery in sugar mills should be used. Recovery of sugar was only 8.38 per cent for Ajnala co-operative mill whereas it was 10.29 per cent for Rana sugar mill. It should be increased on the line with private sugar mill through upgradation of technology in cooperative sugar mills.

Keywords: Growth rate; Instability; Financial performance; Punjab

Introduction

Sugar Industry is the second largest agro-based industry next to cotton in India. The industry plays a vital role in the rural economy of India and also is a potential source of renewable energy. The industry is supporting over 6 million farmers and their families. It consists of more than 550 operational sugar mills which are under different ownership and management structure. During the

last two decades, the average annual growth of sugarcane sector was about 2.6 per cent as against overall growth of 3 per cent in agriculture sector in the country. The contribution of sugarcane to the national GDP is 1.1 percent which is significant considering that the crop is grown only in 2.57 percent of the gross cropped area (Solomon 2016). Sugarcane is the backbone of farming community providing employment opportunities to large number of people (Rahman and Bee, 2019).

Sugarcane is flexible crop which is sufficient source of food, fiber, fodder and energy. Products wise and co-products wise, sugarcane has played an important role in the taste of human being as well as in the economy (Krishnakant *et al.*, 2015). There has been sharp dip in the area under sugarcane during the period 2001-02 to 2010-11 but there has been a slow and steady increase in the area from 0.80 lakh ha in 2011-12 to 0.89 lakh ha in 2020-21 (GoP, 2021).

Presently in Punjab, there are 24 sugar mills in the state out of which 16 are in co-operative sector and 7 are in private sector. Out of 16 sugar mills in co-operative sector only nine co-operative sugar mills namely Ajnala, Batala, Bhogpur, Budhwel, Fazilka, Gurdaspur, Morinda, Nokadar and Nawanshahr are in operation. The remaining six sugar mills situated at Budhlada, Faridkot, Jagraon, Patiala, Tarn Taran and Zira are not operational. Whereas, in private sector there are seven sugar mills and all these are in working condition. (punjabsugarfed.in). The nine functional cooperative sugar mills in the state have a total crushing capacity of 15800 tonnes. In U. P, each mill has crushing capacity of 20,000 to 25,000 tonnes. The low capacity of Punjab sugar mills makes them unviable, so much so that they are they are at times unable to pay to pay even cane costs to farmers. The sugar recovery in these co-operative mills is also much below the standard norms of 8 to 10 per cent whereas private mills give an output of 12 per cent (Nibber, 2017). Keeping in view the above stated facts the present study was conducted in Amritsar district of Punjab with the objectives to examine the physical and financial performance of sugar industry in cooperative vis-a-vis private sector in the state and suggestions if any.

Data sources and methodology

Ajnala co-operative sugar mill from Amritsar district was randomly selected from existing nine

functional co-operative mills in Punjab and Rana sugar mill from private sector was purposively selected from same district for the present comparative study. To study the physical and financial parameters of the two selected mills, secondary data was collected from year 2010-11 to 2021-22. Secondary Data was collected from the selected sugar mills and Punjab state Federation Cooperative Sugar Mills Limited. Physical indicators included total sugarcane crushed, recovery in per cent, sugar production, molasses while financial indicators included Gross profit Margin Ratio, operating profit Margin ratio, Pretax profit margin ratio and Net profit Margin Ratio. The primary and secondary data were analyzed using the statistical tools such as compound annual growth rate (CAGR) and instability analysis.

Compound annual growth analysis

For evaluating the trend in physical and financial parameters of two selected sugar mills exponential form of the growth function was used as follows:

$$Y_t = b_0 b_1^t$$

Where,

Y_t refers to cane crushed/ recovery of sugar etc for the year 't';

b_0 represents the intercept term, indicating the value of Y at the base period ($t=0$);

$$b_1 = (1+r);$$

r stands for the 'average annual compound rate of growth; and

t refers to the point in time.

