दुरितांचे तिमिर जावो । विश्व स्वधर्म सूर्ये पाहो ।
Sant Dnyaneshwar Shikshan Sanstha,
Hon. Shri. Annasaheb Dange Art's, Commerce & Science College, Hatkanangale.
Tal. Hatkanangale, Dist. Kolhapur. 416 109 (Maharashtra)
(Affiliated to Shivaji University, Kolhapur.)
Est. 20 JUNE 1998
Permanent Affiliation : UGC-2(f) & 12 (b)
Junior College Index No. 23.06.022
Ph. +91-(0230) 2483521
Fax : +91-(0230) 2483521
Reaccerdited by NAAC : B (2012)

Outward No. ADACS/ Major / 061 2021 - 22 Date : 08 / 04 / 2021

.To,

The Under Secretary,(FD-III)

University Grants Commission,

Bahadur Shah Zafer Marg,

New Delhi -110002.

Sub :- Submission of Statement of Expenditure Of Major Research Project of Prin. Dr. Mrs.Yojana V. Jugale .

Ref. 1) F.No. - 5-88/2014 (HRP) 6 th July 2016.

2) F.No. - 5 – 88/2014(HRP) 12/01/2018.

3) UGC-HRP –hrp411@gmail.com Feb.28,2020 .

4)UGC HRP-F.No.5-88/2014 HRP Mar.18 2021.

Sir,

With reference to subject mentioned above ,I am submitting herewith my Final Project Report (Thesis) ,Expert Committee Report of Major Research project entitled "Sugarcane Economy of Maharashtra".

Hon. Shri Annasaheb Dange Arts, Commerce & Science College • Hatkanangale, Dist. Kolhapur •

[P.T.O.]

दुरितांचे तिमिर जावो । विश्व स्वधर्म सूर्ये पाहो ।
Sant Dnyaneshwar Shikshan Sanstha,
Hon. Shri. Annasaheb Dange Art's, Commerce & Science College, Hatkanangale.
Tal. Hatkanangale, Dist. Kolhapur. 416 109 (Maharashtra)
(Affiliated to Shivaji University, Kolhapur.)
Est. 20 JUNE 1998
Permanent Affiliation : UGC-2(f) & 12 (b)
Junior College Index No. 23.06.022
Ph. +91-(0230) 2483521
Fax : +91-(0230) 2483521
Reaccerdited by NAAC : B (2012)

Outward No. ADACS/ Date : / /

I request you to accept all submitted documents herewith letter. Further ,I request you to release the remaining amount (II Installment

Rs. 330500/- Three Lakh Thirty Thousand Five Hundred only) as early as possible. This is for your kind information and necessary action.

Thanking you,

Hon. Shri Annasaheb Dange Arts, Commerce & Science College • Hatkanangale, Dist. Kolhapur •

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Encls. –

1) Final Project Report (Spiral copy of Thesis)

2) Expert Committee Report

3)Supplementary Period Expenditure Report (Audited)

Research Documents etc. are posted on the website of the college.

6

Annexure - XI

Final Report Assessment/ Evaluation Certificate

(Two Members Expert Committee Not belonging to the institute of principal investigator)

(To be submitted with the final report)

It is certified that the final report of major research project entitled "SUGARCANE ECONOMY OF MAHARASHTRA" by Dr. Mrs. Yojana Vasantrao Jugale Dept. of Economics has been assessed by the Expert Committee consisting the following members for final submission of the report to the University Grants Commission, New Delhi under the scheme of Major Research Project.

Comments/ suggestion of the Expert Committee:-

(Separate sheet of both experts is attached with this certificate)

1. The researcher has sincerely attempted all the aspects of sugarcane. I therefore recommend for accepting the final report of the MRP.
2. The theme is important in the field of economics. Researcher has taken pain for writing of the final report. I therefore recommend for accepting the research work.

Name and signatures of Experts with Date:-

	Name of Expert	University/ College name	Signature with Date
1)	Dr. H.N. Katre	Rajaram College, Kolhapur	12/12/2019
2)	Dr. A.K. Patil	S.G.M. College, Karad	30/12/2018

It is certified that the final report has been uploaded on UGC-MRP portal on -----

It is also certified that final report, Executive summary of the Report, Research documents, monograph academic papers provided under major research project have been posted on the website of the University/college.

Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, Hatkanangale, Dist. Kolhapur

PRINCIPAL

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Seal

REPORT ON THE UGC RESEARCH PROJECT UNDERTAKEN BY DR. Y. V. JUGALE ON "SUGARCANE ECONOMY OF MAHARASHTRA"

The sugar and sugarcane economy has changed the rural life styles and the stance of the agricultural development. Sugar industry is totally dependent on sugarcane economy. It has established various inter-regional and intra-regional rural-urban linkages. The farm, factory and the consumers are very important aspects of the economy. The sugarcane economy in the states is politically sensitive due to its cooperative organizational structure. In fact politics of development has started with sugar industry in the state. Now the ethos has been changed to development of politics in the state. Consequently, the farmers' faith on the movement became suspensive. The current crisis is being nurtured by this fable.

The researcher has sincerely attempted toil-implications of the sugarcane linkages with farm, factory and the society, which are inversely and adversely causing in decelerating the socio-economic life values of the cane growers. The sugar industry has to pay higher prices (state advised prices) than the recommended statutory minimum fair and remunerative prices to the cane producers.

The sugar sector has changed the agricultural life styles and outlook of agricultural development in the sugarcane cultivation zones of the state, since sugar industry is totally dependent on sugarcane economy.

I, therefore, recommend for accepting this research work. The research throws the light on various issues of sugar industry and sugarcane related problems. The theme is important to the potential researchers so it can be published. The funds (UGC) have been pertinently utilized for carrying out the research on the selected area. It is a good piece of research.

I recommend accepting the work done on the sugarcane economy.

Date: 12/12/2019

Place: Kolhapur

Dr. H. N. Kathare
Associate Professor of Economics,
Rajaram College, Kolhapur

REPORT ON THE UGC FUNDED RESEARCH PROJECT UNDERTAKEN BY
DR. YOJANA V. JUGALE
"SUGARCANE ECONOMY OF MAHARASHTRA"

The commodity studies are location based since the economies of scale work perfectly in the region. Sugarcane is one of the agricultural commercial crops grown in Maharashtra. It has changed the overall outlook of the rural area due to the industry's link with service sector, agriculture sector and agro-industrial cooperative commonwealth.

The researcher has sincerely made an attempt to measure the social-economic aspects of the sugarcane economy in Maharashtra. The research work is scattered into twelve chapters. The work has been analyzed in to farm sector vis a vis industry sector performances. The rewards to the farm sector depend on the industrial performances. The industrial cost on the raw material (i.e. sugarcane) constitutes around 75 to 80 percent.

The state's sugarcane economy has been associated with rural-urban inter-linkages. The farm, factory and the consumers are very important segments of the cane economy. The sugarcane economy in the state is politically sensitive due to its organizational structure. The state participation in the cooperative sugar factories obviously imposes control on the sugarcane economy. With a view to identify the linkages and the influence of the sub-sections of the sugarcane economy is the task of the project. The study obviously guide the industry for facing the challenges and for adopting the competitive management strategies for its efficient functioning vis a vis for paying the remunerative price to the sugarcane growers.

I, therefore, recommend for the acceptance of this valuable research work, which can also be published simultaneously. The public funds (UGC) have been aptly utilised for carrying out the research on the thrust area. The justice is given to the topic.

I recommend accepting the work done on the sugarcane economy. The research work can be published soon.

Date: 30/12/2018

Place: Karad

Dr. A. K. Patil
Associate Professor of Economics,
SGM College, Karad.

.Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College . - Hon. Shri. Annasaheb Dange College, Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the Project - 06 July 2016

6.a. Period of Expenditure : - From 01/07/2015 to 30/06/2018 **(Original Period)**

& From 01/07/2018 to 3103/2019 **(Supplementary Period)**

b. Details of Expenditure

Sr. No.	Item	Amount Approved Rs	Expenditure Incurred .2015-16	Expenditure Incurred .2016-17	Expenditure Incurred .2017-18	Expenditure Incurred 01/04/2018 to.30/06/2018	Exp. Incurred 01/07/2018 to 31/03/2019	Total
i.	Books & Journals	50000/-	00/-	12614/-	12956/-	25100/-	00/-	50670/-
ii.	Equipments (As per recomedation)	35000/-	00/-	00/-	1150/-	35000/-	00/-	36150/-
iii.	Project Fellow Rs.14000/- pm	336000/-	00/-	00/-	175000/-	42000/-	119000/-	336000/-
iv.	Contingency	100000	00/-	2208/-	00/-	104891/-	00/-	107099/-
v.	FieldWork Travel Give detail in the proforma at Annexure-VI	150,000/	00/-	14453/-	79000/-	82000/-	00/-	175453/-
vi.	Hiring Services	75000/-	00/-	00/-	39000/-	37500/-	00/-	76500/-
vii.	Chemicals & Glassware	00/-	00/-	00/-	00/-	00/-	00/-	00/-
viii.	Overhead	51100/-	00/-	00/-	00/-	51100/-	00/-	51100
	Total	**797100/-**	**00/-**	**29275/-**	**307106/-**	**377591/-**	**119000/-**	**832972/-**

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Kolhapur M. No. 036961 Chartered Accountants

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 12000/-p.m.			
2.	Post-Doctoral Fellow Fellowship @ 12000/-p.m.			
3.	Project Associate salary @ Rs. 10000/-p.m.			
4	Project Fellow salary @ Rs. 14000/-p.m.	16 April 2017 to 30 June 2018	336000/-	217000/-
	Project Fellow salary @ Rs. 14000/-p.m.	01/04/2018 TO 31/03/2019		119000/-
	Total		**336000/-**	**336000/-**

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of Rs.797100/- (Rs.Seven Lakh Ninety Seven Thousand One Hundred only) sanctioned to Hon.Shri. Annasaheb Dange Arts,Commerce& Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No. F. No. 5-88/2014(HRP) dated 06/07/2016** out of Sanctioned Grant **Rs.797100/ (Seven Lakh Ninety Seven Thousand One Hundred only)** has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission. **Except a sum of Rs.119000/-(One Lakh Ninteen Thousand only) which is spent on Staff Project Fellow after 30/06/2018 which was originally specified** .The total expenditure is incurred of **Rs.832972/- (Eight Lakh Thirty Two Thousand Nine Hundred Seventy Two only)**

Principal Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Principal

Bhaskar B. Patil & Co. Kolhapur M. No. 036961 Chartered Accountants

Chartered Accountant

17/3/2020

UDIN - 20036961AAAAAW5776

Annexure – V

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

Utilization Certificate

Certified that the grant of **Rs -797100/-/-(Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** sanctioned to Hon. Shri. Annasaheb Dange Arts, Commerce & Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No.F.5-88/2014(HRP) dated 06/07/2016** out of sanctioned Grant **Rs.797100/-(Seven Lakh Ninety Seven Thousand One Hundred only)** has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission. Except a sum of **Rs.119000/-(One Lakh Nineteen Thousand only)** which is spent on Staff Project Fellow after 30/06/2018 which was originally specified .The total expenditure is incurred of **Rs.832972/- (Eight Lakh Thirty Two Thousand Nine Hundred Seventy Two only)**

It is further certify that out of total sanctioned Expenditure **Rs -797100/-/-(Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** the college has already received **Rs.466600/-(Four Lakh Sixty Six Thousand Six Hundred only)** as advance against sanctioned Grant of **Rs -797100/-/-(Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** and balance of **Rs.330500/-(Three Lakh Thirty Thousand Five Hundred only)** is receivable from University Grants Commission.

If as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

Principal Investigator

Principal

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Kolhapur M. No. 036961 Chartered Accountants

Statutory Auditor

17/3/2020

UDIN- 20036961AAAAAW5776

.Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College - Hon. Shri. Annasaheb Dange College, Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the Project - 06 July 2016

6.a. Period of Expenditure : - From 01/07/2018 to 31/03/2019 **(Supplementary Period)**

b. Details of Expenditure

Sr. No.	**Item**	**Amount Approved Rs**	**Exp. Incurred 01/07/2018 to 31/03/2019**
i.	Books & Journals	50000/-	00/-
ii.	Equipments (As per recommendation)	35000/-	00/-
iii.	Project Fellow Rs.14000/- pm	336000/-	119000/-
iv.	Contingency	100000	00/-
v.	Field Work Travel Give detail in the proforma at Annexure-VI	150,000/	00/-
vi.	Hiring Services	75000/-	00/-
vii.	Chemicals & Glassware	00/-	00/-
viii.	Overhead	51100/-	00/-
	Total	**797100/-**	**119000**

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Kolhapur M. No. 036961 Chartered Accountants

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 12000/-p.m.			
2.	Post-Doctoral Fellow Fellowship @ 12000/-p.m.			
3.	Project Associate salary @ Rs. 10000/-p.m.			
4	Project Fellow salary @ Rs. 14000/-p.m.	01/07/2018 to 31/03/2019		119000/-
	Total		**336000/-**	**119000/-**

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of **Rs.797100/- (Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** sanctioned to Hon. Shri. Annasaheb Dange Arts, Commerce& Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No. F. No. 5-88/2014(HRP) dated 06/07/2016)** has been fully utilized to the extent of **Rs. 119000/-** (One Lakh Ninteen Thousand only) for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission. **Except a sum of Rs.119000/-(One Lakh Ninteen Thousand only) which is spent on Staff Project Fellow after 30/06/2018 which was originally specified**

Principal Investigator **Principal** **Chartered Accountant**

Dr. Yojan[illegible]no Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce &
Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. * Chartered Accountants * Kolhapur M. No. 036961

17/3/2020

UDIN - 20036961AAAAAW5776

दुरितांचे तिमिर जावो । विश्व स्वधर्म सूर्ये पाहो ।
Sant Dnyaneshwar Shikshan Sanstha,
Hon. Shri. Annasaheb Dange Art's, Commerce & Science College, Hatkanangale.
Tal. Hatkanangale, Dist. Kolhapur. 416 109 (Maharashtra)
(Affiliated to Shivaji University, Kolhapur.)
Est. 20 JUNE 1998
Permanent Affiliation : UGC-2(f) & 12 (b)
Junior College Index No. 23.06.022
Ph. +91-(0230) 2483521
Fax : +91-(0230) 2483521
Reaccerdited by NAAC : B (2012)

Outward No. ADACS/ 250/ 2018-19 Date : 28 / 10 / 2018.

To,

The Under Secretary, (FD-III)

University Grants Commission

Bahadur Shah Zafer Marg,

New Delhi-110002

Sub: - Submission of Statement of Expenditure of Major Research Project of

Prin. Dr. Mrs. Yojana V. Jugale

Ref. 1) F.No.-5-88/2014 (HRP) 6th JUL2016.

2) No. F.5-88/2014(HRP) 12/1/2018

Sir,

With reference to subject mentioned above, I am submitting herewith the Utilization Certificate, Statement of Expenditure of Major Research Project sanctioned to Prin. Dr. Mrs. Yojana V. Jugale entitled "Sugarcane Economy of Maharashtra".

I request you to accept and release the remaining amount of the said project at your earliest. This is for your kind information and necessary action.

Thanking you.

o/c

Yours faithfully,

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

E-mail : adacshat@gmail.com
website : www.adcacs.in

Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College - Hon. Shri. Annasaheb Dange College, Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the Project - 06 July 2016

6.a. Period of Expenditure : - From 01/07/2015 to 30/06/2018

b. Details of Expenditure

Sr. No.	Item	Amount Approved Rs	Expenditure Incurred .2015-16	Expenditure Incurred .2016-17	Expenditure Incurred .2017-18	Expenditure Incurred 01/04/2018 to.30/06/2018	Total
i.	Books & Journals	50000/-	00/-	12614/-	12956/-	25100/-	50670/-
ii.	Equipments (As per recomedation)	35000/-	00/-	00/-	1150/-	35000/-	36150/-
iii.	Project Fellow Rs.14000/- pm	336000/-	00/-	00/-	175000/-	42000/-	217000/-
iv.	Contingency	100000/-	00/-	2208/-	00/-	104891/-	107099/-
v.	Hiring Services	75000/-	00/-	00/-	39000/-	37500/-	76500/-
vi.	Field Work/Travel (Give details in the proforma at Annexure-VI	150,000/-	00/-	14453/-	79000/-	82000/-	175453/-
vii.	Chemicals & Glassware	00/-	00/-	00/-	00/-	00/-	00/-
viii.	Overhead	51100/-	00/-	00/-	00/-	51100/-	51100/-
	Total	**797100/-**	**00/-**	**29275/-**	**307106/-**	**377591/-**	**713972/-**

B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961 Bhaskar

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 18000/-p.m.			
2	Project Fellow Non Gate /Non-Net Rs.14000/-p.m. for 2 years	16 April 2017 to 30 June 2018	336000/-	217000/-

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of **Rs -797100 /-(Rupees Seven Lakh Ninety Seven Thousand One Hundred only)** sanctioned to Hon.Shri. Annasaheb Dange Arts,Commerce & Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No.F.5-88/2014(HRP) dated 06/07/2016** out of Sanctioned Grant **Rs.678100/- (Rs. Six Lakh Seventy Eight Thousand One Hundred only**) has been fully utilized for the purpose for which it was sanctioned in accordance with the terms and conditions laid down by the University Grants Commission. The total expenditure is incurred of **Rs.713972/- (Seven Lakh Thirteen Thousand Nine Hundred Seventy Two only)**

Bhaskar B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

Principal Investigator Dr. Yojana Vasantrao Sagale PRINCIPAL, Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur. **Principal** **Chartered Accountant**

BHASKAR B. PATIL & Co.
Chartered Accountants

Office : Flat No. 101 & 102, Ground Floor,
'C' Wing, Shamrao Mandlik Park,
13th Lane, Rajarampuri (East),
Kolhapur- 416 008
Phone : 0231-2525985, 0231-2532530

Date :

Annexure – V

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

Utilization Certificate

Certified that the grant of **Rs -797100 /-(Rupees Seven Lakh Ninety Seven Thousand One Hundred only)** sanctioned to Hon.Shri. Annasaheb Dange Arts,Commerce & Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No.F.5-88/2014(HRP) dated 06/07/2016** out of Sanctioned Grant **Rs.678100/- (Rs. Six Lakh Seventy Eight Thousand One Hundred only**) has been fully utilized for the purpose for which it was sanctioned in accordance with the terms and conditions laid down by the University Grants Commission. The total expenditure is incurred of **Rs.713972/-(Seven Lakh Thirteen Thousand Nine Hundred Seventy Two only)**

It is further certify that out of total expenditure **Rs. 678100/- (Six lakh Seventy Eight Thousand One Hundred only**) the college has already received **Rs. 466600/- (Four Lakh Sixty Six Thousand Six Hundred only)** as advance against sanctioned Grant of **Rs. 797100/- (Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** and balance of **Rs.211500/-(Two Lakh Eleven Thousand Five Hundred only)** is receivable from University Grants Commission.

If as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

Principal **Principal** **Chartered Accountant**

Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce &
Science College, HATKANANGALE, Dist. Kolhapur.

