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REDUCTION IN COST OF PRODUCTION
PERSPECTIVE, OPPORTUNITIES & EVALUATION

by
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Perspective

The term cost of production is basically an economics of sugar industry. However, organizational performance directly relates to its variation. Production cost comprises on 70 - 74% of raw material i.e. (sugar cane) while processing & other expense ranges between 26 – 30 %. Sugar cane support-price decided by Government authorities before start of season every year with reasonable elevation of around 6 – 16% which is conducive - relief for the growers. Conversely, sugar price does not take in to account despite of increasing raw material & processing costs along with tax inclination. (Ref: Price data of sugar cane Vs sugar price). Therefore, sugar a sole commodity having almost same price for last 3 years. Therefore, due to consistent elevation of inputs, manufacturing of cost-effective product is question of moment. In order to assess statistics regarding crushing season 2014 -15 crunch experience to the industry due to variation of sugar cane purchase price amongst provinces which resulted disparity of Rs. 9 in production cost.

Statistics of sugar manufacturing for season 2014-15

LEGEND	SINDH	PUNJAB/KPK	VARIANCE
Sugar Cane Price (40Kg) Rs.	155 (182*)	180	25
Average Recovery %	10.5	9.5	1
Breakeven Cost (Rs.)	47	56	9
Production Share %	34.37	60/5.63**	-

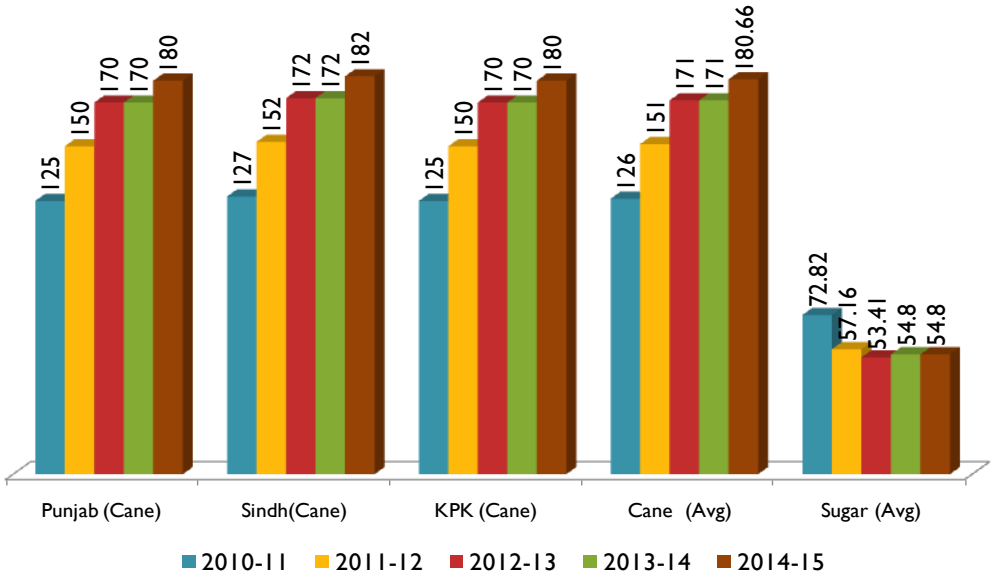
Note: (* identify announced support price) while purchasing cost Rs.155/40Kg. (** Cane + beet)

The statistics reflected breakeven cost having 16 % variance which is much higher between prime producers under the same roof. If we compare from previous data it's remained hardly 1.5 – 2.77 %. Incidentally, South Punjab & Sindh are fortunate territories due to advantageous higher recovery zones. Additionally, keeping in view that Sindh produce an excess sugar from the provincial requirements & cheapest as well for the season 2014-15.