For the purpose of estimation, the above model was linearized by means of logarithmic transformation:

$$\ln Y_t = \ln b_0 + t(\ln b_1)$$

Subsequently, the compound growth was estimated by using the following equation:

$$\ln b_1 = \ln (1+r)$$

Therefore, $r = (\text{antilog}(\ln b_1) - 1)$

Hence, Annual compound growth rate (ACGR) in % = $(\text{antilog}(\ln b_1) - 1) \times 100$

Instability Analysis

For carrying out instability analysis, coefficient of variation (CV) was computed by adopting the formula

$$CV (\text{in}\%) = 100 \times (SD/\text{Mean})$$

Then, the index of instability (I) due to Cuddy and Della Valle (1978) was obtained as

$$I = CV \times \sqrt{(1 - \text{Adj } R^2)}$$

Relative comparison on the physical performance of the two sugar mills was made through *time series* information from 2010-11 to 2021-22 in respect of *four* parameters of physical performance, viz., Total sugarcane crushed (Lakh Qunitals), sugar

Results and discussion

Physical performance of the selected sugar mills

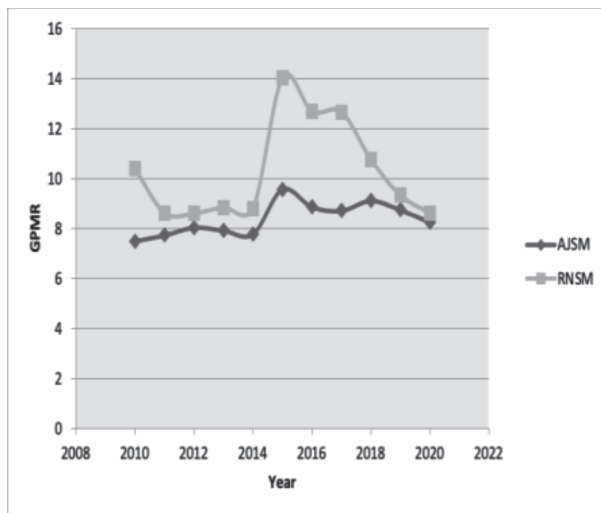
Table 1. Physical performance of the Ajnala co-operative sugar mill Ltd. and Rana sugars Ltd.

Parameter	The Ajnala co-op sugar mills Ltd.				Rana sugars Ltd.			
	Total Sugarcane Crushed (Lakh Qt)	Recovery (%)	Sugar Production (Lakh Qt)	Molasses (Qt)	Total Sugarcane Crushed (Lakh Qt)	Recovery (%)	Sugar Production (Lakh Qt)	Molasses (Qt)
2010-11	6.17	7.5	0.76	28301	134.77	10.38	13.99	708063
2011-12	11.49	7.73	0.89	63910	163.48	8.62	14.1	819680
2012-13	12.75	8.04	1.02	67000	162.08	8.6	13.95	894586
2013-14	16.82	7.92	1.33	88900	169.45	8.84	14.99	837546
2014-15	18.12	7.78	1.41	95000	163.15	8.8	14.38	847310
2015-16	23.42	9.57	2.24	116870	165.5	12.02	23.21	855380
2016-17	26.33	8.86	2.33	139400	158.65	12.67	20.11	962848
2017-18	31.73	8.71	2.76	159730	251.88	12.65	31.87	1290702
2018-19	30.96	9.11	2.82	160100	231.47	10.75	24.9	158960
2019-20	20.42	8.74	1.81	101000	229.92	9.32	21.43	157895
2020-21	18.52	8.25	1.55	91000	236.02	8.61	20.33	162084
Mean value	19.70	8.38	1.72	1,01,019	187.85	10.29	19.38	6,99,550

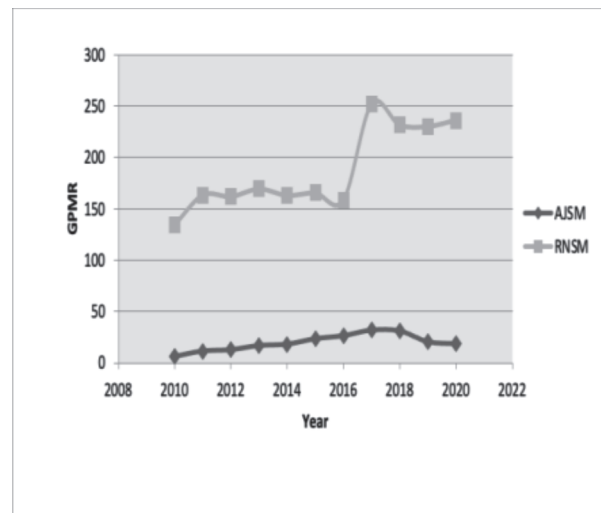
recovery (per cent), total sugar production (Lakh Quintals) and total molasses production (Quintals). Analysis of the data revealed that average total sugarcane crushed, recovery, sugar production and molasses were much higher for Rana Sugar Ltd. than the Ajnala co-op sugar mill Ltd. for the study because of higher crushing coupled with higher sugar recovery (Table 1 and Fig.1). In case of Ajnala co-op sugar mills Ltd, average total sugarcane crushed was 19.70 lakh qtl, recovery was 8.38 per cent, sugar production was 1.72 lakh