B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

.Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College - Hon. Shri. Annasaheb Dange College, . . . Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the Project - 06 July 2016

6.a. Period of Expenditure : - From 01/04/2016 to 31/03/2017

b. Details of Expenditure

Sr. No.	Item	Amount Sanctioned Rs	Expenditure Incurred Rs.
i.	Books & Journals	50000/-	12614/-
ii.	Equipments (As per recomedation)	35000/-	00/-
iii.	Project Fellow Rs.14000/- pm	336000/-	00/-
iv.	Contingency	100000/-	2208/-
v.	Field Work/Travel (Give details in the proforma at Annexure –VI).	150,000/-	14453/-
vi.	Hiring Services	75000/-	00/-
vii.	Chemicals & Glassware	00/-	00/-
viii.	Overhead	51100/-	00/-
	Total	**797100/-**	**29275/-**

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 18000/-p.m.		00/-	00/-
2	Project Fellow Non-Gate/Non NET Rs.14000/-p.m .for initial 2 years	01 July 2015 to 30 June 2018	336000/-	00/-

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of Rs.797100/- (Rupees Seven Lakh Ninety Seven Thousand One Hundred only) sanctioned from the University Grants Commission under the scheme of support for Major Research Project entitled "Sugarcane Economy of Maharashtra" vide UGC letter No. F. No. 5-88/2014(HRP) dated 12/01/2018 has been utilized to the extent of **Rs. 29275/-(Rupees –Twenty Nine Thousand Two Hundred Seventy Five only**) for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

Bhaskar B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

Principal Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Principal

Statutory Auditor

(Chartered Accountant)

.Annexure- IV

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE ON FILD WAOK

Name of the Principal Investigator –

Name of the Place visited	Duration of the visit		Mode of Journey	Expenditure Incurred (Rs.)
	From	To		
Delhi	September 16	September 16	By Air	14453
Total- Fourteen Thousand Four Hundred Fifty Three				14453/-

Certified that the above expenditure is in accordance with the UGC norms for Major Research Projects.

Bhaskar B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

Principal Investigator **Principal** **Statutory Auditor**

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

(Chartered Accountant)

BHASKAR B. PATIL & Co.
Chartered Accountants

Office : Flat No. 101 & 102, Ground Floor,
'C' Wing, Shamrao Mandlik Park,
13th Lane, Rajarampuri (East),
Kolhapur- 416 008
Phone : 0231-2525985, 0231-2532530

Date :

.Annexure – V

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

Utilization Certificate

Certified that the grant of **Rs -797100/-(Rupees –Seven Lakh Ninety Seven One Hundred only)** sanctioned from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No.F.5-88/2014(HRP) dated 12/01/2018** has been utilized to the extent of **Rs. 29275/- (Rupees Twenty Nine Thousand Two Hundred Seventy Five only)** for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

If as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

Bhaskar B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

Principal
Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Principal

Statutory Auditor
(Chartered Accountant)

UGC MAJOR RESEARCH PROJECT

On

"SUGARCANE ECONOMY OF MAHARASHTRA"

By

DR. YOJANA VASANT JUGALE

Principal, Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, Hatkanangale.(MS)

(March 2016 to March 2017)

1) **Non Recurring-** 2016-17

i) Books & Journals

Sr.No.	Shop	Bill. No.	Date	Amount Rs.
1)	Best Books Suppliers	003363	11/08/2016	6380/-
2)	Best Books Suppliers	003364	11/08/2016	6234/-
				Total - 12614/-

iii) Contingency -2016 - 17

Sr.No	**Shop**	**Bill No**	**Date**	**Amount**
1	Unnati Corner Hatkanangale	121	11/08/2016	1668/-
2	Sai Xerox & Stationers	11	11/08/2016	540
				Grand Total -2208/-

v)Travel & Field work – From July 2016 to March 2017

Sr. No.	From	To	Date	Amount (Rs)
1	Hatkanangale	Delhi	13/09/2016	14453/-
				Total- 14453/-

.Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College - Hon. Shri. Annasaheb Dange College, . . .
Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the - 06 July 2016
Project

6.a. Period of Expenditure : - From 01/04/2017 to 31/03/2018

b. Details of Expenditure

Sr. No.	Item	Amount Sanctioned Rs	Expenditure Incurred Rs.
i.	Books & Journals	50000/-	12956/-
ii.	Equipments (As per recomedation)	35000/-	1150/-
iii.	Project Fellow Rs.14000/- pm	336000/-	175000/-
iv.	Contingency	100000/-	00/-
v.	Field Work/Travel (Give details in the proforma at Annexure –VI).	150,000/-	79000/-
vi.	Hiring Services	75000/-	39000/-
vii.	Chemicals & Glassware	00/-	00/-
viii.	Overhead	51100/-	00/-
	Total	**797100/-**	**307106/-**

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 18000/-p.m.		00/-	00/-
2	Project Fellow Non-Gate/Non NET Rs.14000/-p.m .for initial 2 years	16/04/2018 to 30/06/2018	336000/-	175000/-

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of Rs. **797100/-(Rupees Seven Lakh Ninety Seven Thousand One Hundred** only) received from the University Grants Commission under the scheme of support for Major Research Project entitled "Sugarcane Economy of Maharashtra" vide UGC letter No. F. No. 5-88/2014(HRP) dated 12/01/2018 has been utilized to the extent of **Rs. 307106/- (Rupees Three Lakh Seven Thousand One Hundred Six –only)** for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

B Bhaskar Patil & Co. Chartered Accountants Kolhapur M. No. 36961

Principal Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Principal

Statutory Auditor

(Chartered Accountant)

.Annexure- IV

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE ON FIELD WORK

Name of the Principal Investigator –

Name of the Place visited	Duration of the visit		Mode of Journey	Expenditure Incurred (Rs.)
	From	To		
Mumbai	March 2017	March 2018	Hired Car	10000
Pune	March 2017	March 2018	Hired Car	5000
Mumbai	March 2017	March 2018	Hired Car	10000
Pune	March 2017	March 2018	Hired Car	5000
Jaysingpur	March 2017	March 2018	Hired Car	3000
Islampur	March 2017	March 2018	Hired Car	3000
Indapur	March 2017	March 2018	Hired Car	5000
Warnanagar	March 2017	March 2018	Hired Car	2000
Nashik	March 2017	March 2018	Hired Car	8000
Aurngabad	March 2017	March 2018	Hired Car	10000
Tulajapur	March 2017	March 2018	Hired Car	10000
Ahamadnager	March 2017	March 2018	Hired Car	8000
Total- Seventy Nine Thousand Only				**79000/-**

Certified that the above expenditure is in accordance with the UGC norms for Major Research Projects.

Principal Investigator **Principal** **Statutory Auditor**

Dr. Yojana Vasantrao Kadale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

(Chartered Accountant)

BHASKAR B. PATIL & Co.
Chartered Accountants

Office : Flat No. 101 & 102, Ground Floor,
'C' Wing, Shamrao Mandlik Park,
13th Lane, Rajarampuri (East),
Kolhapur- 416 008
Phone : 0231-2525985, 0231-2532530

Date :

.Annexure – V

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

Utilization Certificate

Certified that the grant of **Rs -797100/-(Rupees –Seven Lakh Ninety Seven One Hundred only)** sanctioned from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No.F.5-88/2014(HRP) dated 12/01/2018** has been utilized to the extent of **Rs. 307106/- (Rs. Three Lakh Seven Thousand One Hundred Six only)** for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

If as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

B. Patil & Co. Chartered Accountants Bhaskar Kolhapur M. No. 36961

Principal

Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Principal

Statutory Auditor

UGC MAJOR RESEARCH PROJECT

On

"SUGARCANE ECONOMY OF MAHARASHTRA"

By

DR. YOJANA VASANT JUGALE

Principal, Hon. Shri. Annasaheb Dange Arts, Commerce & Science College,

Hatkanangale.(MS)

(March 2017 to March 2018)

Non Recurring-2017-18

i) Books & Journals

Sr.No.	Shop	Bill. No.	Date	Amount Rs.
1)	Best Books Suppliers	3412	31/03/2018	12956/-
				Total – 12956/-

ii) Equipments – 2017-18

Sr.No.	Shop	Bill.No.	Date	Amount Rs.
1)	Adinath Computer Sales	726	31/03/2018	1150/-
				Total - 1150/-

Recurring-

Honorarium -

Project Fellow Salary – From- 15/03/2017 to 31 March 2018

Sr.No	Month	Cheque No	Date	Amount Rs.
1)	March 2017 to February 2018	184677	05/03/2018	161000/-
2)	March 2018	Voucher	31/03/2018	14000/-
				Total- 175000/-

iv) Hiring Services – From 1/04/2017 to 30/03/2018

Sr.No.	**Name**	**Date**	**Amount Rs.**
1	Kamble Nilesh Dilip	30/04/2017	4000/-
2	Gurav Pravin Shivaji	28/07/2017	15000/-
3	Gurav Pravin Shivaji	25/09/2017	7000/-
4	Kamble Nilesh Dilip	15/11/2017	13000/-
		Total	**39000/-**

v)Travel & Field work – From April 2017 to March 2018

Sr. No.	From	To	Date	Amount (Rs)
1	Hatkanangale	Mumbai	02/04/2017	10000
2	Hatkanangale	Pune	30/04/2017	5000
3	Hatkanangale	Mumbai	10/05/2017	10000
4	Hatkanangale	Pune	30/06/2017	5000
5	Hatkanangale	Shirol	05/07/2017	3000
6	Hatkanangale	Islampur	10/07/2017	3000
7	Hatkanangale	Indapur	20/08/2017	5000
8	Hatkanangale	Warnanagar	26/08/2017	2000
9	Hatkanangale	Nashik	22/09/2017	8000
10	Hatkanangale	Aurngabad	24/10/2017	10000
11	Hatkanangale	Tulajapur	02/11/2017	10000
12	Hatkanangale	Ahamadnager	04/01/2018	8000
				Total- 79000/-

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Chartered Accountants
Kolhapur
M. No. 38961

.Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College - Hon. Shri. Annasaheb Dange College, Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the Project - 06 July 2016

6.a. Period of Expenditure : - From 01/04/2018 to 30/06/2018

b. Details of Expenditure

Sr. No.	Item	Amount Sanctioned Rs	Expenditure Incurred Rs.
i.	Books & Journals	50000/-	25100/-
ii.	Equipments (As per recommendation)	35000/-	35000/-
iii.	Project Fellow Rs.14000/- pm	336000/-	42000/-
iv.	Contingency	100000/-	104891/-
v.	Field Work/Travel (Give details in the proforma at Annexure –VI).	150,000/-	82000/-
vi.	Hiring Services	75000/-	37500/-
vii.	Chemicals & Glassware	00/-	00/-
viii.	Overhead	51100/-	51100/-
	Total	**797100/-**	**377591/-**

B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961 Bhaskar

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 18000/-p.m.		00/-	00/-
2	Project Fellow Non-Gate/Non NET Rs.14000/-p.m .for initial 2 years	16/04/2018 to 30/06/2018	336000/-	42000/-

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of Rs.**797100/-** (Rupees –Seven Lakh Ninety Seven Thousand One Hundred only) Sanctioned from the University Grants Commission under the scheme of support for Major Research Project entitled "Sugarcane Economy of Maharashtra" vide UGC letter No. F. No. 5-88/2014(HRP) dated 12/01/2018 has been utilized to the extent of **Rs. 377591/-(Rupees –Three Lakh Seventy Seven Thousand Five Hundred Ninety One only)** for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

Principal Investigator **Principal** **Chartered Accountant**

.Annexure- IV

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE ON FIELD WORK

Name of the Principal Investigator –

Name of the Place visited	Duration of the visit		Mode of Journey	Expenditure Incurred (Rs.)
	From	To		
Yawatmal	April,2018	June,2018	Hired Car	15000/-
Nagpur	April,2018	June,2018	Hired Car	15000/-
Latur	April,2018	June,2018	Hired Car	10000/-
Beed	April,2018	June,2018	Hired Car	10000/-
Amaravati	April,2018	June,2018	Hired Car	10000/-
Nanded	April,2018	June,2018	Hired Car	10000/-
Solapur	April,2018	June,2018	Hired Car	7000/-
Pune	April,2018	June,2018	Hired Car	5000/-
				82000/-

Certified that the above expenditure is in accordance with the UGC norms for Major

Principal Investigator **Principal** **Statutory Auditor**

Bhaskar B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

(Chartered Accountant)

Seal

BHASKAR B. PATIL & Co.
Chartered Accountants

Office : Flat No. 101 & 102, Ground Floor,
'C' Wing, Shamrao Mandlik Park,
13th Lane, Rajarampuri (East),
Kolhapur- 416 008
Phone : 0231-2525985, 0231-2532530

Date :

.Annexure – V

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

Utilization Certificate

Certified that the grant of **Rs -797100 /-(Rupees –only)** sanctioned from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No.F.5-88/2014(HRP) dated 12/01/2018** has been utilized to the extent of **Rs. 377591 /- (RupeesThree Lakh Seventy Seven Thousand Five Hundred Ninety One only)** for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

If as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

Principal Investigator **Principal** **Chartered Accountant**

Bhaskar B. Patil & Co. Chartered Accountant Kolhapur M. No. 36961

UGC MAJOR RESEARCH PROJECT

On

"SUGARCANE ECONOMY OF MAHARASHTRA"

By

DR. YOJANA VASANT JUGALE

Principal, Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, Hatkanangale.(MS)

First Year (March 2017 to March 2018)

Non Recurring- 01 April 2018 to 30/06/2018

i) Books & Journals

Sr.No.	Shop	Bill. No.	Date	Amount Rs.
1)	Best Books Suppliers	3149,3150,3151,		25100
				Total - 25100/-

ii) Equipments – 01/04/2018 to 30/06/2018

Sr.No.	Shop	Bill.No.	Date	Amount Rs.
2)	CR Computers Sales	3283	16/04/2018	35000/-
				Total - 35000/-

Recurring-

Honorarium -

Project Fellow Salary – From- 01/04/2018 to 30/06/2018

Sr. No	Month	Cheque No	Date	Amount Rs.
1)	April 2018 to June 2018	Voucher	30/06/2018	42000/-
				Total- 42000/-

Bhaskar B. Patil & Co. Chartered Accountants Kolhapur M. No. 36961

iii) Contingency 01/04/2018 to 30/06/2018

Sr.No	Shop	Bill No	Date	Amount
1	Adinath Computers Sales & Service	820	15/4/2018	700
2	Adinath Computers Sales & Service	821	30/4/2018	2600
3	Adinath Computers Sales & Service	822	30/6/2018	7950
4	Adinath Computers Sales & Service	823	30/6/2018	8000
5	Anmol Mudranalay Hatkanangale	2547	21/4/2018	4940
6	Anmol Mudranalay Hatkanangale	2559	25/4/2018	19508
7	Sarvadnya Cutlery	840	01/05/2018	1252
8	Anamol Mudranalay Hatkanangale	2579	31/05/2018	4970/-
9	Pravin Xerox & Mobile Shoppe	90	05/06/2018	5988/-
10	Pravin Xerox & Mobile Shoppe	117	11/06/2018	5988/-
11	Pravin Xerox & Mobile Shoppe	195	20/06/2018	3493/-
12	Sarvadnya Cutlery	845	15/06/2018	4195/-
13	Proprietor Sarvadnya Cutlery	847	25/06/2018	3660/-
14	Proprietor Sarvadnya Cutlery	850	25/06/2018	4270/-

15	Arihant Novelties Hatkanangale	1795	30/06/2018	1160/-
16	Arihant Novelties Hatkanangale	1800	30/06/2018	1167/-
17	Arihant Novelties	1796	30/06/2018	965/-
18	Adinath Computer Sales & Services	825	30/06/2018	14450/-
19	Adinath Computer Sales & Services	824	30/06/2018	8550/-
20	Arihant Novelties Hatkanangale	1797	30/06/2018	1085/-
	Total			104891/-

iv) Hiring Services – From 01/04/2018 to 30/06/2018

Sr.No.	Name	Date	Amount Rs.
1	Kamble Nilesh Dilip	25/06/2018	4000/-
2	Gurav Pravin Shivaji	25/06/2018	13500/-
3	Gurav Pravin Shivaji	30/06/2018	7000/-
4	Kamble Nilesh Dilip	30/06/2018	13000/-
		Total	**37500/-**

v) **Travel & Field work –**

From 01April 2018 to 30 June 2018

Sr. No.	From	To	Date	Amount (Rs)
1	Hatkanangale	Yawatmal	10/04/2018	15000/-
2	Hatkanangale	Nagpur	20/04/2018	15000/-
3	Hatkanangale	Latur	30/04/2018	10000/-
4	Hatkanangale	Beed	10/05/2018	10000/-
5	Hatkanangale	Amaravati	20/05/2018	10000/-
6	Hatkanangale	Nanded	30/05/2018	10000/-
7	Hatkanangale	Solapur	10/06/2018	7000/-
8	Hatkanangale	Pune	20/06/201/8	5000/-
				Total – 82000/-

iv) **Overhead Charges**

Sr.No.	Name	Date	Amount
1)	Hon. Shri. Annasaheb Dange Arts,Commerce&ScienceCollege,Hatkanangale	30/06/2018	51100/-
			Total – 51100/-

.Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College - Hon. Shri. Annasaheb Dange College, Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the Project - 06 July 2016

6.a. Period of Expenditure : - From 01/07/2015 to 30/06/2018 **(Original Period)**

& From 01/07/2018 to 3103/2019 **(Supplementary Period)**

b. Details of Expenditure

Sr. No.	Item	Amount Approved Rs	Expenditure Incurred .2015-16	Expenditure Incurred .2016-17	Expenditure Incurred .2017-18	Expenditure Incurred 01/04/2018 to.30/06/2018	Exp. Incurred 01/07/2018 to 31/03/2019	Total
i.	Books & Journals	50000/-	00/-	12614/-	12956/-	25100/-	00/-	50670/-
ii.	Equipments (As per recomedation)	35000/-	00/-	00/-	1150/-	35000/-	00/-	36150/-
iii.	Project Fellow Rs.14000/- pm	336000/-	00/-	00/-	175000/-	42000/-	119000/-	336000/-
iv.	Contingency	100000	00/-	2208/-	00/-	104891/-	00/-	107099/-
v.	FieldWork Travel Give detail in the proforma at Annexure-VI	150,000/	00/-	14453/-	79000/-	82000/-	00/-	175453/-
vi.	Hiring Services	75000/-	00/-	00/-	39000/-	37500/-	00/-	76500/-
vii.	Chemicals & Glassware	00/-	00/-	00/-	00/-	00/-	00/-	00/-
viii.	Overhead	51100/-	00/-	00/-	00/-	51100/-	00/-	51100
	Total	**797100/-**	**00/-**	**29275/-**	**307106/-**	**377591/-**	**119000/-**	**832972/-**

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Kolhapur M.No. 036961 Chartered Accountants

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 12000/-p.m.			
2.	Post-Doctoral Fellow Fellowship @ 12000/-p.m.			
3.	Project Associate salary @ Rs. 10000/-p.m.			
4	Project Fellow salary @ Rs. 14000/-p.m.	16 April 2017 to 30 June 2018	336000/-	217000/-
	Project Fellow salary @ Rs. 14000/-p.m.	01/04/2018 TO 31/03/2019		119000/-
	Total		**336000/-**	**336000/-**

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of Rs.797100/- (Rs.Seven Lakh Ninety Seven Thousand One Hundred only) sanctioned to Hon.Shri. Annasaheb Dange Arts,Commerce& Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No. F. No. 5-88/2014(HRP) dated 06/07/2016** out of Sanctioned Grant **Rs.797100/ (Seven Lakh Ninety Seven Thousand One Hundred only)** has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission. **Except a sum of Rs.119000/-(One Lakh Ninteen Thousand only) which is spent on Staff Project Fellow after 30/06/2018 which was originally specified** .The total expenditure is incurred of **Rs.832972/- (Eight Lakh Thirty Two Thousand Nine Hundred Seventy Two only)**

Bhaskar B. Patil & Co. Kolhapur M. No. 036961 Chartered Accountants

Principal Investigator **Principal** **Chartered Accountant**

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

17/3/2020

UDIN - 20036961AAAAAW5776

Annexure – V

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

Utilization Certificate

Certified that the grant of **Rs -797100/-/-(Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** sanctioned to Hon. Shri. Annasaheb Dange Arts, Commerce & Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No.F.5-88/2014(HRP) dated 06/07/2016** out of sanctioned Grant **Rs.797100/-(Seven Lakh Ninety Seven Thousand One Hundred only)** has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission. Except a sum of **Rs.119000/-(One Lakh Nineteen Thousand only)** which is spent on Staff Project Fellow after 30/06/2018 which was originally specified .The total expenditure is incurred of **Rs.832972/- (Eight Lakh Thirty Two Thousand Nine Hundred Seventy Two only)**

It is further certify that out of total sanctioned Expenditure **Rs -797100/-/-(Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** the college has already received **Rs.466600/-(Four Lakh Sixty Six Thousand Six Hundred only)** as advance against sanctioned Grant of **Rs -797100/-/-(Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** and balance of **Rs.330500/-(Three Lakh Thirty Thousand Five Hundred only)** is receivable from University Grants Commission.