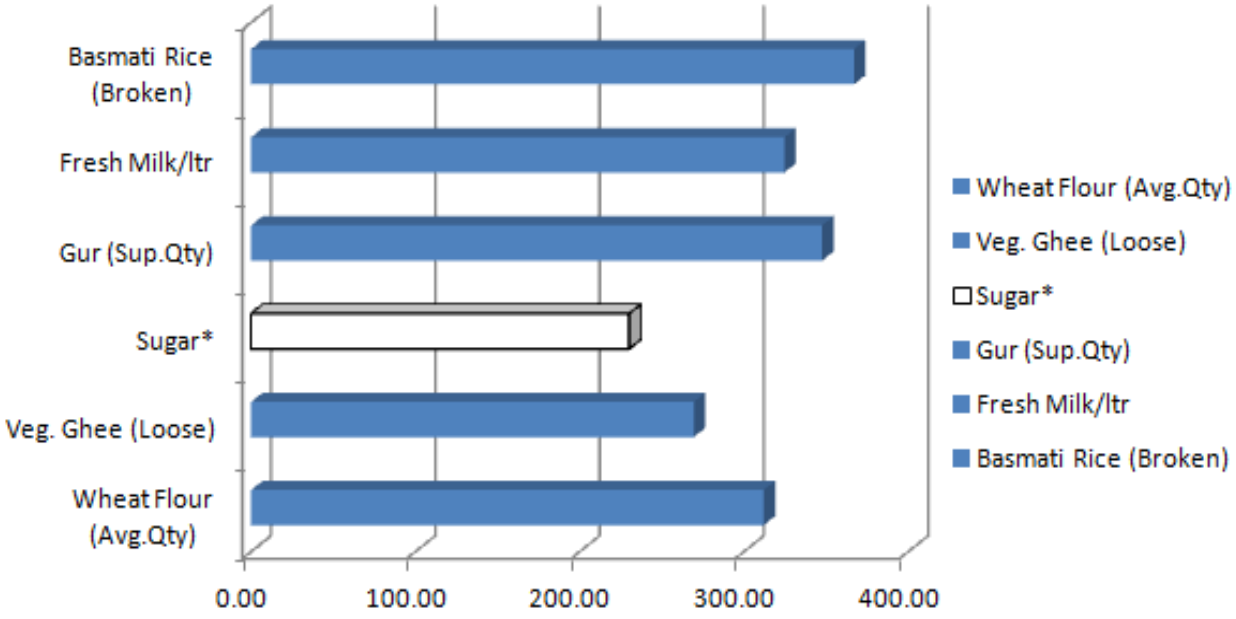
Under circumstances, central Punjab and onward locations are badly suffered due to dual drawback, i.e high purchase price & low recovery. Consequently, meanwhile plants are unable to make payments due to financial constrains. Additionally, couples of mills switching to south - region in future to gain recovery - attraction.

A recent development from Sindh, factories are paying Rs. 5 in addition to 155 to the growers. However, 3 units have confirmed this activity. While subsidize Rs. 12 from government also in pipe line to growers. Such relief will facilitates both stake holders to greater extent in specific territory of Sindh. This relief wills also aspect from concerns authorities in other part of country.

Cane Vs Sugar price (PKR) comparison 2010-11To 2014-15 PSMA



Price escalation of commodities Vs Sugar



Methodology of production cost

In order to give a better understanding for participants regarding cost of production primarily classified as follows,

1. Raw Material Cost (Sugar cane + QP + RoadCess + Market Committee + TPT differentials)
2. Processing Cost (Conversion Cost + Wages + Salaries)
3. Depreciation Cost (Cost reduction by means)
4. Operating Expense (Administrative heads+ Selling & distribution expense)
5. Financial Charges (Others)

Base line opportunities to reduce cost of production

1. Automation
2. Milling performance Vs Pol in cane
3. Energy efficiency
4. Maintenance management
5. Material's management
6. Capacity Utilization
7. By products
8. Performance Evaluation / Time Efficiency

Automation

Automation use to measure the utmost accuracy at point of application. It improves the efficiency of process & ensures safe working conditions. Automation reflected such as Boilers DCS ensures 10 % efficiency through master control.

Mill automation:

It ensures 6 - 10% capacity enhancement. Additionally, milling equipments life extended up to 10% due to reduction in torque.