qtl, molasses was 1, 10,109 qtl whereas for Rana sugars Ltd average sugarcane crushed were 187.85 lakh qtl, recovery was 10.29 per cent, sugar production was 19.38 and molasses production was 6,99,550 qtl from 2010-11 to 2020-21.

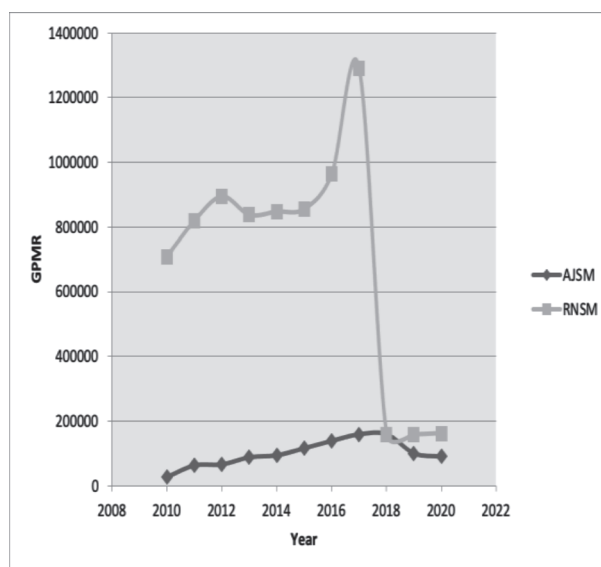
Relative comparison on the financial performance of the two sugar mills in respect of *time series* information from 2012-13 to 2021-22 on four parameters of financial performance, viz., Gross profit margin ratio, operating profit margin ratio, pre-tax profit margin ratio and net profit margin



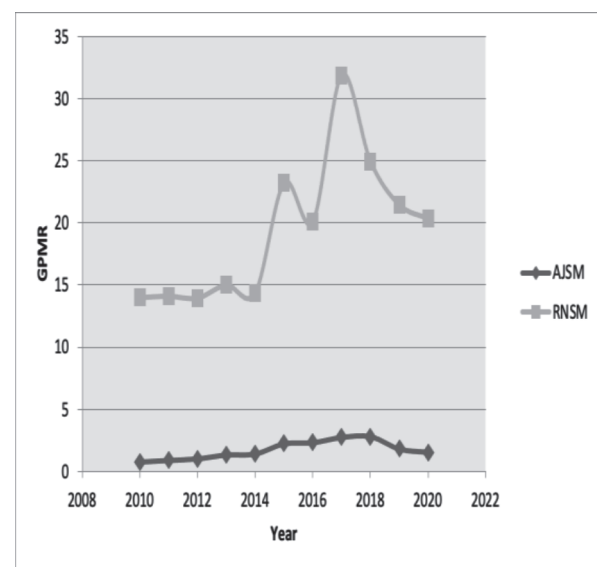
a. Total sugarcane crushed



b. Recovery



c. Sugar production



d. Molasses production

Figure 1. Relative comparison of physical parameters for selected mills in the study period

Financial performance

Table 2. Financial performance of the Ajnala co-operative sugar mill Ltd. and Rana Sugars Ltd.