If as a result of check or audit objection some irregularly is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

Bhaskar B. Patil & Co. ★ Chartered Accountants ★ Kolhapur M. No. 036961

Principal Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Principal

Statutory Auditor

17/3/2020

UDIN- 20036961AAAAAW5776

.Annexure- III

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110002

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1.Name of Principal Investigator - Dr. Yojana Vasantrao Jugale.

2.Dept.of University/College - Hon. Shri. Annasaheb Dange College, Hatkanangale

3.UGC approval No. and Date - F. No. 5-88/2014(HRP)Date 6 July 2016

4.Title of the Research Project - "Sugarcane Economy of Maharashtra"

5.Effective date of starting the Project - 06 July 2016

6.a. Period of Expenditure : - From 01/07/2018 to 31/03/2019 **(Supplementary Period)**

b. Details of Expenditure

Sr. No.	**Item**	**Amount Approved Rs**	**Exp. Incurred 01/07/2018 to 31/03/2019**
i.	Books & Journals	50000/-	00/-
ii.	Equipments (As per recommendation)	35000/-	00/-
iii.	Project Fellow Rs.14000/- pm	336000/-	119000/-
iv.	Contingency	100000	00/-
v.	Field Work Travel Give detail in the proforma at Annexure-VI	150,000/	00/-
vi.	Hiring Services	75000/-	00/-
vii.	Chemicals & Glassware	00/-	00/-
viii.	Overhead	51100/-	00/-
	Total	**797100/-**	**119000**

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Kolhapur M.No. 036961 Chartered Accountants

c. Staff

Date of Appointment -16/04/2017

Sr. No.	Expenditure Incurred	From to	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1.	Honorarium to PI (Retired Teachers Rs. 12000/-p.m.			
2.	Post-Doctoral Fellow Fellowship @ 12000/-p.m.			
3.	Project Associate salary @ Rs. 10000/-p.m.			
4	Project Fellow salary @ Rs. 14000/-p.m.	01/07/2018 to 31/03/2019		119000/-
	Total		**336000/-**	**119000/-**

1.It is certified that the appointment(s) have been made in accordance with the terms and conditions laid down by the commission.

2. It as a result of check or audit objective, some irregularly is noticed , later date, action will be taken to refund ,adjust or regularize the objected amounts.

3. Payment @ revised rates shall be made with arrears on the availability of additional funds.

4. It is certified that the grant of **Rs.797100/- (Rs. Seven Lakh Ninety Seven Thousand One Hundred only)** sanctioned to Hon. Shri. Annasaheb Dange Arts, Commerce& Science College Hatkanangale from the University Grants Commission under the scheme of support for Major Research Project entitled **"Sugarcane Economy of Maharashtra"** vide **UGC letter No. F. No. 5-88/2014(HRP) dated 06/07/2016)** has been fully utilized to the extent of **Rs. 119000/-** (One Lakh Ninteen Thousand only) for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.

Except a sum of Rs.119000/-(One Lakh Ninteen Thousand only) which is spent on Staff Project Fellow after 30/06/2018 which was originally specified.

Principal Investigator **Principal** **Chartered Accountant**

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Bhaskar B. Patil & Co. Kolhapur M. No. 03[illegible] Chartered Accountants

17/3/2020

UDIN - 20036961AAAAAW5776

Annexure-VI

PROFORMA FOR SUPPLYING THE INFORMATION IN RESPECT OF THE STAFF APPOINTED UNDER THE SCHEME OF MAJOR RESEARCH PROJECT

UGC FILE NO. F.No. 5-88/2014(HRP) YEAR OF COMMENCEMENT: 6th July 2016.

TITLE OF THE PROJECT: SUGARCANE ECONOMY OF MAHARASHTRA

<table>
<tr><td>1</td><td>Name of the Principal Investigator</td><td colspan="5">Dr Yojana Vasantrao Jugale</td></tr>
<tr><td>2</td><td>Name of the College</td><td colspan="5">Hon. Annasaheb Dange Arts, Commerce and Science College, Hatkanangle.</td></tr>
<tr><td>3</td><td>Name of the Research Personnel appointed</td><td colspan="5">Mrs. Newase Shital Bhagwan</td></tr>
<tr><td>4</td><td>Academic Qualifications</td><td>Sr. No.</td><td>Qualification</td><td>Year</td><td>Marks</td><td>%age</td></tr>
<tr><td></td><td></td><td>1</td><td>M. A.</td><td>2013</td><td>1055</td><td>66%</td></tr>
<tr><td></td><td></td><td>2</td><td>M.Phil</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td></td><td>3</td><td>Ph. D.</td><td colspan="3">Awarded on 9th Mar.2018</td></tr>
<tr><td>5</td><td>Date of joining</td><td colspan="5">16/03/2017</td></tr>
<tr><td>6</td><td>Date of birth of Research Personnel</td><td colspan="5">15/07/1986</td></tr>
<tr><td>7</td><td>Amount of HRA</td><td colspan="5">-------</td></tr>
<tr><td>8</td><td>Number of candidates applied for the post</td><td colspan="5">05</td></tr>
</table>

CERTIFICATE

This is to certify that all the rules and regulations of UGC Major Research Project outlined in the guidelines have been followed. Any lapses on the part of the University will liable to terminate of said UGC project.

Principal Investigator

Head of the Dept.

Registrar/Principal

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Annexure -VIII

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI - 110 002.

Annual Report of the work done on the Major Research Project.

(Report to be submitted within 6 weeks after completion of each year)

1. Project report No. 2nd –	Annual Term Report
2. UGC Reference No.-	F. No. 5 – 88/2014 (HRP)12 Jan 2018.
3. Period of report: from	15 March 2017 to 31 March 2018
4. Title of research project-	**Sugarcane Economy Of Maharashtra**
5. (a) Name of the Principal Investigator-	Dr. Mrs. Yojana Vasant Jugale
(b) Department.	Economics
(c) College where work- has progressed	Hon. Shri. Annasaheb Dange Arts, Commerce & Science College Hatkanangale
6. Effective date of starting of the project: -	01- 07-2015
7. Grant approved and expenditure incurred during the period of the report-	16 March 2017 to August 2018
a. Total amount approved	Rs. 797100/-
b. Total expenditure	Rs. 501536/-
c. Report of the work done: (Please attach a separate sheet) -	Separate sheet is attached
i. Brief objective of the project -	
ii. Work done so far and results achieved and publications - if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication	Three papers published in 1) Indian Development Reviews ISSN: 0972-9437 2)Indian Economy views and vision ISBN-978-81-8387-740-4 3) Proceedings and papers of 31st National Conversion ISBN: 978-93-8-85456-13-8

iii. Has the progress been according to original - plan of work and towards achieving the objectives. If not, state reasons - Yes the progress has been according to original plan of work & towards achieving the objectives. Review of literature is completed. First two chapters completed

iv. Please indicate the difficulties, if any, experienced in implementing the project- No

v. If project has not been completed, please indicate the approximate time by which it is likely to be completed. - Approximate time one year

A summary of the work done for the period (Annual basis) may please be sent to the Commission on a separate sheet - Work done for the period is attached on a separate sheet.

vi. If the project has been completed, please enclose a summary of the findings of the study. Two bound copies of the final report of work done may also be sent to the Commission. - After completion of the project

vii. Any other information which would help in evaluation of work done on the project. At the completion of the project, the first report should indicate the output, such as (a) Manpower trained (b) Ph. D. awarded (c) Publication of results (d) other impact, if any ----------

Signature of the Principal Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

Principal (Seal)

WORK DONE REPORT

Brief objectives of the project:

1) To study the sugarcane economy of Maharashtra since installation of Nira irrigation canal near Pune in the year 1901.
2) To study the backward and forward linkages of the sugarcane economy.
3) To study the convergent and divergent investments in the sugarcane production activities
4) To study the economics of the byproducts of sugarcane vis-à-vis its industrial uses.
5) To study the socio cultural implications of sugarcane cultivation through its industrial processing
6) To study the carbon trading business through sugarcane crop

Research methodology:

The foregoing exploration introduces the gross methodology of the research problem so far undertaken. However, to be more specific, mapping of the procedure of the methodology is envisaged as under:

Selection of Area and Sampling Size:

The historical perspective of the sugarcane crop is proposed to be reviewed at the outset beginning from contemporary irrigation policy in Maharashtra (1901). The area, production, productivity trades are proposed to be reviewed from 1901 to 2010. The industrial spread of the crop through jaggery and sugar industry is then proposed to be reviewed. The convergent and divergent investment in the crop cultivation will be studied from the Pravara experiment. The organizational transformation of sugar factories from private to cooperatives and cooperatives to private will be of high significance in the orgnisational perspectives.

The cluster group approach will held to study the sugarcane economy. To such cluster groups are very famous worldwide; viz the Warna Sugarcane Economy and Pravara cluster of sugarcane economies. Rest other industrial agglomerations out brakes the scattered phenomenon in the limited cluster of their localities. Hence Warana and Pravara cluster areas are proposed to be selected for identifying the role of sugarcane in the growth indicators like per capita income, per capita investment, per family employment, industrial spread along with pool and push factors, will be assessed by way of randomization and scores scaling techniques. Chi square is proposed to be employed for field work analyses. Exhaustive questionnaire is proposed for both cluster groups. The target group within the cluster group consists of the founder members of cooperative sugar factories. The eye witness respondents will be preferred. The historical accounts will be traced with the other studies and reviews.

Out of 35 district of Maharashtra 26 sugarcane growing districts are divided into six regions viz. Kolhapur, Pune, Ahmadnagar, Aurangabad, Nanded, Amravati and Nagpur. Kolhapur and Sangli districts are fall under Kolhapur region and had 23.49 percent sugar contribution in total sugar production of Maharashtra. Satara, Pune and Solapur districts are fall under Pune region and had 38.73 percent sugar contribution in total sugar production.

Sampling

Sample size was calculated using the formula by Salant and Mr. Don A Dillman n= N/1+N (e)'2 Out of 35 districts in Maharashtra 26 districts are selected on the basis of area of sugarcane cultivation and location of the sugar factories.

All the 26 districts are divided into three zones.

1) South zone
2) Central zone
3) North zone (Khandesh Vibhag and Marathwada Vibhag)

Districts under each zone, total factories fall under each district and OPR capacity of each factory is given in Table No. 1, 2, 3 and 4.

Table No. 1

South zone

Districts	Total factories	OPR capacity(TCD)
Kolhapur	19	67200
Sangli	16	37250
Satara	10	33250
Total	**45**	**137700**

[Table No.2

Central zone

Districts	Total factories	OPR capacity(TCD)
Pune	12	38500
Ahmednagar	18	49900
Nasik	08	14500
Solapur	17	42500
Total	**55**	**145400**

Table No. 3

North zone

Khandesh Vibhag

Districts	Total factories	OPR capacity(TCD)
Dhule	04	7500
Nandurbar	03	8750
Jalgaon	07	13000
Aurangabad	08	15250
Jalna	04	8750
Beed	08	16000
Parbhani	03	4750
Hingoli	03	6250
Nanded	07	13750
Osmanabad	09	17250
Latur	10	17500
Total	**66**	**128750**

Table No. 4

North zone

Marathwada Vibhag

Districts	Total factories	OPR capacity (TCD)
Buldhana	04	5800
Yavatmal	04	10000
Akola	01	2500
Washim	01	1250
Amarawati	03	6250
Wardha	02	3750
Nagpur	03	10000
Bhandara	01	1250
Total	**19**	**40800**

Using the sampling formula, 12 factories are selected from south zone, 15 from central zone and 30 from north zone. Respondents from each district and each factory are divided into marginal farmers (holding half to one acre land), small farmers (holding one to two acres land), medium farmers (holding two to five acres land) and large farmers (holding above five acres land). These respondents are selected from the population on the basis of honored and awarded by the factories as a progressive and rational farmer. Total respondents from each district, selected factories and each category of their size of holding are 450 farmers.

Data collection:

The obligatory data and the information were generated from the primary and secondary sources of data. Secondary source of information has been collected from the published data from annual reports of Indian sugar mill association, annual reports of sugar factories, statistical diary of Maharashtra State Co-operative Sugar Factories Federation Ltd, Mumbai etc. will collected and tabulated. Primary source of data information was generated by conducting the interviews of the respondents.

Data Analysis:

The collected data has been tabulated in an orderly manner in the context of the objectives stated earlier. Keeping in a view the objectives of the study, some appropriate statistical techniques such as averages, dispersion, standard deviation, coefficient of variation coefficient of correlation and regression analysis is used. Moreover, some cartographic devices was used for data analysis by bar graph, regression trend line fit by line graph.

Research Design:

In the first phase of the study, important research works hitherto done on the objectives has been reviewed. The collected data from all segments is suitably tabulated and classified in various chapters.

During second phase of the field work interviews have been conducted by administering the questionnaire. Open-ended discussion was also held effectively.

Chapters in brief:

All information and reviews has been spread over 5 Chapters. The first chapter introduces the methodology of data collection and data analysis. Second chapter

discloses the historical aspects. Third chapter deals with the backward and forward linkages of the sugarcane economy. Chapter four illustrates the convergent and divergent investments in the sugarcane production. Chapter five gives an idea the economics of the byproducts of sugarcane. Sixth chapter envisages the socio cultural implications of sugarcane cultivation through its industrial processing. Chapter seven extends the carbon trading business through sugarcane crop. The last chapter concludes the findings.

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Principal Investigator

Dr. Yojana Vasantrao Jugale
PRINCIPAL,
Hon. Shri. Annasaheb Dange Arts, Commerce & Science College, HATKANANGALE, Dist. Kolhapur.

MAJOR RESEARCH PROJECT

ON

SUGARCANE ECONOMY OF MAHARASHTRA

BY

CHIEF INVESTIGATOR

PRIN. DR. MRS. YOJANA VASANTRAO JUGALE
M.A., M. Phil., M. B. A., Ph. D.

Hon. Shri. Annasaheb Dange Arts, Commerce and Science College,

Hatkanangle, Dist. Kolhapur.

RESEARCH ASSISTANT

DR. SMT. SHITAL NEWSE

UNIVERSITY GRANTS COMMISSION, NEW DELHI

2018

EXPERT REPORT ON THE RESEARCH WORK UNDERTAKEN AS UGC FUNDED RESEARCH PROJECT ON

"SUGARCANE ECONOMY OF MAHARASHTRA"

The commodity studies are location based since the economies of scale work perfectly in the region. Sugarcane is one of the agricultural commercial crops grown in Maharashtra. It has changed the overall outlook of the rural area due to the industry's link with service sector, agriculture sector and agro-industrial cooperative commonwealth.

The researcher has sincerely made an attempt to measure the social-economic aspects of the sugarcane economy in Maharashtra. The research work is scattered into twelve chapters. The work has been analyzed into farm sector vis a vis industry sector performances. The rewards to the farm sector depend on the industrial performances. The industrial cost on the raw material (i.e. sugarcane) constitutes around 75 to 80 percent.

The state's sugarcane economy has been associated with rural-urban inter-linkages. The farm, factory and the consumers are very important segments of the cane economy. The sugarcane economy in the state is politically sensitive due to its organizational structure. The state participation in the cooperative sugar factories obviously imposes control on the sugarcane economy. With a view to identify the linkages and the influence of the sub-sections of the sugarcane economy is the task of the project. The study obviously guide the industry for facing the challenges and for adopting the competitive management strategies for its efficient functioning vis a vis for paying the remunerative price to the sugarcane growers.

I, therefore, recommend for the acceptance of this valuable research work, which can also be published simultaneously. The funds (UGC) have been aptly utilized for carrying out the research on the thrust area. The justice is given to the topic.

I recommend accepting the work done on the sugarcane economy. The research work can be published soon.

Date: **Dr. A. K. Patil**

Place: Karad **Associate Professor of Economics,**

SGM College, Karad.

EXPERT REPORT ON THE RESEARCH WORK UNDERTAKEN AS UGC FUNDED RESEARCH PROJECT ON

"SUGARCANE ECONOMY OF MAHARASHTRA"

The sugar and sugarcane economy has changed the rural life styles and the stance of agricultural development. Sugar industry is totally dependent on sugarcane economy. The sugarcane economy has established various rural-urban linkages. The farm, factory and the consumers are very important aspects of the economy. The sugarcane economy in the states like Maharashtra is politically sensitive due to its organizational structure.

The researcher has sincerely made attempt toill-implications of the sugarcane linkages with farm, factory and the society which are inversely and adversely causing in decelerating the socio-economic life values of the cane growers. The sugar industry has to pay higher prices (state advised prices) than the recommended statutory minimum fair and remunerative prices to the cane producers.

The sugar sector has changed the agricultural life styles and outlook of agricultural development in the sugarcane cultivation zones of the state. Sugar industry is totally dependent on sugarcane economy.

I, therefore, recommend accepting this research work. The research throws the light on various issues of sugar industry and sugarcane related problems. The topic is important to the emerging researchers so it can be published soon. The funds (UGC) have been pertinently utilised for carrying out the research on the selected area. The justice is given to the topic.

I recommend accepting the work done on the sugarcane economy.

Date: **Dr. H. N. Kathare**

Place: Kolhapur **Associate Professor of Economics,**

Rajaram College, Kolhapur

PREFACE

While working on the competitiveness of the sugar co-operatives, I came across the connotation of the sugarcane economy. The sectoral estimation of the gross income assessment was thought essential by CPCS, Bangalore. The methodology, they explored was impressive and reaches the ground realities. This has influences to think the sugarcane economy separately. The project has been further showed up when the UGC, New Delhi has grated financial support to conduct the project independently. There are some references in use from the competitiveness of co-operative sugar, which directs the current project towards the stretch of the sugarcane economy in the Maharashtra state.

Sugarcane in fact is important cash crop in Maharashtra, UP and Karnataka. The rural economy has been flourishing on the better yield and the fair price of sugarcane in the states. Now a day, the environmental foot prints of the sugarcane has been considered eulogistically. It has been investigated that the sugarcane soaks $CO_2$from the atmosphere for preparation of sugar in the stem-leaf joints; ultimately it is an eco-friendly crop, which minimizes the pressure of the climate change.

Recently, the ill-implications of the sugarcane linkages with farm, factory and the society are inversely and adversely causing in decelerating the socio-economic life values of the cane growers. There are various other dimensions of the cane economy including; adverse and beneficial, reversible and irreversible, qualitative and quantitative, actuarial and perceived impacts, which needs subjective and objective assessment in real terms, since it is one of the development project that has been land marked by the socio-economic and political thinkers in some states like Maharashtra, Karnataka and UP.