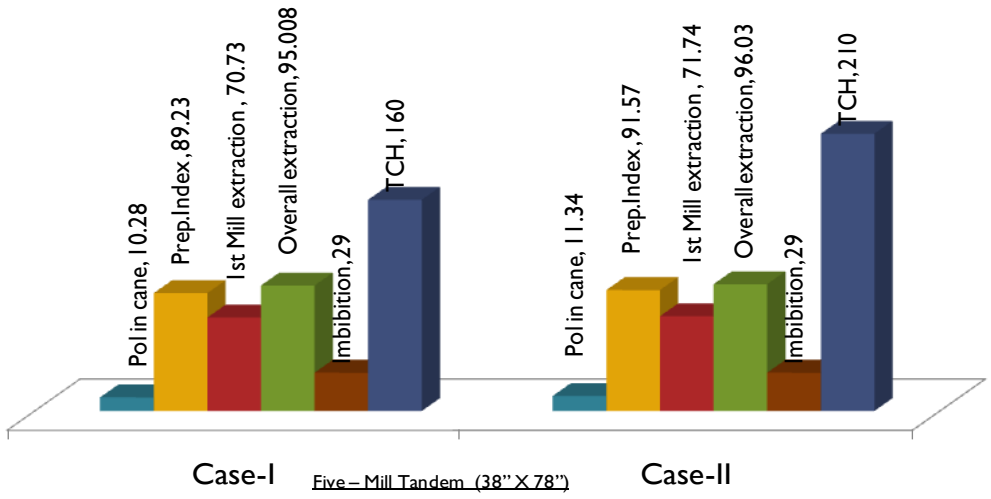
Evaporators:

Automation ensures operational consistency to control surges.

Pan station:

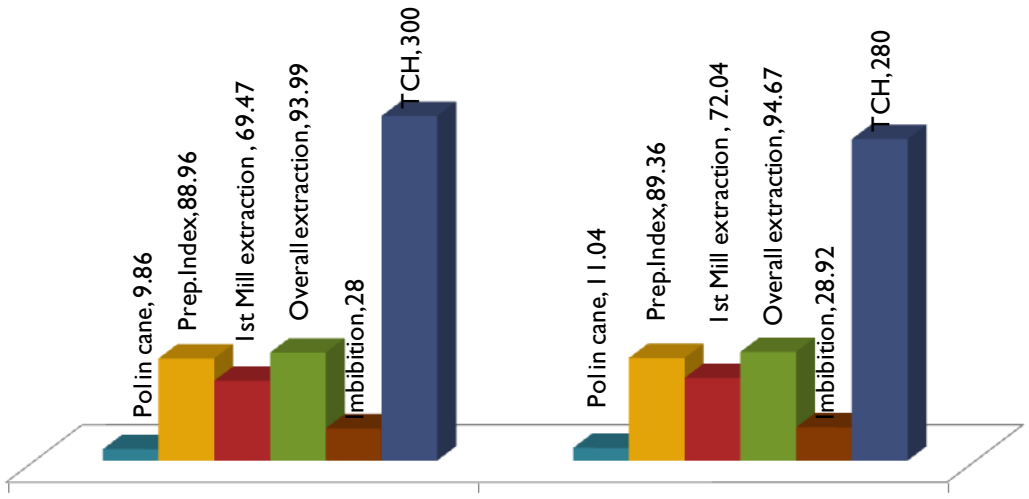
Implementation of automation can lead to control quantity of water at pans which subsequently increase 22% capacity-enhancement. While steam saving is realized 190 – 195 Tons/day.

Comparison of Pol in Cane Vs Milling performance (%)



Five – Mill Tandem (38" X 78")

Comparison of Pol in cane Vs Milling performance (%)

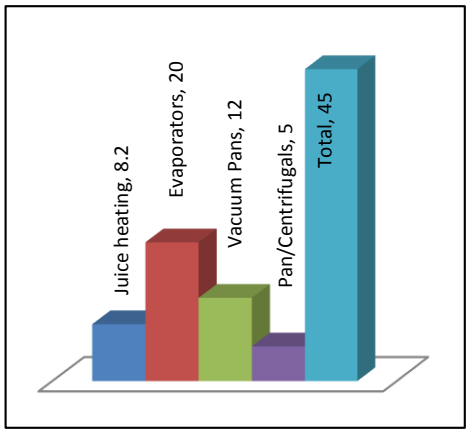


Four – Mill Tandem (42 X 84 inch)

Energy efficiency through process application

Steam balance classification at process applications as follows. The variation can be ± 3 – 4% for individual plants. Under mentioned base scenario is use to reduce cost of production for comparison.