Parameter	The Ajnala co-operative sugar mill Ltd.				Rana sugars Ltd.			
	Gross profit margin ratio	Operating profit margin ratio	Pre-tax profit margin ratio	Net profit margin ratio	Gross profit margin ratio	Operating profit margin ratio	Pre-tax profit margin ratio	Net profit margin ratio
2012-13	(+)1.70	(-)19.94	(-)19.94	(-)26.22	15.41	12.47	8.44	0.84
2013-14	(-)44.21	(-)63.42	(-)63.42	(-)70.77	12.51	10.47	12.34	-3.7
2014-15	(-)82.23	(-)104.52	(-)104.52	(-)133.86	15.28	12.34	15.62	1.97
2015-16	(-)13.04	(-)28.81	(-)28.81	(-)53.44	6.69	4.65	7.25	-4.14
2016-17	(+)7.19	(-)4.75	(-)4.75	(-)26.77	3.1	0.53	3.75	-8.86
2017-18	(-)35.41	(-)44.21	(-)44.21	(-)66.95	3.21	0.89	3.88	-6.86
2018-19	(-)36.90	(-)47.79	(-)47.79	(-)80.36	6.52	3.83	6.41	20.23
2019-20	(-)14.45	(-)23.07	(-)23.07	(-)52.89	10.71	8.16	10.37	12.9
2020-21	(-)39.79	(-)44.24	(-)44.24	(-)101.96	21.49	10.71	12.69	6.09
2021-22	(-)20.05	(-)30.76	(-)30.76	(-)80.68	19.1	11.13	12.66	3.41

ratio were made (Table 2 and Fig 2). Moreover, the different types of profit margin ratios for the former mill i.e Ajnala co-operative sugar mill were *negative*, whereas respective ratios for the latter mill i.e Rana private sugar Mill were positive. The Gross Profit Margin Ratio is the percentage of revenue that exceeds the cost of producing the product. This ratio was negative for Ajnala Sugar mill whereas it was positive for Rana Sugar mill which highlights the fact that Rana Sugar Mill is successfully earnings profit over its costs in comparison to the Ajnala co-operative mill. Operating profit Margin Ratio is the ratio of operating income to net sales but it does not include taxes or interest expense. This ratio was also negative for Ajnala co-operative sugar Mill and positive for Rana sugars Ltd during the study period. The pre-tax profit margin Ratio is also a financial accounting tool used to measure operating efficiency of the mill before deducting

taxes. This ratio gives information about the percentage of sales turned into sales before tax. It was again negative for Ajnala cooperative sugar mill and positive for Rana Sugars Ltd . Net Profit Margin Ratio measures the percentage of sales revenue a mill earns after covering all its cost including interest and taxes. It is profitability ratio and is used for determining the overall efficiency of the business. This ratio was negative for Ajnala cooperative mill which signifies the fact that overall Ajnala co-operative mill is not working efficiently in the study period. Overall, we may thus infer that on all the four indicators of financial health, Rana sugars Ltd. has significantly outperformed Ajnala co-operative sugar mill. Thus, in conclusion, we may say that Rana sugars Ltd. has performed far better than Ajnala co-operative sugar mill as assessed on both physical and financial parameters.