Cane quality is least cared by the sugar factories. More than 400 sugar mills in India are having the Cane Development Department with only 15 to 20 employees. In private sector this number stands to 100 to 150. Maharashtra, UP and Tamil Nadu are having the positions of Sugar Commissioners and Sugar Directorate under Central Government. The cane quality in these states is not good as compared to other countries, even though the estimation of the crop yield is not perfect and accurate. Consequently, the mills cannot make their crushing schedule flawlessly.

On this background the project has been undertaken for studying the inter-linkages of sugarcane crop in the society and the economy so as to guide the industry for facing the

challenges and for adopting the competitive management strategies for its efficient functioning vis a vis for paying the remunerative price to the sugarcane growers.

The sugarcane economy has established various rural-urban linkages. The farm, factory and the consumers are very important aspects of the economy. The sugarcane economy in the states like Maharashtra is politically sensitive due to its organizational structure. The state participation in the cooperative sugar factories obviously imposes control on the sugarcane economy. With a view to identify the linkages and the influence of the sub-sections of the sugarcane economy is the task of the project.

I thank University Grants Commission for its financial support to the project. Without its support the project could not be materialized. I sincerely thank the management of the Sant Dnyaneshwar Shikshan Sanstha Islampur for their co-operation and support in guiding the project.

While working on this project, so many experts and the followers turn into their valuable comments and reviews for which I ought to be grateful dependably. I thank the industry expert's and Government officials for their help in providing required data information. Particularly, I must thank the Co-operative Sugar Federation of Maharashtra and Vasantdada Sugar Institute for their assistance and services. The work may not be inclusive without expressing my appreciation to my husband Dr. Vasantrao Jugale; Senior Professor of Economics, our beloved son Pramod, daughter-in-law Rina, daughter Dr. Pallavi, son-in-law Dr. Jitesh sweetie granddaughters Aarvi and Marvi lovely grandsons Idhant and Ridhan for their support, love and encouragement to work on this project.

I humbly look forward to the industry persons, critical readers and researchers for their valuable comments and suggestions if any.

Place: Sangli
Date: 04th August, 2019.

Prin. Dr. Mrs. Yojana Jugale
Principal and Chief Investigator

Dedicated

To

To my beloved father

Gopal Chintamani Kulgude

At/Post: Alas Dist. Kolhapur,

Always inspired me for higher learning

CONTENTS

CHAPTER - I

DATA BASE AND RESEARCH METHODOLOGY

The farm and the factory sectors of the sugar industry in India are one of the organized farm practices and organized industries in rural western Maharashtra. The sugar and sugarcane economy has changed the rural life styles and the stance of agricultural development. Sugar industry is totally dependent on sugarcane economy. The industrial linkages have changed the socio-economic and political ethos of the rural Maharashtra. It brings income of more than Rs. 23,000 crores in the form of sugarcane price, which directly goes to the pockets of the cane farmers. Sugarcane is the largest crop grown in Maharashtra, UP, Karnataka and Andhra Pradesh.

In agriculture sector, sugarcane share is about 7% of the total value of agricultural output and occupied about 2.6% of India's gross cropped area. Sugarcane provides raw material for the second largest agro-based industry after textile. More than 7.5% of rural population in India is engaged in sugarcane cultivation, along with 50 million cane growers and 5 million women workers engaged in the sugar industry. Sugar is although manufactured out of sugarcane; it is in fact developed in the cane farms. However, it is the best example of agro-industries. Cane farms are equally responsible for efficient industrial processing. More than 70% of the industrial cost is shared by cane as its raw material.

The sugar industry has to pay higher prices (state advised prices) than the recommended statutory minimum fair and remunerative prices to the cane producers. This issue has created short time uproar in the rural areas during the sugar season. The farmers associations are very aggressive towards sugarcane prices. The cost and revenue, the farmers experience do not match hence, instability is normally observed during the beginning of the sugar season. There is high variability in the yield and areas of sugarcane around the Indian states. A decline in cane crushing period has an unpleasant effect on viability of sugar processing units some times. Simultaneously, the reverse also occurs due to higher acreage of sugarcane plantation. The present work is intended to confine the cane economy and its role in sugar sector. It has various linkages with rural economic activities economically and politically. The whole state remains under the pressure of sugarcane farming, onion, milk lobby. Unionism is becoming the problem solving system in rural Maharashtra.

Box 1

Name of important national and international organizations involved for crop improvement:

A. National:

1. Vasantdada Sugar Institute Manjari (Bk), Tal. Haveli, Dist. Pune, PIN-412307 (Maharashtra)
2. Indian Institute of Sugarcane Research, Rae Bareli Road, Post Dilkusha,Lucknow-226 002 (U.P.)
3. Sugarcane Breeding Institute, ICAR Coimbatore-641 007 (Tamilnadu).
4. National Sugar Institute, Kalyanpur, Kanpur – 208017 (U.P.)
5. U.P.Council of Sugarcane Research Sahjahanpur, U.P.
6. Indian Sugar Mills Association, Ansal Plaza, 'C' Block, 2nd Floor, August Kranti Marg, Andrews Ganj, New Delhi- 110049
7. National Federation of Cooperative Sugar Factories Ltd (NFCSF) Ansal Plaza, Block-C, 2nd Floor, August Kranti Marg, New Delhi.

B. International:

1. International Society of Sugar Cane Technologists, Mauritius,
2. Brazilian Society of Sugar and Ethanol Technologists, Brazil.

1.1. Conceptual framework of sugarcane economy

The word economy has been universally used to define the system of production, processing and marketing perspectives. It is basically a relative terminology since it does not turn into any absolute values to its meaning. It is considered as system analysis eminence in the market believed to be with certain economic parameters starting from land tilling to cultivation of the sugarcane to supply of sugarcane to the sugar factory from where the industrial sector begins. The sugarcane economy and its competitiveness have three dimensions. (Thorne, F. 2004 and Ali Muhammad Khushk and et al, 2011) All three are very essential to concede the health of the sugar industry. The industry has joint sectoral linkages with the sugarcane farm economy, sugar economy along with technological efficiencies and by-products and the consumer's standard of living and the attitude of consumers towards the purchase of sugar at the high prices. The strategic management in all respects vis a vis industrial organization play a significant role in determining the competitiveness of the sugar

industry. Following three dimensions are jointly taken together in the present approach so for defined in this project (quoted in Jugale and Jugale, 2014).

1. Traditional trade theory,
2. Industrial organization theory and
3. Strategic management theory.

The traditional trade theory is useful for analyzing the supply side of the economic trade analysis. Relative price differentials between the countries are the basis of such analysis. The demand components of the trade competitiveness are addressed to the qualitative differences in products, marketing, service abilities and strategies of the firms and industries (McCalla, A.F., 1994).

The financial and business performances of the firms and industries are considered in industrial organization theories of competitiveness. The internal factors of the organization consist of the technological aspects of the sugar industry. The technological factors like boiling house efficiency, crushing capacity, milling efficiency, overall efficiency and supply chain management of the sugarcane are some of the prominent factors, which influence the organizational efficiency of the sugar units in Maharashtra; as the locational factors play a momentous role in determining the technical efficiencies of the industry.

Strategic management theory of competitiveness is more concerned to production, human resource development, influences of technical and non-technical aspects of a particular firm or industry in respect of the national and international markets. The cost advantage can be achieved through standard technological efficiencies, which affect the productivity of labour and capital in the industry. Various external issues prevailing in the sugar industry are well thought-out. The issues like sugar recovery, quality of the sugarcane, its harvest and transport schedule, supply chain management of the sugarcane from farm to factory, payment of fair and remunerative sugarcane prices, strategic management of the by-products e.g. molasses and biogases. Being an agro-industry the sugar production is completely dependent of farm sector i. e. sugarcane and its quality.

1.2 Review of literature

The stochastic production frontier approach (Mehmet Balcilar and Murat Cokgezen) is commonly used in measuring the inefficiencies. To eliminate the inefficiencies lying in the sugar sector is obviously, illustrious to augment the efficiencies in the sugar sector. Normally, technical and non-technical efficiencies are well known in the sugar industry. The co-operative sugar enterprises are very familiar with the sweeping efficiencies in the sugar

sector; but now the results provide empirical evidences and insights for privatisation debate and sugar market in the states like, Maharashtra.

There are two methods available for inefficiency comparisons:

(1) Productivity indicators and

(2) Production and cost frontiers.

The productivity indicators are simple input-output relations such as labour/output and capital/output ratios. Although the productivity indicators are easy to compare; they are incomplete. The frontiers approach recognizes the much more complex nature of interactions between inputs and output. The cost frontiers specify the costs as a function of the level of output and the input prices. The production frontiers reveal technical relations between output and inputs of firms and are preferred when cost data is not available (Mehmet Balcilar and Murat Cokgezen).

The DEA-Malmquist Index is used to calculate the total factor productivity growth of sugar units. The Malmquist's Total Factor Productivity (TFP) Index measures the changes in total output relative to input. This idea was first developed by a Swedish statistician Malmquist (1953). The Malmquist productivity index can be decomposed into efficiency change, technical change and total factor productivity growth. TFP growth is geometric mean of efficiency change and technical change. The DEAP software developed by Coelli (1996) to compute these indices was applied to their work.

The efficiency of a firm has two components: technical (or physical) efficiency and allocative (or price) efficiency. Technical efficiency (TE) measures the ability of a firm to produce maximal potential output from a given input. Sugarcane as a raw material to the sugar sector emanates from the agriculture sector; whose share in the conversion costing of the sugar remains more than 65-70 per cent. Allocative efficiency (AE) measures the ability of a farm to utilise the cost-minimizing input ratios or revenue-maximizing output ratios. This is a burning issue as for as the Statutory Minimum Price/Fair and Remunerative Price (SMP/FRP) of sugarcane is concerned. One needs to be technically efficient before one can be allocative efficient and attainment of both is required for economic efficiency (Coelli, 1996).

Competitiveness of the sugar industry can be measured with the help of various indicators. The concept of competitiveness is synonymous to the concept of efficiency; which includes various aspects of the sugar activities like; spatial and locational level (e.g. high sugar recovery zone of the state), economic and political factors (an ideology of Pragmatism, agro-industrial co-operative commonwealth and co-operative movement with vertical and

horizontal links etc.) as well as on a timely levels of harvesting and crushing the cane (short term, long term) etc. These abilities are based on various factors. The firms' cost levels are influenced by cane prices and the conversion costs of sugar and interest rates to be paid for various loans borrowed for the smooth functioning of the sugar units. On the other hand the firms' productivity is based on the cane variety and the unit costs of sugarcane. Besides, competitiveness is influenced by national/state policies concerning taxes, regulations and subsidies. The performance sugar production is influenced by the following location factors:

	Field (Beet/Cane Production)	Factory (Processing)
Natural location factors - soil type - temperature - rainfall - topography	- cane variety - sugar recovery, - irrigation/draining, - possibility of machinery - fertilizers applied - crop protection measures - cane harvesting and transporting efficiencies	- crushing campaign - maintaining the crushing time table - technical efficiencies like; ROE, RBHE,
Economic location factors - opportunity costs of labour, land and capital - internal and external economies - working capital management -productivity	- input prices - terms of trade- competitive and complimentary - wages, land prices and interest rates of the crop loans -unit cost	- conversion cost -unit cost - efficiency in maintaining the tangible and intangible asset of the sugar units - unit cost
Political location factors - subsidies - product consumer prices - factor prices - competitive cane prices - state support - agitations and strikes	- beet/cane prices, - Prices of irrigation water, energy etc. - carbon credit	- sugar prices (domestic and export), - Prices of the by-products and energy etc. - co-generation - ethanol production - processing and by-products of molasses
Govt factors - tax policy - Govt expenditure	- purchase tax and other taxes on income, property and energy etc.	- taxes on income, property and energy sources etc.
Regulations - social standards - environmental Standards	- non-wage labour costs, - costs, caused by regulations for fertiliser and pesticide use	- non-wage labour costs, - costs, caused by regulations for air emissions, effluents, waste

Source: This table is based on Beate Zimmermann and Jürgen Zeddies, International Competitiveness of Sugar Production

The sugar industry in the state is linked with all above factors since most of the sugar factories are formed in cooperative principles. The private sector in the industry is an outburst

of the cooperative sector since the proprietary belongs to the cooperative leadership. Hence, it would be interesting to study the technical and non-technical inefficiencies in the industry vis a vis the private and cooperative sector.

Sunil Kumar and Nitin Arora (2012) have assessed the literature on the measurement of technical efficiency, which provides two competing approaches for estimating the relative efficiency across firms using the best practice frontier:

i) Non-parametric data envelopment analysis (DEA) approach; and

ii) Parametric stochastic frontier analysis (SFA) approach.

They have used the overall technical efficiency (OTE) score as the yardstick of performance, which was dependent on the internal sources of managerial (proxies by pure technical efficiency (PTE)) and scale efficiencies (SE) as well as external sources like profitability, availability of skilled manpower and capital intensity etc.

Singh (2006a) utilized data for 65 private sugar mills operating in six major states viz., Uttar Pradesh (U.P.), Bihar, Punjab, Andhra Pradesh, Karnataka, and Tamil Nadu. The data was obtained from Prowess database provided by the Center for Monitoring Indian Economy (CMIE). Using the non-parametric DEA technique, the study observed that 38 per cent and 60 per cent of sugar mills have attained the status of globally and locally (efficient under VRS assumption) efficient firms respectively. The prevalence of increasing returns-to-scale (IRS) has been observed in 60 per cent of the inefficient sugar mills, signifying the urgent need of increasing the plant size. Singh (2006b) further has utilized the technique of DEA to analyze the efficiency of 36 sugar mills of Uttar Pradesh (U.P.) operating during the year 2003-04.

Methodology applied

Sugarcane is a kind of grass that thrives well in tropical and warm areas. It requires high amount of rainfall, rich soil, high temperature and high amount of fertilizers. Sugarcane production system uses the economic importance of cultivation, motives of the farmers behind this, it's processing and marketing, fair prices paid to the cultivators and economic and political implications of the crop cultivation in a region also economic implications and potential productive diversification with co-product and by-products (Rachel Murphy, 2017).

The CBPS, Bangalore has developed the income accounting devices for the crops like sugarcane and its linkages with other activities in the rural as well as urban economies.The state of the sugarcane crop economy has been intensively taken together for measuring the State GDP in concern to the sugarcane only. The forward and backward linkages of the economy are measured at the current prices. Following factor are jointly taken care of for

measuring the strength of the economy. The crop SGDP has been further taken up for comparing the overall SGDP of the Maharashtra state.

Of late, the sugar industry finds itself entangled in a complex web of problems leading to declining profitability of the cane growers as well as sugar factories. The reasons have to be traced and suitably addressed to incentives the sector for the interest of so many dependable entities in the rural economy. In one of the studies conducted by NABARD (2010) extends that the sugarcane is the only source of sugar and therefore, any mismatch between demand and supply of sugar in the country assumes significance at the national level and influences the economics of sugarcane cultivation to a great extent. The fixing a remunerative sugarcane price on one end and pressurizing sugar mills to make payments within a reasonable time on the other end encouraged farmers to put in more area under the sugarcane crop. The movement of sugarcane crop from the farm to the factory motivates to understand the nature of production conditions, production linkages and the bye products highlighting demand-supply mismatches, Govt policy towards the industry has been the thrust of the present study.

The technical and non-technical efficiency norms of the sugar co-operatives have been developed by the Vasantdada Sugar Institute, Pune; a premier institution to guide the sugar co-operatives in Maharashtra. The technical measures are designed by Gundurao and Mittal. The private sector follows varieties of matrix and efficiency norms. Professionalization is measured on the international bases. The technical and the non-technical efficiency norms analyse the comparative performances of the co-operative sugar units. The reduced overall efficiency (ROE), reduced mill efficiency (RME), reduced boiler house efficiency (RBHE), pol percentage, CLRF, cane and mill related efficiencies are some of the technological efficacy norms followed by the VSI. These efficiencies are optimised at all layers of the sugar co-operatives except one or two efficiency norms. However, these efficiencies can further be amplified through turn around management of the sugar factories in general and the sugarcane in particular. Sugarcane economy has a direct link with the economy of the sugar factories as they are controlled by the cane cultivators themselves. Even the State intervention in the day to day functioning of the co-operative sugar factories compels the Sugar Managers to follow the second best (political economy norms) alternatives rather the first best (only economic norms). These are the basic differences of the private sector sugar factories and the co-operatives. Co-operatives are having much favourable atmosphere than the private. The private sector has no guarantee of sugarcane supply unless they make a contract with cane suppliers (may be farmers or middlemen). They are purely

dependent on the 'gate cane' purchase of the cane. Even the co-operatives also need to register the members' cane supply first and then only they can go to the open market 'gate cane' purchase from the non-members in the case of shortage of cane supply. The co-operatives have a guarantee of cane supply since their members grow the sugarcane. The sugar economy, sugarcane economy, product mix and product flexibility, export and raw sugar initiatives, decontrolling devices, workers and their efficiencies, depolitisation of the co-operatives, effective linkages in all processing activities and the policy initiatives of the Govt towards the industry are the important segments of our analysis. Under the circumstances, our confession with the co-operatives sugar factories is that, if they are managed professionally with forward and backward linkages, they can perform better than the private. The farm sector is the significant aspect of co-operative sugar industry. The sector is further analysed with respect to the 97th Constitutional Amendment.

These indicators are considered while assessing the technical performances of the sugar co-operatives. The non-technical indicators are also taken up as they help to improve the productivity of the co-operative sugar units.

1.3 Objectives of the study

The overall objectives of this book are, to analyze the competitiveness of the sugar industry in Maharashtra. This research attempts to make an in-depth study of the sugarcane farm and sugar industry. The qualitative and quantitative data is collected to analyze the competitiveness. Based on the above considerations, the research work has governed the key objectives as under:

1. To study the structure of sugarcane and sugar production.
2. To analyze costs and returns of sugarcane and sugar production.
3. To examine the competitiveness of the sugar industry and identify indicators of competitiveness.
4. To develop a strategic road map for the sugar factories for improving the competitiveness.

1.4 Hypothesis and research questions

The indispensable module of competitiveness of co-operative sugar is interesting since the co-operative sugar are not being paid apt retort by the State and Central Govts as earlier during the neoliberal policy period. The policy inventiveness like decontrol and delicensing, removal of the quota system and levy system though appears to be not affable to the co-operative sector, are really an opportunity to improve themselves. Moreover, all components of competitiveness of the co-operative sugar are acting in response towards the

struggle with the private sugar units in the state of Maharashtra. Thus, the hypothesis of this project is that higher competitiveness of domestic sugarcane growers and sugar industry can improve their competitive performances endowed with the strategic competitiveness in the national and international markets. To evaluate the competitiveness of sugarcane and sugar production under the co-operative sector would be an opportunity to prove better even with the lessening status of the co-operative sector. The research work thus focuses on the following research questions:

1. What is the current situation of the sugar industry and sugar market in India and the world?

2. What are the important barricaders or limiting factors toward the competitiveness of the sugarcane growers and sugar industry?

3. How can the sugarcane growers and sugar industry be improved at low production costs? What are the strategies for improving the competitiveness of the sugar industry?

4. What are the government policy implications to help sugarcane growers and the sugar industry in India and Maharashtra?