Juice heating	8.2 %
Evaporators	20 %
Vacuum Pans	12 %
Miscellaneous	5 %
(Pan washing, Centrifugals)	
Total	45 % on cane



Energy efficiency through live & exhaust steam balance

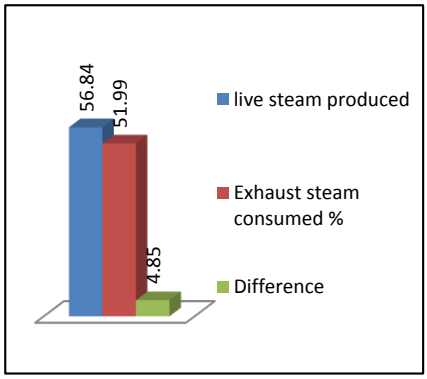
Steam production & consumption, an important realization of energy balance. Minimum variation can leads to enhance productivity and consequently reduce production cost by steam saving. Let's dual case study reflects both input/output.

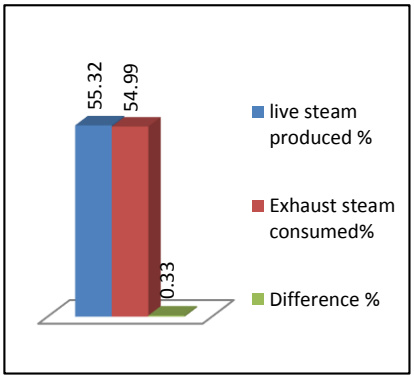
Case I (5000 – 6000 TCD Plant on cane)

Live steam produced	56.84%
Exhaust steam consumed	51.99%
Difference	4.85%

Case II (7000 – 8000 TCD Plant on cane)

Live steam produced	55.32%
Exhaust steam consumed	54.99%
Difference	0.33%





Energy efficiency through equipments utilization

1. Specific power consumption for existing plants ranges 17 - 18 KWH/Ton of cane. However, it bring down up to 14 – 16 KWH/Ton of cane which can be optimize through capacity utilization & equipment efficiencies within plants.

2. Heat recovery equipments like Vapor line heaters, condensate heat exchangers jointly raised raw juice temperature by 30 - 33 ^{O}C before going to conventional heating produce tremendous saving. Additionally, condensate gravity aspects through condensate heat exchanger ensure pure condensate availability for imbibition without sharing of raw water for desired imbibition at mill house.

3. FFE induction is really tremendous which brings down steam on cane from 5 to 10% within season. Its high-capital investment especially for those plants which already attained high cost of production how can induct meanwhile?

4. Oxygen analyzer, a handy and efficient way to analyze boiler performance, O_2 concentration needs to range 4-5 % which surely reduces 5% bagasse consumption at boilers.

5. Boiler starts up & stops always uncountable at our plants, contributes 10 – 12% losses much higher, it should manage @ 3 -5 % maximum.

Energy efficiency through steam distribution system

Impact of air/ in-condensable gases over system efficiency

Air is present within the steam supply system and equipment at start-up. Even if the system is filled with pure steam at the last time, when it was remain in use. The steam would condense at shutdown and air would be drawn in by the resultant vacuum.

Reflection of Steam & air mixture

If a steam / air, mixture made up of ¾ of steam & ¼ of air by volume. Total pressure of the mixture is 4 bar (Abs) then the effective steam pressure would be 3 bar (Abs) Therefore, steam has an effective pressure of 3 bar as opposed to its apparent pressure of 4 bar (Abs.) Correspondingly, temperature of mixture of 134 ^{O}C instead of expected 144 ^{O}C, this is translate in terms of heat equals to variation of 10 kcal/kg. This phenomenon has a significant impact over heat exchangers and in process applications where minimum temperature can required for a chemical or physical change.

Resistance to heat transfer

A layer of air 1 mm thick can offer the same resistance to heat as compare to layer of water 25-µm a layer of iron 2 mm thick or a layer of copper 25 mm thick.