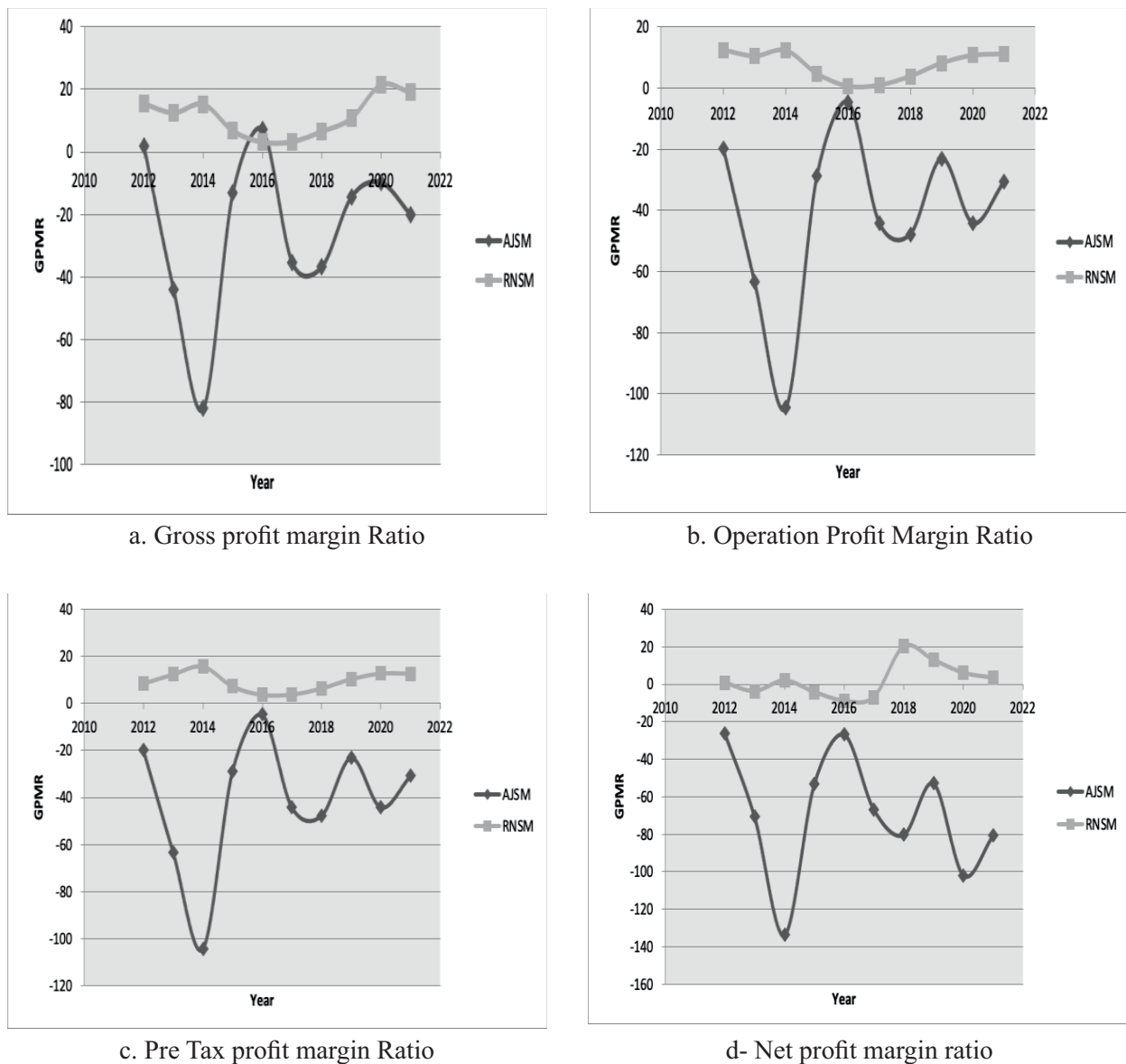


Figure 2 Relative comparison of financial parameters for selected mills in the study period

In order to make a precise estimation of the pace of growth and extent of temporal fluctuations, average annual compound rates of growth as well as the instability index for the four physical parameters in respect of both the mills were worked out. As per the analytical findings, it was observed that for both mills, the rates of growth were significant, although at varying probability levels (Table 3). Recovery in respect of Rana Sugar Mill was the only exceptional case, wherein the rate of growth was non-significant. Except for total

sugarcane crushed, the extent of instability in the other three parameters of physical performance was larger for Rana sugar mill *vis-à-vis* Ajanala co-operative sugar mill. Overall, in all four physical parameters Rana Sugar Ltd performed much better than Ajanala co-op sugar mills Ltd.

A perusal of these figures clearly indicated that on each of the four parameters, there occurred far wider temporal fluctuations in the Ajanala co-operative sugar mill Ltd. *vis-à-vis* Rana sugars Ltd. Moreover, the different types of profit margin ratios

Table 3. Compound annual growth rates and index of instability in the parameters of physical indicators of selected sugar mills

Variable	The Ajnala Co-op Sugar Mills Ltd.		Rana Sugars Ltd.	
	Compound Annual Growth Rate	Index of Instability	Compound Annual Growth Rate	Index of Instability
Total sugarcane crushed	11.63 ^{**}	0.2701	5.61 ^{***}	0.1609
Recovery	1.52 [*]	0.0805	1.03 ^{NS}	0.1862
Total sugar produced	10.94 ^{**}	0.2432	6.69 ^{**}	0.2452
Molasses produced	11.36 [*]	0.3213	-15.21 [*]	0.6914

^{***}Significant at 10 % probability level; ^{**}Significant at 1% probability level;

^{*}Significant at 5% probability level

for the former mill were *negative*, Whereas such ratios for the latter mill were positive, Compound annual compound rates of growth as well as the instability index for the four parameters in respect of both the mills were estimated in Table 4. A glance at these tables reveals that the rates of

growth were, negative in magnitude and were non-significant. Further, the extent of instability in all the four parameters of financial performance was larger for the Ajnala co-operative sugar mill Ltd. *vis-à-vis* Rana sugars Ltd.