1.5 Sources of data collection and period of study

The data and the period of study are significant to determine the competitiveness. Collection of the primary data is hazardous and vague if not confined properly. The secondary source of data is enough to prove the competitiveness of the industry. This study focuses on comparing the sugarcane and sugar data during the neoliberal policy period i. e. from 1992 to 2017 onwards. Informal field work and interviews were carried out with the people involved in sugarcane and sugar production activities in the specific localities. Additional secondary data were reviewed to support the research. The data source used in this study consists of only secondary sources mainly collected from Vasantdada Sugar Institute, Factories' federations and the Govt Departments. Data was collected for the period from 1992 to 2017 (15 years of neoliberalism). This research work was conducted in the Maharashtra state. However, some references are interpreted at the national and international levels too.

1.6 Tools of investigations

The main constituents of competitiveness are jointly taken together for reviewing and revitalizing the functioning of the co-operative sugar in the State. The co-operative sector after neoliberal policy initiatives, however, should undertake a strategic leap forward with restructuring their organizational and strategic set up. Although the ownership dilemma is the main factor of competitiveness, however, it has been discussed in the context of proficient execution of the industry.

The sugarcane economy has been looked at in the milieu of its varieties, quality, sugar recovery and the supply chain management from field to factory. Irrigation water and fertilizer applications are unscientifically knobbed in the farm practices. The supply chain management of the sugarcane dismantles with the increasing crushing capacities of the sugar factories.

The entire analysis is devised multiparty with the turnaround managerial requirements for leveraging the technical and non-technical efficiencies in the sugar industry. Sugarcane economy, sugar economy, technical efficiencies, economics of sugar recovery, ecological refugees and the sugar industry, economics of by-products, export competitiveness of sugar and the road map for the development of the industry for next decade are the main area of exploration.

The technical efficiencies as defined by the VSI are taken up for interpreting the performance during the crushing seasons. Following technical indicators are notably taken up for analyzing the competitiveness.

1. Pol percentage for 2000 TCD (1987 specifications) 2.3 per cent, for 1250-2000 TCD (1973 specifications) 2.6 per cent.
2. Final purity of molasses 30 per cent
3. Loss of cane juice in press mud 0.07 per cent to 0.10 per cent
4. Normative loss should include biogases, molasses, press mud and other undetermined losses
5. Pol percentage can be measured on the basis of normative losses
6. Last five year's sugarcane quality and productivity
7. All above norms should be applied to factory wise/ zone wise
8. 100 per cent capacity utilization
9. Waste of time only 10 per cent
10. While planning for the crushing season, cane availability and quality of cane should be considered
11. Consumption of steam at rate of 25 to 27.5 per cent

1.7 Chapters in brief

The first chapter introduces the problem and area of the study. The parameters are defined to arrive at the proper data collection. Chapter II and III simultaneously explains the competitiveness in sugar production and supply chain management of the sugar industry. The technical and non-technical factors are discussed in the corresponding chapters. The economics of sugar recovery, technical efficiencies, decontrol and delicensing of the sugar

industry, ecological refugees and the road map for the corresponding growth of the sugar industry are devoted with each chapter in support of the data information so for collected.

1.8 Conclusions

The sugar industry plays a significant role in the states like UP, Maharashtra and Karnataka. The industries' competitiveness will help them to explore proper policy initiatives. Unfortunately, the industry during neoliberal policy initiatives is found in turbulence to cop up their industrial demands. The farmers always receive soft corner by the policy makers to sustain their livelihood. Even though, the farmers are not getting remunerative and fair prices for their produce. But they continue to lodge the sugarcane, because the sugarcane crop is sturdy and labour saving. It provides employment to the ecological refugees of the state during the season. The road map at the end will steer the industry for next generation development outlook.

Notes:

Following websites and national and international institutions are useful and informative for farmers, development officers, policy planners and scientific community.

Indian Sugar Mills Association (ISMA), Sugar House, 39, Nehru Place, New Delhi-110 019. E-mail: sugarmill@nda.vsnl.net.in

National Federation of Co-operative Sugar Factories Ltd., (NFCSF), Vaikunth (3rd Floor), 82-83, Nehru Place, New Delhi-110 019. E-mail: nfcsf@ndb.vsnl.net.in

All India Distillers Association (AIDA), 805, Siddharth, 96, Nehru Place, New Delhi 110 019. E-mail: distiler@vsnl.net.in

The Sugar Technologies Association of India (STAI), 21, Community Centre, East of Kailas, New Delhi 110 065. E-mail: staidel@vsnl.net.in

Indian Sugar and General Industry Export Import Corporation Ltd., 21, Community Center, East of Kailas, New Delhi 110 065. E-mail: isiec@ndb.vsnl.net.in

Sugar Technology Mission, D-5 Apartment, Qutab Hotel, New Mehrauli Road, New Delhi 110 016.

Website of advisory services to farmers:

www.up.cane.org .

http://www.upcane.org/sis/en/index.asp

http://www.sugarindia.com/glossary.htm

http://www.vsisugar.com

http://www.fcamin.nic.in/dfpd_html/index.asp

http://www.cogenindia.org/default.asp

http://www.staionline.org

http://ncdc.nic.in/index.php

http://www.coopsugar.org

http://www.indiansugar.com

http://www.tifac.org.in/index1.htm

http://nsi.gov.in

www.sugarcaneweb.co.uk

www.bonsucro.com

www.issct2013.com.br

www.sugarcane.res.in

www.wsro.org

www.upcane.org

www.sugarcaneweb.co.uk

www.vsisugar.com

www.sugarbazar.com

http://www.issct.org

CHAPTER II

HISTORICAL PERSPECTIVES OF SUGARCANE RISING

Sugarcane cultivation in India dates back to the Vedic period. The references are found in Indian writings of the period 1400 to 1000 B.C. It is now widely accepted that India is the original home of *Saccharum species. Saccharum barberi* and *Polynesian* group of island especially New Guinea is the centre of origin of S. *officinarum.* It belongs to family Gramineae (Poaceae), class monocotyledons and order glumaceae sub family panicoidae, tribe Andripogoneae and sub tribe saccharininea. The cultivated canes belong to two main groups: (a) thin, hardy north Indian types *S.barberi* and *S.Sinense* and (b) thick, juicy noble canes *Saccharum officinarum*. Highly prized cane is *S. officinarum*. The genus *Saccharum* has five important species viz. 1. *Saccharum officinarum, 2. S. Sinense, 3. S.barberi, 4.S.robustum, 5.S.spontanuem.* The first three species are the cultivated species and the last two are wild ones. S. officinarum species is widely cultivated in India because of high sucrose content.

About 525 working sugar factories were located in the country during 2018-19 with total crushing capacity of about 335 lakh tons. The sugar industry is an instrumental in generating the sizable employment in the rural sector directly and through its ancillary units. It is estimated that about 50 million farmers and their dependents are engaged in the cultivation of sugarcane and about 0.5 million skilled and unskilled workers are engaged in sugar factories and its allied industries. The sugar industry in India has been a focal point for socio-economic development in the rural areas by mobilizing rural resources, generating employment and enhancing farm income. Some of the sugar factories have also diversified into bye-products basis industries and have invested and put up distilleries, organic chemical plants, paper, ice board factories and cogeneration plant.

Sugarcane is one of the basic raw materials of the sugar industry. The sugar sector has changed the agricultural life styles and outlook of agricultural development in the sugarcane cultivation zones of the state. Sugar industry is totally dependent on sugarcane economy. Sugarcane economy has a more than hundred years of history in Maharashtra. It has changed the socio-economic and political ethos of the rural life. It brings income of more than 23,000 crores in the form of sugarcane price. Sugar industry is 2nd largest industry after cotton and sugarcane is the largest crop grown in western Maharashtra after paddy and soya. Sugar industry accounted for around 1% of GDP of the country during FY2005. Further, sugar

industry contributes an estimated Rs. 17 billion annually to national exchequer and treasuries of various state Governments by way of excise and purchase tax on Sugarcane. More than 7.5% of rural population in India is engaged in sugarcane cultivation, along with 50 million cane growers and 5 million women workers engaged in the industry.

The purpose of this chapter is to introduce how the ownership dilemma has been shifted from private to co-operative sugar enterprises during 1950s and co-operative to private during the reform period after 1990s.

2.1 Speedy expansion

A British company had established a sugar factory in 1919 at Haregaon in Ahmadnagar district of the Bombay Province. Walchand Group had then erected a sugar factory at Walchandnagar in Pune district in 1930. Government of India granted fiscal protection to sugar industry in 1932. In 1933, the sugar factories came into existence in Phaltan, Kolhapur and Rawalgaon. It is being followed by Belwandi, Malinagar and Tilaknagar in 1934. Two more sugar factories were established at Sakharwadi and Shripur in 1939. Changdeonagar and Laxmiwadi came up in 1941. All these sugar factories were organized under private sector. There were 12 sugar factories working in the Maharashtra state.

Chalisgoan Bagaitdar Sangh (Irrigators Association of Forty Villages) had been held a conference of irrigators in 1945 under the chairmanship of Dr. D. R. Gadgil. A proposal for establishing a sugar factory on co-operative basis was mooted and upheld unanimously. Formerly, these irrigators of forty villages were cultivating the sugarcane for the sugar factories run by the private organization. It was decided in the conference that a co-operative sugar factory should be initiated under the leadership of Vitthalrao Vikhe Patil. He took up the challenge for Pravara Co-operative Sugar Factory. This sugar factory becomes the precursor of sustained co-operative sugar industry movement all over the country. The agro-genetic capital in the area of western Maharashtra (Satara, Sangli and Kolhapur districts) is a reward to the sugar industry with high sugar recovery in the southern districts of Maharashtra.

Co-operatives in the state have connected to two modernistic ideas; viz the idea of national self-sufficiency and self-organization and the idea of the market-directed economy of scale. (Peter Simonic) Sugar co-operatives are the egalitarian (democratic) and economically competitive vis a vis social groups in the region. Neoliberalism took the system towards the opposite direction, where the situations like; community deconstruction, indebtedness, privatization and greater externalization of costs exist. (Peter Simonic)

The total number of co-operative sugar factories has increased to 173 within a period of next five decades after 1950s. All private sectors except four were merged under co-operative set up. The number of private sugar factories has declined till 1990. But in the era of New Economic Policy, the private sector sugar factories have again increased from 04 to 22. Government policy is favourable to increase the sugar factories in private sector during the neoliberal policy period. Simultaneously, the area under sugarcane and production has increased. Co-operative sugar factories have started the Cane Development Department under which they were supported to the cane growing farmers for growing the sugarcane crop in the operational areas of the co-operative sugar factories.

From last sixty five years the installed capacity of sugar factories in Maharashtra has been increased rapidly. Number of sugar factories has adopted the modern technology for the production of sugar. The investment in sugar factory has also increased. The installed capacity of co-operative sugar factories has been increased by many folds.

India is having 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. No co-operative unit has been established in Maharashtra so for during the neoliberal policy period.

Most of these processing units work for six months in a year (September to May) and the capacity varies from 750 to 10,000 tons 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 ton), rectified spirit (Rs.25 per liter) and bagasse (Rs.1,200 per ton) are not enough to pay farmers and is an area of concern. Table 1 indicates the growth of sugar units in India during the last five years.

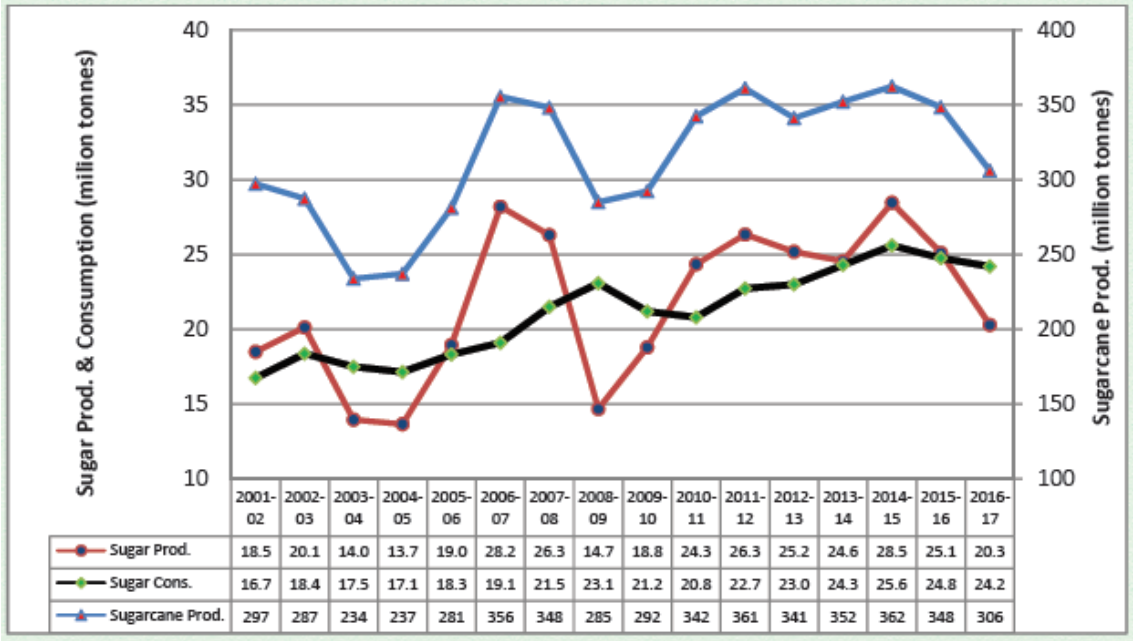
Table 2.1

Growth of Sugar Industry in India

Years	No of factories in operation	Cane acreage (000 hectares)	Sugarcane production (lakh tons)	Molasses production (000 tons)
2009-10	490	4175	2923	8400
2010-11	507	4885	3424	10970
2011-12	529	5100	3538	11824
2012-13	526	5279	3544	11744
2013-14	509	5341	3456	10882
2014-15	538	5307	3668	12482
2015-16	526	5284	3369	10837
2016-17	493	4945	3036	9026
2017-18	525	5042	4110	14063

Source : ISMA

Chart 1.1: Trends in Production of Sugarcane, Sugar and Consumption of Sugar



	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Sugar Prod.	18.5	20.1	14.0	13.7	19.0	28.2	26.3	14.7	18.8	24.3	26.3	25.2	24.6	28.5	25.1	20.3
Sugar Cons.	16.7	18.4	17.5	17.1	18.3	19.1	21.5	23.1	21.2	20.8	22.7	23.0	24.3	25.6	24.8	24.2
Sugarcane Prod.	297	287	234	237	281	356	348	285	292	342	361	341	352	362	348	306

Source: DES, Ministry of Agriculture and Farmers Welfare and Directorate of Sugar, DFPD

India stands next to Brazil in area and production of sugarcane. In terms of productivity, India stands tenth in the world with 62 tons of sugarcane yield per hectare. The sugar industry is one of the leading agro industries after cotton textile in India. The per capita

consumption of white sugar in India has increased substantially from 4.80 kg in 1960-61 to 19.10 kg in 2007-08 and that of *gur* and *khandsari* has decreased substantially from 15.20 kg to 4.50 kg during the same period. About 7.5 per cent of the rural population covering 50 million sugarcane farmers, their dependents and a large number of agricultural labourers are involved in sugarcane cultivation, harvesting and ancillary activities. About half a million skilled and semi-skilled workers, mostly from the rural areas are also engaged in the sugar industry (NABARD, 2010). More than 5 million hectares of land is used for sugarcane cultivation. The industry contributes about Rs.1650 crores to the central exchequer as excise duty and other taxes annually. Besides, the State Governments realize about Rs.600 crores annually through sugarcane purchase taxes, cess etc. The total value of sugarcane produced in the country is estimated at Rs. 24,000 crores per year. The overall transaction of the industry is estimated to about Rs 80,000 crores. The total cane payment stands to Rs 55,000 crores, which is directly paid to the cane growers without middlemen. More than 65 per cent of sugar is consumed by the bulk consumers. The industry is located in rural areas; perceptibly it helps to develop rural area and provides employment opportunities to rural youths. India, the world's second-biggest sugar producer after Brazil, is estimated to produce 24.4 million tons of the sweeteners in the 2013-14 marketing year (October-September), sufficient to meet the domestic demand of 23.5 million tons. During the current season (2013-14), 157 factories, 96 cooperative and 61 private ones, have so far crushed 42.5 million tons cane, to produce 4.8 million tons of sugar at an average recovery of 10.92 per cent.

2.2 From Private to Cooperatives and vice versa

The Maharashtra state emerged as a leading state in India regarding the production of sugar. The highest productivity of sugar industry in Maharashtra as compared to the India’s average is also noteworthy. Higher recovery of sugar has been obtained by sugar factories in Maharashtra, which remained from 10.47 % to 13.0 % as compared to all India average of 10 %.

The development of sugar co-operatives in Maharashtra is due to the favourable controlled policies of the State and Central Govt. The co-operative sugar factories are strictly the farmer’s factories. As a result, farmers have keen interest in the development of sugar co-operatives. They have become central agencies of further economic efforts and development within their own area. Once a co-operative factory begins, the functioning in an area; the farmer members have realized the advantages of the co-operative efforts. They look forward to the expansion of facilities which can be made further available through the society. The development of sugar co-operatives in Maharashtra has to be largely ascribed to leadership of

late Yashwantrao Chavan. The role of political leaders became the co-operators, which led to the growth of sugar industry in the state economy. The involvement of government with Shree Vikhe Patil, eminent thinker and Prof. D. R. Gadgil was the important person for the growth of co-operative sugar factories on a large scale in 1950s.

Sugar industry is one of the important organized industries in India and the states like Maharashtra, dependent in a major way on unorganized sector. Since the industry was organized on the principles of co-operation, its responsibility ought to transform the rural life styles. The socio-economic life of agriculturists since its institution has undergone a complete change. Pandit Jawaharlal Nehru, Dr. D. R. Gadgil, Vaikunthbhai Mehta, Yashwantrao Chavan, Vitthalrao Vikhe Patil, Dr. Vasantdada Patil were the pioneers in bringing the ideology of Agro Industrial Co-operative Commonwealth (McKinsey Model of agro-industrial linkages) into practice. The rural employment – both in agriculture and in industrial sector, has risen phenomenally since the inception of sugar factories in Maharashtra.

There are 302 private sugar mills and 221 units under co-operative sector in India. The installed capacity of total units in India is 5.89 lakh TCD per day. The Maharashtra state has 229 sugar units of which 196 belongs to cooperative sector, rest 33 units in private sector. The number of private units is increasing in the state. The state has granted 92 more private sugar factories in the year May, 2011. (Sanjay Jog, Business Standard, 27th May, 2011).The private sector has been anticipated to grow considerably over the next couple of years. Of the total units in Maharashtra 48 were not operating during 2016-17. Only one sugar factory has been registered under co-operative sector during last few years. It has been anticipated that 80-90% of the sugar factories will be owned by the co-operative sector. There are comparative advantages to the co-operative factories over the privately owned sugar factories.

The co-operative sugar industry is entangled in a complex mesh of evils leading to declining profitability to the cane growers in particular as well as sugar industry in general. The reasons need to be addressed to give boost to the industry. Particularly, the co-operative identity of the sector desires to be maintained for the welfare of the farmers in particular and rural economy in general. The millers and the farmers should maintain their rationality in farm and factory activities. The global perspectives of the industry necessitate studying the economies of farm and factory in detail. For the interest of the cane growers and their own co-operative sugar units, we preferred to toil on the co-operative sugar factories in the State of Maharashtra.