Energy monitoring & managing in sugar industry (Base Scenario)

1. Energy Inputs from Bagasse 91.7%
2. Energy Inputs from way of condensate return 8.3%
3. Energy recovered in steam of total Energy 64.6%
4. Contributed by de-superheating water 0.4 %

Total heat available in steam from boilers distributed as

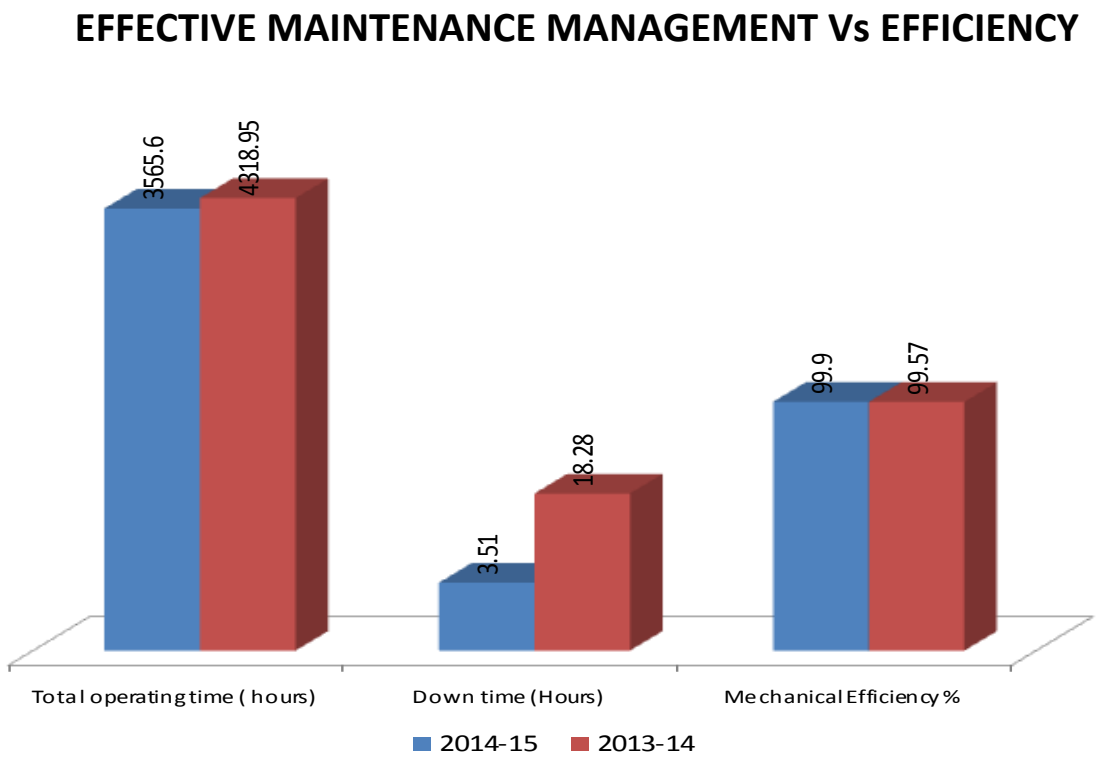
1. For Process heating, boiling 71.8 %
2. For Prime Movers 6.9 %
3. Recovered in hot exhaust condensate 13.3 %
4. Radiation , leakages and Others 8 %

Maintenance management

1. Plant Reliability leads to enhance recovery up to 0.5 - 1% in comparison of Mechanically good and bad running factory having stoppages less than equals to 10% of total running hours.
2. For a good running factory having less than 5 % mechanical stoppages can make reduction 10 % in lubricant consumption.
3. Energy cost reduction from 1 – 5 %
4. Reduction in scrap / Quality improvement of product between 1-3 %
5. Machine / Manpower /capacity utilization improvement 2 - 10%
6. Alignment can cause around 10 – 15 % stoppages in our operation. Therefore, optimum maintenance strategies can minimize this frequency.

Benchmark evaluation

Maintenance cost **should not be more than 2 %** of the replacement cost of plant and machinery.