Table 4. Compound annual rates of growth and index of instability in the parameters of financial performance of selected sugar mills

Variable	The Ajnala Co-operative Sugar Mill Ltd.		Rana Sugars Ltd.	
	Av.Annual GR	Index of Instability	Av.Annual GR	Index of Instability
Gross Profit Margin Ratio	-356.55 ^{NS}	1.0601	2.39 ^{NS}	0.5702
Operating Profit Margin Ratio	-108.37 ^{NS}	1.2523	-1.8 ^{NS}	1.0471
Pre-Tax Profit Margin Ratio	-108.37 ^{NS}	1.2523	0.89 ^{NS}	0.4651
Net Profit Margin Ratio	-39.66 ^{NS}	0.7165	-58.55 ^{NS}	0.5961

^{NS} non-significant

Conclusion

Compound annual rate of growth was significant for all four physical parameters in case of both selected mills but average sugarcane crushed; recovery percentage, sugar production and molasses production were much higher for Rana sugar mill in comparison to Ajnala co-operative sugar mill for the study period. Except for total sugarcane crushed, the extent of instability in the

other three parameters of physical performance was large for Rana Sugar mill *vis a vis* Ajnala cooperative sugar mill. Moreover, the different types of profit margin ratios for the Ajnala cooperative sugar mill were *negative*, whereas such ratios for the Rana Sugar mill were positive. Compound annual growth rates of financial indicators were negative in magnitude and were non-significant. Further, the extent of instability in all the four parameters of financial performance

was larger for the Ajnala co-operative sugar mill Ltd. *vis-à-vis* Rana sugars Ltd. Overall in all physical and financial parameters Rana sugar Ltd performed better than Ajnala Co-operative sugar mill. The physical and financial parameters of co-operative and private sugar mills clearly indicate the fact that private Sugar mill is performing better than cooperative sugar mill in the study area. The average cane crushed by the private sugar mill (187.85 Lakh qtl) is much higher than cooperative sugar mill (19.70 lakh qtl) which shows that either the crushing capacity of cooperative mill is not optimum or the mill is not procuring sufficient cane from farmers. To increase crushing capacity of the co-operative mills timely payment to cane farmers should be made and technically co-operative mills should be upgraded. Recovery of sugar is only 8.38 percent for Ajnala co-operative mill whereas it was 10.29 percent for Rana sugar mill. It should be increased on the line with private sugar mill through upgradation of technology and growing high sugar varieties in cooperative sugar mills. Out of 16 co-operative sugar mills, six mills are closed and only 9 are in operating condition in the Punjab state. To keep these remaining co-operative mills functional in future, sugarfed should closely monitor the functioning of these sugar mills in the state. The government also provided incentives on producing ethanol from molasses and cane juice to divert the sugar surpluses towards biofuels, thus indirectly supporting sugar prices.

References

- Government of India. 2022. Economic Survey. Ministry of Finance. <https://www.chinimandi.com/mill-quarterly-results/rana-sugar/>;
- Kant K, Tripathi SP, Meena M. 2015. Cost of cultivation of sugarcane crop in Meerut district of Uttar Pradesh. *International journal of Forestry and crop improvement* 6(1):41-48. <https://doi.org/10.15740/HAS/IJFCI/6.1/41-48>.
- Nibber GS. 2017. Revive or privatize: Punjab co-op sugar mills fate not so sweet. *Hindustan Times*, Aug 18. Available from: <https://www.hindustantimes.com/punjab/revive-or-privatise-punjab-co-op-sugar-mills-fate-not-so-sweet/story-xccYj0QcY3h43Pmr5Ry6cL.html>
- Rahman F, Bee N. 2019. Trends and pattern of sugarcane Production in Shahjanpur District, Uttar Pradesh: A Geographical Analysis. *Economic Affairs* 64 (3):537-545. <http://dx.doi.org/10.30954/0424-2513.3.2019.9>.
- Solomon S. 2016. Sugarcane Production and Development of sugar industry in India. *Sugar Tech* 18(1):588-602. <https://doi.org/10.1007/s12355-016-0494-2>.