2.3 The State's Difference

Sugar and sugarcane economy plays a significant role in political and economic pitch of the Maharashtra State. The rural economy has been retained active through this economy both in political and economic atmospheres. The "sugar barrens" mostly politicians have a political hold in rural politics through co-operative network, subsequently, co-operative economy is vertically and horizontally linked to other input sectors and services sectors like; credit, irrigation, purchase and sale societies, agricultural produce marketing, dairy and other processing activities etc. There is an effective tie-up among the cane growers, co-operative banks or credit societies and sugar factories. Consequently, the selfishness of the politicians has been sprouted of late. The politics of development (Baviskar, 1986) has been reversed to development of politics through co-operatives (Jugale, 2012). And this has caused an agrarian distress against the agro-industrial politicians from the stakeholders in rural area. The politicians' self-interest has caused the non-profitable functioning of the sugar co-operatives. The sickness of the industry is disquieting. The co-operative units have been renovated into private enterprises. Five decades ago the private sugar units have been transfigured into co-operatives. Now, the privatization of the co-operatives is on move with aggressive support from the stakeholders i.e. the members of the sugar co-operatives. A peculiar transformation is gearing on to a crusade of privatization. Hence, it is much worried. Some people and mostly the farmers' unions are in favour of this ownership change. Long back, in 1950s, one of the leading trade union leader; Kishor Pawar was against the expansion of the sugar co-operatives due to the reason that the co-operative sugar factories are run by the member farmers and the member sugar workers. Workers are the members of the cane growers' families. Management belongs to the farmers and the workers. So, any trade union action hardly becomes effective or ineffective. Now, the farmers as its members are not happy with the co-operative management. But, surprisingly, the management gets elected from the farmer members unanimously. The group which fails to acquire power goes against the management in rule. Opposition no doubt, brings efficiency in the management. Since 1980s awareness among the farmers has been created. Now farmers are under the impression that any management which comes to power is habituated to exploit the cane growers. Rampant corruption in the sector induces the sugar sector to fail sick.

Sugar industry is one of the major agro-industrial co-operative commonwealths of the Maharashtra state. The Pragmatism Think Tank *(Phalpramanyawadi vichar*) and the group of Hindi-Economists in Maharashtra were supported to this ideology. The Pragmatism believes in the theory that, it "advocates primarily by practical methods adapted to the existing circumstances rather than by methods which conform to some ideas" (Webster Dictionary).

G.K. Gokhale, Justice M. G. Ranade, Dr. D. R. Gadgil were supporting this ideology. The ideology of agro-industrial linkages has been first considered by G. K. Ghokale and was then practically operated by the veteran political and co-operative activators like; Y. B. Chavan, Vasantdada Patil, Tatyasaheb Kore, Ratnappa Kumbhar, Vitthalrao Vikhe-Patil etc. As a Chief Minister of the Maharashtra, Y.B. Chavan had practically activated the concept through co-operative sugar industry in Maharashtra. Since, the creation of the Maharashtra State in 1960, the sugar industry's linkage with agriculture and services sector (banking, marketing, forward and backward linkage sectors) had strengthened the village economy. Consequently, sugarcane belt become well-known for its vertical and horizontal growth linkages with socio-economic break-through during the 1970s.

Of late, the ill-implications of these linkages are inversely and adversely causing in decelerating the socio-economic life values of the ruralites. There are various other dimensions of this kind of impact including; adverse and beneficial, reversible and irreversible, qualitative and quantitative, actuarial and perceived impacts, which needs subjective and objective assessment in real terms, since it is one of the development project land marked by the socio-economic and political thinkers in the State.

Neither of the industrial persons (alternatively farmers) or the management of the sugar factories is happy nor are the farmers happy towards all such vertical and horizontal linkages; because, the professional management of the sugar factories became scrawny. Sugar prices are falling, the margin against loan on sugar stock is fewer hence, the financial institutions are not ecstatic the farmers are powerless to recover their cost of cultivation. The service providers are also indirectly affected by this triangular trapping effect. The industry is wedged in a decisive triangle trapping effect.

These grass root realities however, cannot be overlooked. In fact, the industry incessantly remained enthralling about so many stanch factors. It is extant only because of the State's prop up. Most of the state supports are obtained in the form of the packages; which in normal cases goes to institutional agencies. In fact, this package is used to fill up the vacuum (gap) created due to this kind of triangular trapping effect. The cane growers are least cared not cared by the government packages.

The cane growers are the owners of the sugar factories, who have mislaid their faith in the co-operative movement, which is again the political economy of the industrial activities, mostly ran by the political leaders of the region. However, some are working well in sugar co-operatives. Those who are nastiest, they are being transferred for private management on convinced conditional basis. The workers, the factory set up and the cane suppliers remaining

the same, the factory under private management is working in profit. There are so many incidences of this nature in the country. The disembodied technological progress (without inputs and technological additions) function works very effectively in this matter, because without adding to the inputs, the factory is managed with only change in the outlook by creating; courage, confidence, and a sense of belongingness among the humane factors of production. Obviously, this mechanism works for a short period, as a matter of psychological effects caused by change in the management. The long term changes although remain still suspicious. The private sector in fact, will survive so long as there is a profit in their industrial entrepreneurship.

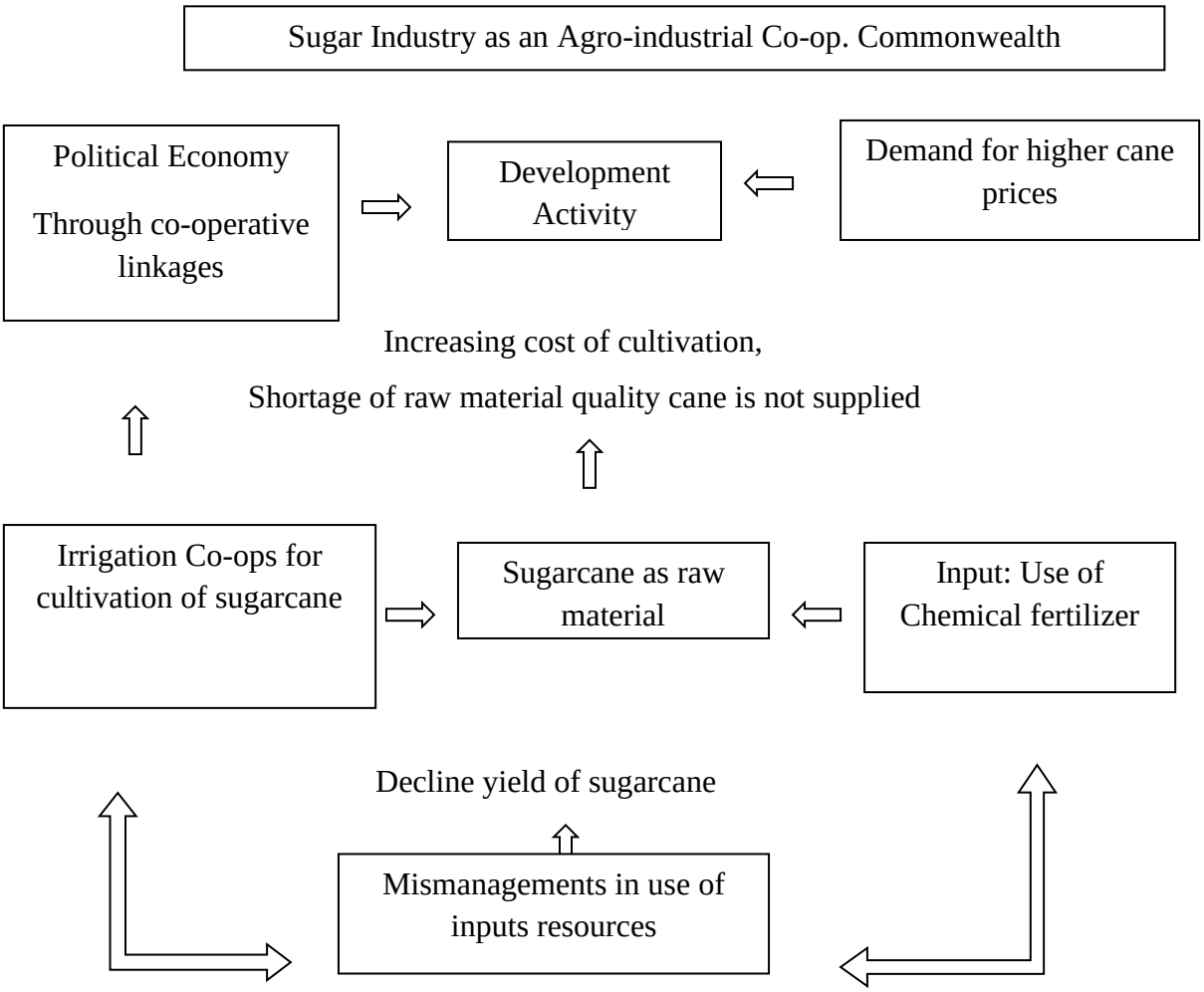
The industrial sickness caused by cyclical situations is one of the weighty problems of almost all-industrial settings. The cyclical situations normally hang about for a short period. The causes, other than this may produce so many worries on the part of the industrialists. In this respect, government protection becomes an inevitable part of the industrial policy. Obviously, when the market fails, the Government has been compelled to intercede with an industrial compassionate policy.

2.4 Political economy of the sugar sector

Sugar industry is an agro-industry, with the Government control. Both sugar and sugarcane are centrally controlled commodities. Besides, more than 60-61% of the input cost of the sugar industry on sugarcane, as a raw material has been again supported by Statutory Minimum Price. Similarly, the price of sugar as a commodity in perfect market is fixed and governed by the market forces. The sugar manufacturers are not the price makers unlike the other industries. In some states, the seed capital is provided by the Government as a part of its partnership policy. The factories have a freedom to manage only the conversion costs consisting of only 25% of the total costs of the industry.

Operationalization of the conversion costs is a mechanical activity. An economic cost in various operations is a wider concept applied to the system. Economic costs are evolved in each operation of industrial or commercial activities. Plunging prices of sugar and increasing costs of inputs causes the industrial sickness of the sugar units. Even mis-priorities and mis-management of the units is another cause of sickness in the sugar industry.

Fig. 2.1



The study has been designed to highlight the economics of costing and also tries to estimate the costing of the various economic activities in the sugar industry. The carelessness of the sugar units in this respect has obviously, caused the problem of sickness crucial.

2.5 Controlled agro-industry

Sugar industry is an agro-industry, with the limited Government control. Both sugar and sugarcane are controlled commodities. Besides, more than 70 per cent of the input cost of the sugar industry (i.e. sugarcane, as a raw material) has been again supported by Statutory Minimum Price/Fair and Remunerative Price. Similarly, the price of sugar as a commodity in perfect market is fixed and governed by the market forces. The sugar manufacturers are not

the price makers unlike other industries. In some states, the seed capital is provided by the Government as a part of its industrial partnership policy. The factories have a freedom to manage only the conversion costs consisting of only 28-30 per cent of the total costs of the industry.

The sugar industry in India is still a controlled industry. The industry is controlled in the following respects.

1. Minimum distance criteria between the mills – it is determined at 15 km, but, it was flexible to 25 km. The various committees have recommended varieties of suggestions in determining the distance between the mills.
2. Import and export control – the timing of import and export are distorting. Objective should be to ensure India becomes net exporter on continuous basis and becomes self-sufficient for domestic needs.
3. Dual cane pricing by Centre and State.
4. Cane area reservation except Maharashtra, Gujarat - farmers is required to supply all cane to the mill. Mills are required to procure all cane produced in the area, even if incurring losses.
5. State Govt. and Central Govt. controls the industry in various other aspects.
6. Sugarcane price is also controlled by both Central and State Govt.
7. Sugarcane cultivation size is fixed.

During the last 50 years, the industry has an experience of control for nine years, under gone under decontrol for 12 years and partial control for 29 years. The industrial viability and the suitability were experienced during the period of partial control of the industry. Today under the aegis of the Rangarajan Committee, there is demand for total (not partial) decontrol of the sugar industry. Even the private and co-operative sector units are in favour of total decontrol. They were favouring some recommendations like levy sugar, zoning of the sugarcane supply, withdrawal of sugar from the Essential Commodities Act etc since long. Release mechanism has been freed now but, this will create a chaos in the supply of sugar with fall in sugar prices. The traders' lobby will strap up the benefits of decontrol.

The sugar industry is delicensed; as a result the aerial distance of the 15 km is the only initial criteria to obtain the letter of intent or permission. The number of private players is high in obtaining such permissions, since Govt has withdrawn the financial support to the industry. So, the industry is stirring to the private sector enterprising rather than going for co-operatives.

CHAPTER III

AREA, PRODUCTION AND PRODUCTIVITY OF SUGARCANE

As the main commercial crop of the Maharashtra state, its area, production and productivity remains higher as compared to the other states in India. Sugarcane crop consumes high amount of water; obviously, the crop is being planted in highly irrigated area of the state. Kolhapur, Sangli and south Satara districts of the state has highest sugar recovery during the seasons. Vidharbha and Marathwada region has lowest sugar recovery in the state. Rest other districts have middle level sugar recovery. Table 3.1 and 3.2 gives the data about the area, productivity and production of sugarcane in the state from 1950 onwards. The Agricultural Statistics at a Glance 2017 shows the actual area under sugarcane in 2016-17 as 4.39 million hectares, production took place at 306.72 million tons and average per hectare yield at 69.88 tons per hectare. The Maharashtra's share in the area during the same period was 0.63 million hectares, production share was 50.64 million tons and the yield rate remained at 74.65 tons per hectare.

Table No. 3.1

Compound growth-rates of area, production and yield of sugarcane since 1949-50

(Base: T.E. 1981-82=100)(% per annum)

Sugarcane	1949-50 to 2007-08	1949-50 to 1964-65	1967-68 to 2007-08
Area	1.78	3.28	1.71
Production	2.87	4.26	2.72
Yield	1.07	0.95	0.99

Source: Agricultural Statistics at a glance, 2008, page 198

Table No. 3.2

Compound growth-rates of area, production and yield of sugarcane during 1980-90, 1990-2000 and 2000-2008 (Base: T.E. 1981-82=100) (% per annum)

Sugarcane	1980-81 to 1989-90	1990-91 to 1999-	2000-01 to 2007-

		2000	08
Area	1.44	-0.07	1.89
Production	2.70	2.73	2.20
Yield	1.24	1.05	0.30

Source: Agricultural Statistics at a Glance, 2008, page 199

Table No. 3.3

Sugarcane Harvested Area in Selected District of Maharashtra (1970-71 to 1998-99)

(in hundred hectors)

S. No.	District \ Year	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
1	Nasik	122	206	298	338	284	234	293	305	245	219	224
2	Dhule	31	82	142	134	137	123	189	236	192	98	101
3	Jalgaon	14	59	117	149	140	107	174	177	143	109	107
4	Ahmadnagar	317	469	532	544	530	305	596	714	546	459	596
5	Pune	154	176	334	352	331	292	390	389	429	409	489
6	Solapur	119	158	397	368	311	328	460	458	506	539	621
7	Satara	93	176	369	362	378	351	441	511	473	426	451
8	Sangli	133	247	249	340	294	218	358	449	445	459	486
9	Kolhapur	399	476	626	665	635	630	836	961	897	882	947
10	Aurangabad	98	184	280	284	246	199	299	329	150	100	158
11	Jalna	00	00	120	120	89	149	200	212	81	38	67
12	Beed	20	55	210	159	140	104	191	224	151	115	202
13	Latur	00	00	123	112	108	105	186	186	212	209	233
14	Osmanabad	75	160	202	204	106	92	176	153	154	154	167
15	Nanded	32	45	130	132	75	85	124	155	143	97	110
16	Parbhani	26	46	117	116	107	96	105	163	160	129	171
17	Buldhana	11	15	27	34	28	11	16	20	13	06	8
18	Akola	05	04	27	29	05	25	20	23	20	19	15
19	Amravati	02	02	17	14	09	11	15	29	28	18	20
20	Yavatmal	05	13	69	71	69	57	63	65	101	68	65
21	Wardha	01	01	10	03	14	16	14	18	31	20	28
22	Nagpur	01	02	04	04	02	08	10	12	11	06	06
23	Bhandara	05	04	13	15	14	14	15	11	31	23	07
24	Chandra	02	01	02	00	02	00	00	00	00	01	00

S. No.	District \ Year	1970-71	1980-81	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
	pur											
25	Gadchiroli	00	00	00	00	00	00	00	00	00	00	00
26	State total	1668	2584	4416	4550	4055	3562	5172	5800	5162	4603	5298

Source: District wise Agricultural Statistics Information of Maharashtra, Part-II, 1999, page 96

The taluka wise position of the sugarcane area under cultivation is exhibited in Table No 3.5. Kolhapur, Satara, Sangli and Solapur districts are dominant in sugarcane cultivation. Particularly, the sugar recovery except Solapur district remains high. Since no other alternative crop provides fair and remunerative prices the farmers are much more interested in sugarcane crop. Besides, other profitable crops as compared to sugarcane are labour intensive. The wages of the agricultural workers are higher and shortage of workforce also compels the farmers to go for sugarcane cultivation. Harvesting of the sugarcane is also managed by the sugar factories. So, there are no hazards of the harvesting of the crop. In other cases the harvesting too costly and labour intensive. A small farmer cannot sustain to higher the workforce. Hence, the farmers are only interested in sugarcane as a monocrop.

Sugarcane is considered as a convenient crop. The cropping pattern does not change due to the unsustainable wage rates in the sugarcane belt. The farmers even very well know the most remunerative crops other than sugarcane, but could not undertake its cultivation only because of the reason of non-availability of agricultural workforce or the high wage rates in the belt. Such crops requires more and timely workforce. Farmers do not get it done in time. Such crops have to be sown and harvested in time. Farmers prefer to accept the monocrop culture due to the vicitudinal behaviour of the agricultural workers. In the Nira canal area this trend is seen. Even in western Maharashtra farmers prefer sugarcane even when it is not sustainable. Looking at the average yield of sugarcane, it is justifiable. Farmers are happy with low yield rate, but don’t want to hire the workers at the higher wages, since such crops have no guarantee of yield due climatic conditions. Sugarcane is sturdy crop to sustain the climate change. Thus farmers don’t change their cropping pattern because of the unavailability and high wage rates of the agricultural workers, mostly in sugarcane belt of the Maharashtra state. Workers exploit the farmers.