Material management

Inventory based material management is another source to reduce cost of production .Equipment standardization also contributes to make reduction about 10% of inventory cost can easily be done specific integrals as follows,

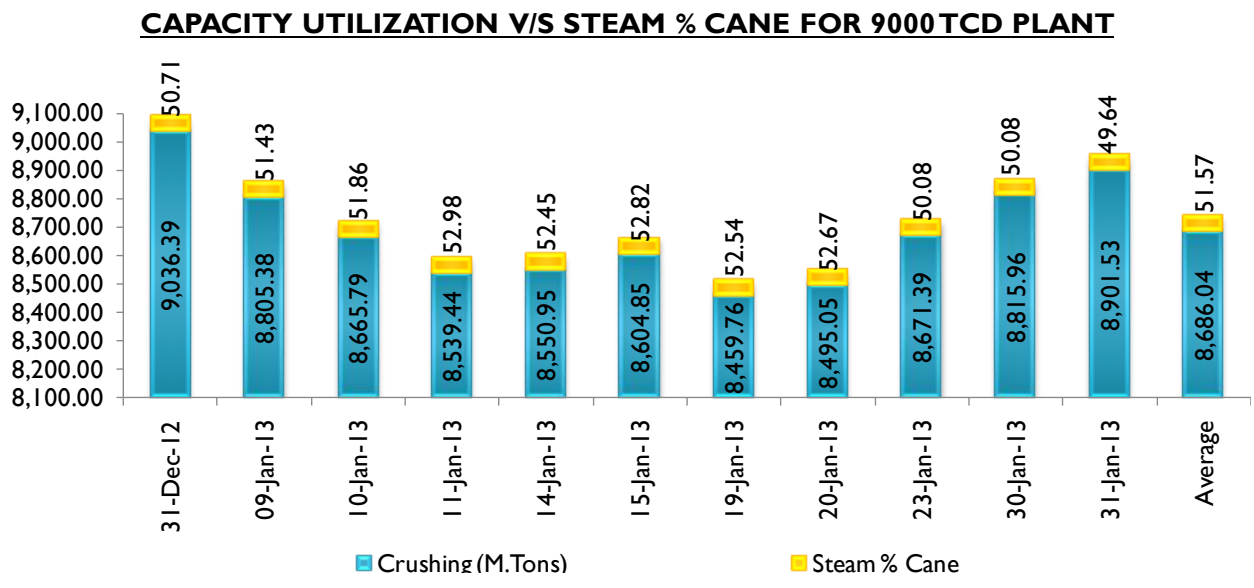
1. Mill Rollers (Universal Type – square end)
2. Mill drives & gear boxes
3. Drag Roller conveyor chains for Mill / Boiler carriers
4. Transmission Chains to entire houses
5. Ball & Roller bearings
6. Packing & Jointing material
7. Pipe & Fittings
8. Boiler Tubes
9. SS Tubes for evaporators
10. Lubricants

Benchmark evaluation

For inventory cost, it **should not be more than 2%** of the replacement cost of plant.

Economics of capacity utilization:

Production process consists of fixed & variable costs. Fixed charges are integrated inspite of plant is operated at 30 or 100% capacity. While variable expense are relates to scales of operations. Therefore, under capacity plant utilization is dual – edge knife which leads to produce expensive production. Capacity utilization surely reduces cost of production by lower down 2-3 steam % on cane without any investment. Although, well manages by cane procurement with plant availability. A critical review of steam % cane on capacity utilization as follows,



By - products potential

Bagasse, molasses and press cake are principal by-products contains about 37 – 38 % weight of the total cane crushed. However, their economic utilization can reduce the cost of production. Bagasse is a prime source of energy amongst all to generate greater revenue through energy saving measures. Therefore, cost analysis as follows,

1. Bagasse Rs. 2500 – 3000 / Ton
2. Press Mud Rs. 250 – 270 / Ton
3. Molasses Rs. 7500 – 8500 / Ton
4. Total Rs. 10250 – 11770/Ton

Plant contribution VS GROUND REALITIES (Case study)

Plant Integrity

Case I	Case II
99.67%	99.90% (Equipment – reliability)
0.33%	0.1% (Stoppages due to technical reasons)

Plant Reliability

Case I	Case II
100%	100% (No schedule – cleaning / Stoppages)

Plant Availability

Case I	Case II
73.20%	55.03%
26.8%	44.97 (Raw material deficiency + Misc :)

Plant Utilization

Case I	Case II
72.68%	54.69%
27.32	45.31% (Plant Un – utilization)