Table No 3.5

Taluka wise Sugarcane Cultivation in Maharashtra (000 hectares)

District/Taluka	2000-01	2001-02	2002-03	2003-04	2004-06	2006-08	2006.07	2007-08	2008-09	2009-10	2010-11
Nasik											
Malegaon	48.7	58.3	60.2	61.6	54.2	59.00	60.0	68.0	63.0	68.3	74.6
Baglan	57.1	51.2	77.5	60.7	49.1	29.5	66.0	88.0	81.0	78.7	75.6
Kalwan	83.6	90.9	83.0	88.2	62.6	71.0	80.0	78.0	78.0	73.9	77.0
Devala			69.1	54.7			57.0	65.0	58.0	74.7	93.4
Nandgaon	69.8	89.5	68.7	25.5	62.8	40.0	83.0	73.0	69.0	84.3	91.7
Surgana			73.5								
Nasik	112.4	101.3	111.7	52.8	48.0	49.0	55.0	87.0	52.0	73.1	77.3
Tryambkeshwar			73.5								
Dindori	92.0	69.2	27.8	42.2	54.9	44.1	52.0	73.0	64.0	63.8	61.1
Igatpuri	76.5	155.0	88.3	39.5	62.5	57.0	52.0	66.0	68.0	84.7	69.4
Petne	86.4										
Niphad	113.8	104.9	74.6	49.4	56.3	53.0	72.0	94.0	70.0	69.2	77.7
Sinner	116.5	64.3	129.3	97.9	60.3	80.0	63.0	88.0	66.0	63.9	79.7
Yeola	58.4	46.9	70.1	52.9	53.3	43.0	61.0	58.0	56.0	77.9	80.5
Chandwad	96.9	59.3	40.8	61.0			71.0	80.0	65.0	60.0	70.2
Dhule											
Dhule	43.3	42.4	43.2	59.1	46.2	63.0	73.0	68.0	56.0	67.8	103.2
Safri	84.7	88.7	76.9	67.7	68.4	59.0	76.0	80.0	63.0	76.7	90.5
Shirpur	56.7	65.1	56.9	58.5	66.9	64.0	60.0	75.0	68.0	77.7	84.5
Shindkhed	87.0	88.3	79.9	102.5	47.3	58.0	69.0	58.0	50.0	69.4	58.8
Nandurbar	50.3	57.4	45.7	60.8	64.3	54.0	72.0	78.0	64.0	54.0	73.2
Navapur	73.9	69.8	69.0	51.9	47.8	52.0	67.0	55.0	66.0	53.9	59.4

Shahada	54.9	48.1	64.9	68.8	64.3	70.0	66.0	80.0	79.0	80.2	73.4
Taloda	58.6	63.7	53.8	65.4	70.3	61.0	63.0	71.0	88.0	83.4	84.2
Akrani											
Akkalkua			63.2								
Jalgaon											
Jalgaon	35.6	83.0	67.5	61.4	68.3	52.0	64.0	52.0	70.0	62.2	60.8
Bhusawal	62.2	81.1	64.8	61.6	76.6	63.0	71.0	64.0	57.0	44.6	51.9
Bodvad			79.7	66.7		66.0	42.0	67.0			
Yavala	99.0	85.7	79.3	82.9	69.1	71.0	67.0	65.0	63.0	67.6	77.7
Rawer	62.1	76.7	83.2	71.8	61.6	81.0	79.0	77.0	80.0	70.4	77.2
Muktainagar	76.8		69.1								
Amalner	21.6	54.3	56.8	62.1	62.2	48.0	55.0	56.0	50.0	65.2	65.4
Chopda	67.6	87.1	72.6	78.3	60.5	75.0	80.0	76.0	73.0	69.7	76.3
Erendol	100.9	79.4	72.0	80.7	76.9	66.0	70.0	84.0	74.0	82.0	86.7
Dharangaon		63.1	65.7			76.0	52.0	46.0	54.0	68.4	77.6
Parola	62.2	60.5	41.7	53.9	62.5	40.0	58.0	55.0			
Chalisgaon	75.8	67.5	53.3	52.1	49.8	51.0	48.0	59.0	62.0	82.2	82.9
Jammer	76.8		50.9								
Pachora	65.3	88.9	65.8	52.0	49.6	80.0	55.0	71.0	53.0	69.6	72.4
Bhadgaon	73.7	63.9	69.1	63.8	55.1	72.0	56.0	65.0	76.0	50.0	73.3
A Nagar											
A Nagar	110.6	55.4	50.4	26.0	33.1	40.0	49.0	68.0	72.0	73.0	75.3
Parner	52.2	75.4	64.5	64.3	63.9	67.0	79.0	89.0	83.0	73.8	89.3
Shrigonda	93.1	72.0	97.5	44.3	69.3	99.0	61.0	96.0	82.0	91.0	111.6
Karjat	57.2	71.1	58.2	79.6	36.2	66.0	73.0	80.0	79.0	85.9	80.1
Jamkhed	56.3	41.2	36.8	20.8	36.6	81.0	64.0	62.0	72.0	58.0	67.4
Shevgaon	49.5	20.8	28.8	24.4	55.9	32.0	41.0	53.0	57.0	52.0	57.2
Pathardi	71.3	46.7	95.1	32.4	22.9	39.0	57.0	73.0	38.0	95.8	109.2
Nevas	86.8	68.8	77.1	32.5	59.8	84.0	80.0	83.0	72.0	89.9	94.5
Rahuri	54.4	59.7	62.5	52.2	47.5	65.0	68.0	65.0	94.0	93.0	121.4
Sangmner	67.1	82.8	43.7	88.5	83.3	88.0	55.0	74.0	71.0	72.7	98.1

Akola	81.3	118.7	44.5	51.4	69.7	57.0	61.0	61.0	64.0	66.0	72.0
Kopergaon	69.4	66.3	62.9	48.0	74.0	73.0	77.0	87.0	80.0	77.6	87.5
Rahata			48.4		48.6	85.0	58.0	85.0	77.0	77.6	87.5
Shrirampur	89.0	62.5	65.8	39.2	66.9	73.0	59.0	78.0	71.0	92.0	100.1
Pune											
Pune city											
Haveli	71.4	76.6	92.52	80.8	86.0	85.0	83.0	99.0	96.0	86.9	93.8
Mulsi	88.7		83.6	34.1			74.0	73.0	90.0	81.7	90.0
Bhor	77.9	68.4	60.3	52.5	57.3	63.0	65.0	62.0	51.0	67.0	80.4
Maval	88.7		83.6				84.0	80.0	63.0	54.8	45.1
Velhe	88.7		83.6								
Junnar	113.9	75.1	91.76	68.5	73.0	54.0	79.0	78.0	89.0	87.9	95.4
Khed	88.7		83.6								
Ambegaon	72.9	81.8	89.2	58.5	58.7	90.0	100.0	89.0	87.0	78.0	91.6
Shirur	107.4	95.4	81.75	43.3	66.5	77.0	97.0	110.0	92.0	94.8	124.0
Baramati	80.2	79.9	80.15	61.6	75.5	80.0	87.0	93.0	98.0	108.0	106.3
Indapur	90.2	78.4	83.74	71.5	96.8	106.0	91.0	100.0	102.0	82.0	92.4
Dhound	87.8	91.1	88.71	70.7	81.8	93.0	80.0	98.0	98.0	103.0	102.0
Purandar	93.3	76.6	83.6	66.2	80.1	68.0	45.0	87.0	83.0	76.6	103.7
Solapur											
N. Solapur	73.5	72.2	72.9	62.4	70.6	91.0	68.0	87.0	57.0	93.0	86.7
S. Solapur	93.9	73.6	73.5	30.7	34.8	67.0	91.0	89.0	63.0	90.9	91.7
Barshi	77.5	72.3	57.1		34.3	62.0	65.0	63.0	44.0	53.6	83.2
Akkalkot	72.0	71.8	62.7	42.4	75.5	95.0	71.0	77.0	87.0	90.6	81.9
Mohol	115.7	94.1	90.9	28.6	66.3	92.0	105.0	71.0	111.0	95.0	106.0
Madha							75.0	58.0	68.0	66.8	98.4
Karmala	96.1	69.3	73.4	56.7	66.1	111.0	88.0	92.0	88.0	91.0	106.9
Pandharpur	109.1	68.7	68.2	57.1	89.1	94.0	91.0	98.0	93.0	104.0	107.0
Sangola	82.2	95.4	70.2	39.7	65.7		93.0	94.0	107.0	95.8	107.6
Malshiras	108.2	82.0	93.7	78.0	78.8	94.0	95.0	85.0	94.0	114.8	101.8
Mangalwedha	98.1	86.0	73.0	47.7	60.2	50.0	68.0	77.0	81.0	101.0	89.7

Satara											
Satara	93.2	89.3	97.6	82.8	73.2	77.0	93.0	88.0	91.0	83.0	107.1
Javali	93.8	102.3	85.0	88.7	94.9	104.0	80.0	87.0	94.0	97.7	121.9
Patan	74.3	94.0	89.9	89.4	73.8	94.0	86.0	88.0	82.0	84.0	91.4
Karad	102.6	105.2	106.9	59.9	85.2	91.0	81.0	76.0	88.0	102.0	100.5
Koregaon	90.7	85.1	80.4	59.2	84.0	76.0	83.0	81.0	79.0	78.6	85.4
Khatav	65.5	68.9	75.8			86.0	94.0	87.0	74.0	72.9	85.1
Man	72.3	31.7	67.3	53.8			136.0	112.0	67.0	73.8	83.7
Phaltan	98.2	91.5	110.9	67.4	89.2	101.0	83.0	110.0	82.0	96.0	94.3
Khandala	57.7	69.4	55.4	71.1	77.8	67.0	82.0	95.0	79.0	90.0	104.0
Wai	83.3	87.7	86.4	70.6	95.3	96.0	80.0	77.0	85.0	87.0	99.1
Mahabaleshwar											
Sangli											
Miraj	108.5	79.2	83.8	54.6	90.8	90.0	82.0	102.0	68.0	76.6	99.1
Jath	96.4	96.4	96.4	96.4	96.4	96.0	87.0	85.0	67.0	89.0	97.9
Khanapur	53.5	65.2	43.4	43.6	81.0	75.0	102.0	88.0	92.0	82.0	96.1
Walva	101.8	120.9	101.4	87.4	99.2	82.0	106.0	116.0	120.0	109.0	124.8
Tasgoan	83.4	83.5	30.6	59.1	82.4	101.0	96.0	102.0	91.0	94.0	101.9
Palus		75.5	86.0	85.8	86.9	86.0	89.0	109.0	90.0	55.5	104.5
Kadegaon						86.0	87.0	85.0	80.0	87.8	93.6
Shirala	81.9	121.7	99.8	46.3	44.9	40.0	95.0	80.0	50.0	61.0	79.9
Atpadi	95.1	40.0	75.2	31.7		64.0	62.0	77.0	56.0	82.0	78.5
K. Mahankal	83.7	70.6	29.8	12.9	29.2	58.0	52.0	67.0	55.0	52.6	58.9
Kolhapur											
Hatkanangle	94.2	77.9	81.41	84.7	87.0	94.0	106.0	98.0	98.0	108.0	116.2
Shirol	99.0	103.2	100.49	62.6	91.0	92.0	96.0	107.0	97.0	111.9	99.7
Panhala	91.5	105.5	111.17	75.4	111.0	94.0	87.0	93.0	92.0	95.0	98.4
Shahuwadi	66.1	54.8	71.27	22.7	64.8	15.0	51.0	70.0	45.0	53.7	58.5
Radhanagari	80.7	89.5	90.1	54.7	77.0	82.0	87.0	82.0	79.0	90.7	90.0
Bavada	93.8	98.9	76.1	32.4	62.0	56.0	102.0	59.0	51.0	58.6	56.7
Karveer	86.3	113.1	85.59	46.4	92.0	72.0	85.0	97.0	106.0	90.8	113.1

Kagal	101.7	102.6	100.24	68.7	93.6	75.0	83.0	92.0	84.0	103.7	91.4
Gadhinglaj	68.5	55.9	79.71	46.4	75.5	65.0	60.0	66.0	62.0	63.6	71.0
Bhudergad	81.8	75.0	57.79	41.9	63.2	69.0	65.0	64.0	73.0	66.7	66.7
Aurangabad											
Aurangabad		49.1	60.2	49.3	80.9	67.0	91.0	92.0	72.0	75.9	
Fulambri			62.6			60.0	76.0	83.0	71.0	68.7	83.1
Paithan		55.6	86.3	52.5	72.5	66.0	111.0	79.0	73.0	94.0	97.1
Gangapur		71.2	37.7	11.7	48.0	46.0	76.0	75.0	61.0	84.9	79.2
Vaijapur		33.0	47.9	50.6	50.2	65.0	76.0	83.0	71.0	68.7	83.1
Kannad		55.8	67.9	53.3	67.7	74.0	85.0	59.0	54.0	59.0	66.0
Khuldabad		21.6	52.0	50.6	53.1	52.0	81.0	79.0	67.0	81.5	85.5
Sillod		51.6	74.3	95.7	75.4	61.0	68.0	77.0	68.0	78.0	102.1
Soygaon			62.6								
Jalna											
Bhokardan		33.9	71.3	65.8	41.6	45.0	52,0	100.0	69.0	60.0	68.0
Jaffrabad		70.9	79.7	53.7	48.5	57.0	71.0	73.0	62.0	47.8	71.9
Jalna	74.0	55.8	69.1	45.2	62.5	51.0	85.0	73.0	58.0	57.5	74.6
Ambad		70.6	74.5	56.8	90.2	62.0	97.0	85.0	69.0	115.0	76.4
Partur		65.4	94.1	57.0	69.4	61.0	74.0	68.0	66.0	84.8	76.2
Badnapur		56.9	58.6	55.6	82.3			74.0			
GhanSangvi		67.7	61.8	50.6	72.5	81.0	81.0	81.0	71.0	70.5	64.9
Martha		61.4	117.5	69.5	43.9	46.0	73.0	62.0	61.0	54.0	90.7
Beed											
Beed		88.3	75.1	41.2	82.4	77.0	77.0	82.0	73.0	66.6	103.9
Patoda		118.5	62.6	28.2	42.2	91.0	78.0	88.0	65.0	69.1	74.0
Shirur (Kasar)			77.4			70.0	78.0	88.0	71.0	91.0	104.1
Ashti		38.0	85.3	26.3	53.2	56.0	52.0	86.0	77.0	79.0	81.9
Georal		65.9	61.0	66.1	84.1	68.0	79.0	93.0	82.0	78.0	71.2
Majalgaon		77.7	53.1	9.1	77.6	63.0	58.0	67.0	51.0	53.0	78.3
Ambejogai	65.8	60.0	65.8	29.7	36.5	75.0	83.0	63.0	40.0	76.0	70.3
Kaij		95.2	65.4	38.7	76.7	73.0	66.0	133.0	158.0	89.0	77.7

Parall		39.0	70.3	58.2	51.7	58.0	53.0	55.0	46.0	52.0	72.6
Dharur		35.6	71.6	34.7	75.6	51.0	65.0	85.0	54.0	84.0	80.6
Wadvani			95.1	21.1		82.0	89.0	83.0	48.0	52.0	93.5
Latur											
Latur		60.0	34.0	37.6	53.6	55.0	98.0	80.0	95.0	103.4	78.2
Renapur		59.7	52.5	45.7	75.8	12.0	77.0	61.0	57.0	81.9	80.5
Ausa		59.5	73.8	42.8	35.5	88.0	88.0	87.0	57.0	68.8	66.4
Ahmedpur		57.8	65.3	78.1	61.9	105.0	69.0	73.0	64.0	64.5	58.3
Nilanga		45.3	48.8	41.5	45.1	49.0	64,0	70.0	54.0	69.7	55.3
Shirur A.pal			54.6				76.0	72.0	55.0	67.0	70.7
Udgir		77.7	35.1	52.5	58.9	89.0	72,0	70.0	65.0	64.0	66.9
Jaikote			52.5				62.0	61.0	53.0	59.0	81.7
Devani			52.5				71.0	68.0	59.0	76.7	81.7
Chakur		54.4	56.2	41.0	54.0	90.0	69.0	62.0	52.0	66.3	73.1
Osmanabad											
Osmanabad	88.9	60.4	54.7	22.0	46.4	66.0	88.0	60.0	54.0	98.9	86.9
Tuljapur		68.4	52.7	31.3	67.2	72.0	85.0	73.0	72.0	113.5	91.9
Paranda		93.4	67.6	13.2	43.6	62.0	74.0	86.0	96.0	77.7	79.0
Bhoom		52.1	43.5	32.8	52.4	39.0	70.0	72.0	66.0	56.5	73.7
Washi			44.9			67.0	68.0	59.0	74.0	59.0	57.2
Kalamb		58.2	37.9	26.7	51.1	71.0	89.0	60.0	61.0	105.9	59.9
Omerga	49.2	57.9	43.0	41.1	57.1	92.0	73.0	63.0	34.0	61.9	77.1
Lohara			45.5			77.0					
Nanded											
Nanded		94.2	70.1	89.0	65.7	63.0	73.0		88.0	49.0	77.5
Ardhapur			76.0				73.0		71.0	66.5	70.1
Mukhed			76.0				73.0		58.0	48.5	48.0
Buloll		55.5	76.0		74.4	97.0	72.0		48.0	51.8	57.5
Dharmabad			76.0				69.0		51.0	50.0	45.4
Naygaon			76.0								
Mukhed		50.1	54.5	57.8	58.4	63.0	67.0		50.0	56.5	53.0

Kandhar		46.5	76.0	94.9	50.5	52.0	74.0		44.0	47.6	42.7
Loha		120.7	74.0	67.8	32.4	78.0	74.0		54.0	44.6	47.5
Hadgaon		56.5	89.2	84.7	61.1	69.0	72.0		47.0	45.8	76.5
Himayatnagar			76.0				75.0		55.0	68.0	46.9
Bhokar		53.3	97.4	69.4		54.0	91.0			51.0	49.8
Umri			76.0								
Deglur		38.0	51.3	97.3		65.0	70.0		61.0	44.8	53.5
Kinwat		51.0	57.0	83.2	63.3	60.0	72.0		48.0		
Mahur			76.0		63.9						
Parbhani											
Parbhani		79.8	87.8	61.4	60.1	107.0	102.0	76.0	109.0	83.8	116.6
Gangakhed		50.6	64.0	71.9		65.0	61,0		91.0	89.0	79.4
Sonepeth			62.2	65.6	50.6	92.0	106.0		78.0	111.0	135.3
Palam		51.1	27.0		100.0	36.0	75.0		51.0		
Pathri		117.4	64.7	67.7	51.7	62.0	74.0	78.0	66.0	65.0	65.2
Manvat			63.8	66.8	55.0	59.0	69.0				64.6
Jintur		125.7	60.0	43.6		59.0	86.0	66.0			
Purna		83.6	63.7	62.7	54.4	75.0	78.0	77.0	79.0	66.0	76.6
Seloo		73.9	64.3	70.0		66.0	111.0	84.0			97.9
Hingoli											
Hingoli			79.9								
Aundha		62.0	79.9	50.2	59.1		67.0	100.0	37.0	44.0	
Sengaon		67.8	79.9	71.2	43.3						
Kalamuri		82.1	79.9	71.2	43.3		58.0	57.0	61.0	49.8	63.8
Basmath		78.1	79.9	63.5	64.3		68.0	62.0	3.02.0	60.6	69.7
Buldhana											
Jalgaon Jamod		34.2	24.5				87.0				
Sangrampur		27.1	31.0				44.0	48.0			
Chikhali	60.2	85.5	61.7	90.3	54.0	73.0					62.4
Buldhana	102.3	108.3	83.1	52.7	85.0		57.0	63.0			
Deulgaon Raja	87.2	82.8	80.2	59.9							

Mehakar							80.0	68.0			64.0
Shindkhed Raja											55.2
Lonar	88.5	79.5	85.0	86.3			80.0	74.0			52.1
Khamgaon	111,2	94.5	84.6	42.4							
Shegaon											
Motala											
Nandura	12.7	35.0	90.0	52.3			63.0				
Akola											
Akot	58.7	68.8	48.4	51.5	9.0	73.0	74.0	51.0	45.0		
Telhara	61.4	70.5	73.1	63.1			69.0	56.0	46.0		65.8
Balapur			73.7								
Patur	69.5	93.2	88.6	64.5	9.0		74.0	56.0	46.0		64.4
Akola			71.0								
Barshi Takli	89.4	51.6	64.9	56.1	8.0						
Murtujapur	96.5	68.6	81.9	54.9	9.0						
Washim											
Washim	53.6	69.8	49.4								
Risod	61.4	65.8	74.6	49.4							
Malegaon	45.5	53.7	32.7	72.2							
Amaravati											
Dhami	75.3	65.2	71.1		31.0	36.0		73.0	51.0		
Chikhaldara											
Amaravati	65.9										
Bhatkal	51.1	50.7									
NadgaonKh.	60.2	54.3	55.5	100.0							
Chandu Rly	54.8	72.5	55.8								
Tiwasa	67.5	75.5	60.5	61.4							
Morshi											71.5
Warud			64.1								70.6
Daryapur											54.6
Anjangaon	121.0	14.3	64.2	68.1	34.0						

Achalapur	67.2	74.9	77.8	54.6	36.0						
Chandur Bazaar	119.3	94.0									
Dhamangaon Rly			64.1								
Yavatmal											
Yavatmal	73.0	87.6	73.7	62.6	51.0			71.0	61.0	66.6	
Babhulgaon	67.5	51.6	73.1	70.3	39.0						
Kalamb	68.2	45.8	43.7	57.8	54.0						
Danawaha	112.5	40.4	63.0	58.2	73.0			65.0	53.0	44.0	
Digras	74.2	85.1	16.3	44.9	56.0			68.0	53.0		
Ami	146.3	64.3	54.8	60.5	58.0		93.0	74.0	54.0		
Ner	63.1	52.6	57.5	54.5	11.0						
Pusad	76.9	81.4	52.8	58.3		90.0	36.0	82.0	51.0	60.0	71.5
Umarkhed	71.9	79.8	82.5	68.1	78.0	71.0	51.0	88.0	53.0	74.0	70.0
Mahagaon	103.0	48.8	81.4	37.7	27.0	70.0	54.0	70.0	52.0	65.0	54.6
Wani											
Moregaon											
Zari Jamani											
Kelapur											
Ghatanji	72.1	103.4	74.1	73.8	76.0						
Ralegaon											
Wardha											
Arvi	61.0	87.1	50.7	61.7	62.0	87.0	56.0	60.0	35.0	86.8	58.6
Karanja											62.5
Ashta		61.3	55.9								46.2
Wardha	73.0	43.2	44.4	51.0	62.0	39.0	98.0	31.0	31.0		66.0
Selu	98.0	60.4	62.6	52.8	77.0	24.0	72.0	49.0	33.0	73.0	93.0
Davali		78.8	65.8	52.5							
Hinganghat	77.0	48.3	56.8	86.7	95.0		93.0	77.0			2.9
Samudrapur	63.0	76.1	71.3	64.7	32.0						30.3
Nagpur											
Nagpur (U)											

Nagpur ®											
Kamthi	84.5	72.1	40.0	53.4	73.0		38.0	104.0	57.0		9.0
Hingane											
Ramtek	12.9	34.9	13.9	18.8			16.0				
Parshivani	16.8	24.5	49.3	57.3							
Mauda	5.5	33.9	48.3	40.5							
Katol											
Narkhed	60.5	54.4		58.9							
Savner	28.2	70.0	50.4	40.0							
Kalmeshwar	67.4	49.9	58.7	12.7							
Umrer	105.3										
Bhiwapur											
Kuhi	64.3		24.7	63.2							
Bhndara											
Bhandara	77.6	62.1	65.4	48.8	52.0	17.0	23.0	7.0			80.5
Mohadi	84.8	4.5	56.9	47.0	41.0	57.0	11.0	32.0	30.0	38.0	38.1
Tumsar	32.2	50.3	47.1	45.9	38.0	46.0	60.0	54.0	49.0	45.0	50.2
Paoni	133.5	11.4	21.1	26.0	12.0						37.0
Sakoli	59.6	47.0	39.7	64.6	83.0	72.0	83.0	80.0	86.0		93.6
Lakhari			48.6		34.0						
Lakhandur	64.1	85.7	42.0	28.9		53.0	69.0	14.0	69.0		154.9
Gondia											
Gondia	140.7	56.2	81.9								
Goregaon			81.9								
Salekasa			37.0								
Toroda	79.8	107.2	81.9								
Amgaon	27.2	20.8	69.0		86.0						
Morgaon Ar.		42.2	15.8								
Sadak Ar.	5.9	16.5	13.1		29.0						
Deori		6.3	50.7								

Source: Maharashtra Statistical Profile, DES, Govt of Maharashtra, 2016-17.

The state's area under sugarcane during 1990 onwards is indicated in Table 3.4 below. It indicates that the average yield of sugarcane in the state is consistently growing during the period. Some experimental plots yield more than 300 MT of sugarcane yield per hectare.

Table No 3.4

Area, Production and Yield of Sugarcane 1990 to 2016-17

Years	Area in 000 hectares	Production in 000 MT	Yield in MT per hectare
1990-91	442	38154	86.40
2000-01	595	49569	83.27
2010-11	965	85691	88.85
2015-16	987	69233	70.15
2016-17	633	54237	86.00

Source: Economic Survey of Maharashtra, 2019, pp. 120.

Economics of water for sugarcane

The state of economy of irrigation water to sugarcane has been a matter of political economy issue. It is mainly because of the diversified climatic condition of the state. Some part of the state receive heavy rainfall, consequently some districts fall under the disaster of riverine floods, whereas some districts does not receive drinking water for the general masses. This controversy has been discussed by Dandekar-Devuskar controversy, eight months vs twelve months irrigation controversy, regional imbalance committees headed by V, M, Dandekar in 1980s and Vijay Kelkar in the recent past.

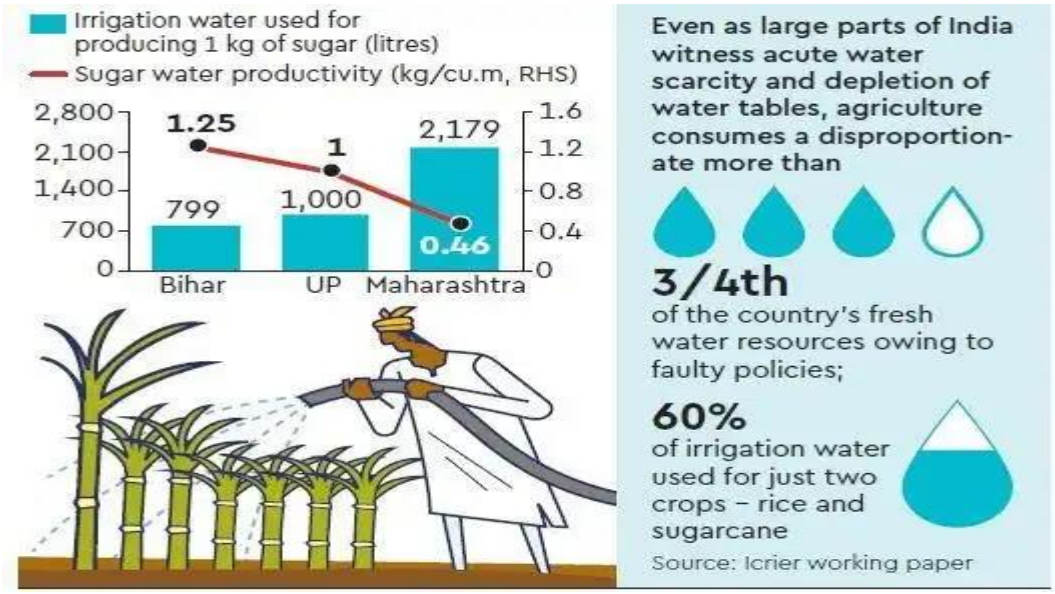
The Nira left canal was built in 1901. But the farmers were not using the irrigation water for agriculture. The erstwhile Bombay Govt appointed a Committee under Kamat an engineer. The Kamat Committee has suggested undertaking the cultivation of sugarcane, which requires perennial irrigation water. Meanwhile the sugar factory was installed in Saswad by Mali Group. This group purchased the canal water on volumetric basis and same is supplied to the sugarcane farmers on rental basis. This system still continued.

In western Maharashtra, the political leaders who have initiated the establishment of sugar factories in the region started lifting of water from the river on cooperative principles. Number of cooperative lift irrigation schemes has installed to irrigate the sugarcane farms. Irrigation water of these schemes is mis-utilised as there is no proper rotation of water to the crops due to rising demand for water from the farmers. Consequently, farmers are using huge water supply to the cane farms. This has caused the soil quality to decline. Soil salinity is becoming a grave problem in Sangli, Kolhapur districts.

The irrigation water used for producing one kilogram of sugar in Maharashtra is 2179 litres, in UP it is 1000 litres and in Bihar it is only 799 litres. In comparison to this the cane yield is negatively responding to the use of water for sugarcane. The sugar water productivity per kilogram/cubic meter is 1.25 in Bihar, 1 in UP and 0.46 in Maharashtra (Ashok Gulati and Gayatri Mohan, 2018, ICRIER, working paper 358 pp 22). Maharashtra state has around nine lakh hectares of land area under sugarcane crop. So, there is waste of water and simultaneously low yield of sugarcane.

The NITI Ayog under a Task Force headed by Ramesh Chand has suggested reducing the area under sugarcane crop by 20%. However, it is difficult on the part of the Govt. As a part of its policy, the Maharashtra Govt has now decided to ban on sugar factories and sugarcane cultivation in Marathwada region.

The major sugarcane growing states showed that the irrigation water productivity in traditional sub-tropical sugarcane region (Uttar Pradesh and Bihar) was almost three times more than the tropical region comprising of Maharashtra, Tamil Nadu and Karnataka, while it was the other way round when land productivity (per unit area basis) was considered (Ashok Gulati and Gayatri Mohan, 2018). The per month profitability of the (after adjusting crop duration) sugarcane crop cultivation in Uttar Pradesh is more profitable than in Maharashtra. The economic productivity (value of crop output produced per unit of irrigation water applied) of sugarcane with other major crops grown within Maharashtra showed the less water intensive cotton, tur and groundnut to be more efficient (Ashok Gulati and Gayatri Mohan, 2018). Obviously, ban more sugar factories and sugarcane cultivation in the dry region like Marathwada and Vidharbha where the sugar recovery also remains less is justifiable. Even the flood irrigation should be replaced by drip or sprinkling system. Ashok Gulati and Gayatri Mohan (2018) have estimated that, the water saved through drip technology in one hectare of sugarcane area can bring an additional 2.29 hectare area under conventional irrigation and double this area.



Source: Ashok Gulati and Gayatri Mohan, 2018 quoted in by Prashant Sahu, Finance Express, 09/09/2019.

Aurangabad and Amravati region are deficit regions; the region should not entertain sugarcane as their main crop. Alternative incentives can be provided through the policy initiatives like increasing the minimum support price, change in the cropping pattern like advocating the cultivation of millet, which is suitable crop to the water deficit region. The prices of the millets are going high as the year 2023 is declared as the International Year of Millet.

Table No 3.5
Classification of Regions Based on Annual Water Availability per Hectare

Division	Region	Annual Water Availability (cum/Ha)	Category as per Water availability
Aurangabad	Marathwada	2572	Deficit
Amravati	Vidharbha	2755	Deficit
Nagpur		8968	Abundant
Konkan	Konkan	35968	Very high
Nasik	Western Maharashtra	4352	Normal
Pune		7176	Normal
Maharashtra		7267	Normal

Note: The annual water availability is calculated by evaluating the surface irrigation water available from different irrigation projects per unit of cultivable command area covered under the projects.

Source: (GoM, 2013, quoted in Ashok Gulati and Gayatri Mohan, 2018.

The technical profile of the factory sector is indicated in Table No 3.6, which clearly exhibits that the all technical efficiencies in the sugar industry are positive and favourable. However, the financial indicators are higher than the private sector.

Table No. 3.6

Profile of sugar mills in Maharashtra from 2001-02 to 2013-14

Sr. No.	Characteristics	Seasons												
		2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Installed sugar mills	160	179	148	186	187	188	193	195	199	209	215	226	229
2	Installed capacity (lakh TCD)	3.91	4.31	4.40	4.464	4.469	4.55	4.71	4.77	5.01	5.36	5.58	5.96	6.25
3	Sugar mills not in operation	25	19	48	84	45	25	19	48	57	42	42	54	72
4	Sugar mills in operation	135	160	136	102	142	163	174	147	142	167	173	171	157
5	Gross days	135	135	90	82	121	189	182	107	170	186	157	132	134
6	Sugarcane crushed (lakh tons)	483.87	534.74	290.39	194.58	445.71	798.83	762.27	400.27	613.90	802.16	771.27	700.48	678.75
7	Sugar production (lakh tons)	56.13	62.21	31.71	22.17	51.98	91.00	90.74	45.79	70.67	90.53	89.82	79.94	76.10
8	Capacity utilization (%)	101.76	99.39	93.95	84.07	99.54	94.98	92.12	97.41	94.51	92.96	97.64	105.83	101.75
9	Recovery (% of cane)	11.62	11.68	10.94	11.42	11.68	11.39	11.94	11.46	11.55	11.31	11.66	11.43	11.45
10	Lost hrs. % to available hrs.	12.10	13.42	15.27	20.15	13.76	14.56	15.68	15.30	15.44	15.63	12.95	9.81	11.46
11	Pol (% of cane)	13.54	13.62	12.87	13.30	13.59	13.42	13.90	13.36	13.46	13.26	13.59	13.38	13.35
12	Share of State in country’s sugar production (%)	30.28	30.88	23.32	17.51	27.42	32.16	34.41	31.50	37.37	37.11	34.10	31.78	31.17

Source: Compiled from various Technical Reports of VSI, Pune

CHAPTER IV

SUGARCANE PRODUCTION AND SUPPLY CHAIN MANAGEMENT

Sugarcane is the main raw-material of the sugar industry. It requires growing for at least 12 months and maximum 18 months. Sugar is formed at the point of leave-stem joints. The cane leaves should not be removed so long it remains green. The crop requires huge amount of energy and water. It soaks large amount of carbon from the atmosphere. It matures during off-monsoon winter season, when the sugar recovery, if extracted remains very high. Obviously, it is required to be harvested during the same period.

This chapter discusses the cane economy and its linkages to the milling section of the sugar factory. The fair and remunerative price of sugarcane is one of the crucial and critical issues during the beginning of the sugar season. Farmers remain aggressive during the period for bagging the remunerative price for their produce. Hence, the political economy of the cane farming now a day is becoming belligerent.

4.1 Who produces the sugar?

Sugarcane is the main component of the sugar industry. It shares around 70 per cent of industrial cost. The sugar recovery determines the profitability of the sugar units. Prior to 1980s, it was least cared in the industrial scenario. There was a debate at the Centre between the private sugar mill owners and the co-operative sugar mill owners that, who produces the sugar; the farmer or an industrialist? The Talwar Committee working on the issue clarified that quality of cane does matters in the sugar output. The geo-climatic conditions prevailing in the area does also matters in yielding high sugar recovery. The Kolhapur, Sangli and south Satara districts of the Maharashtra are high sugar recovery districts of the State. The co-operative mill owners are the farmers engaged in sugarcane production, so they claimed that sugar is produced in the farms not in the factories. The sugar factory just processes the cane to convert it into sugar by adopting suitable technology. The Pravara Model has been widely accepted as a role model for expansion of the industry in India. The rural economy of the State has been intensively changed through sugar industry in the State. Initially, the private sector factories were transferred in to co-operatives due to the incentives provided by the State.

Now, under the pressure of globalization and liberalization, the State incentives have been slowly withdrawn. As a result, the industry is being thrown away from the State control. Besides, the political economy of co-operative sugar industry in the State has hard-pressed the co-operative sector towards the private sector. So, a diversion from co-operatives to private is the way out to stumble on suitably by the co-operators themselves. Most of the private sector units belong to the (political) sugar barrens.

4.2 Sugarcane economy

Sugarcane is cultivated in 127 countries both in tropics and sub tropics. 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. More than 50 million farmers, 5 lakh women and large number of agricultural workers in rural India are directly engaged in the sugarcane cultivation activities, which consists of around 7.5% rural population of the country. Besides, the industry provides employment to 5 lakh skilled and semi-skilled workers in rural areas.

The sugarcane value chain indicate that, when 1000 kg of sugarcane is crushed in the milling section, it produces 100 kg of sugar when the sugar recovery remain 10%, bagasse of 300 kg, molasses 45 kg, steam 660 kg, alcohol 11.25 litres and power to the tune of 130 kwH, of which exportable surplus remains 100 kwH.

The farmers receive more than 23000 crores as sugarcane price, which is directly pumped in the rural markets. Both Central and State Govt collects around Rs. 6000 crores as tax to the exchequer.

Sugarcane plants absorb CO^2 from air. It converts carbon into sugar (C12 H22 O11) and releases Oxygen into the air. It is roughly estimated that, Carbon Credit can be earned to the tune of Rs. 72000 per hectare. (8 lakh hectares * Rs. 72000 = 5760 crores per Annam)

The farmers' input costs of sugarcane are growing, while the demand for sugar is variable. The costs of sugarcane cultivation are varying due to the reason that, the crop is grown under diversified conditions with lot of adversities and risks. The return of a rupee invested on labour depends on the gross returns minus total variable cost and cost on labour. Similarly, return of a rupee invested on fertilizers depends on gross returns minus

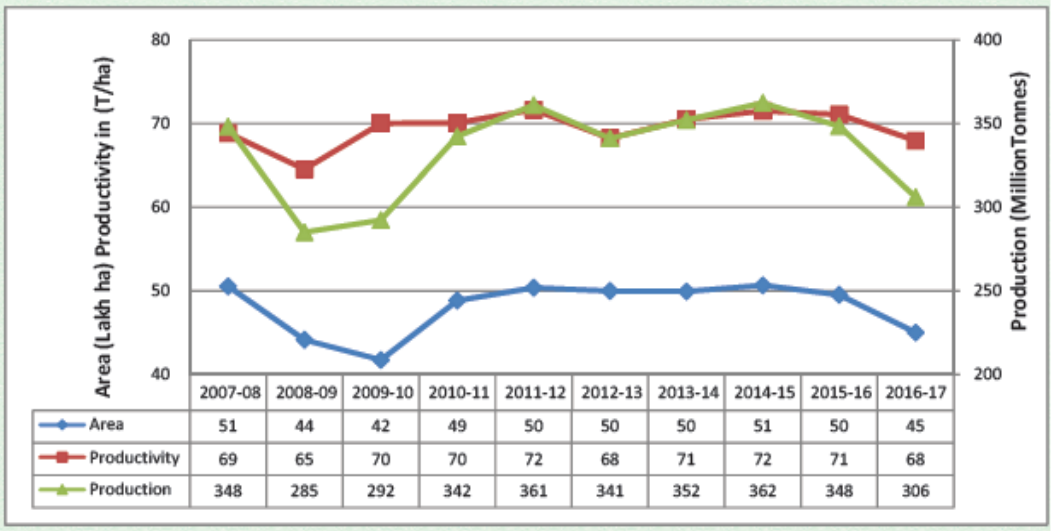
total variable cost and cost on fertilizers. The cane growers need to rationalize the cost of sugarcane cultivation. The low cost and no cost technologies in sugarcane cultivation are given below;

1. Deep tillage at the optimum time of the favourable soil moisture level.
2. Preparation of ridges and furrows by tractor and timely plantation.
3. Reducing the seed costs by way of planting the single bud directly, using the seedlings raised in nursery beds, spaced transplanting using polybag seedlings, planting chip buds directly, chip bud seedlings raised in polythene bags and transplanting, and planting quality sets etc.
4. Testing soils and using the nutrients accordingly.
5. Use of organic fertilizer components like; press mud, trash, *neem*, slow release of N-fertilizer, use of bio-fertilizers, foliar application of fertilizers, green manuring, use of rock-phosphate and phosphobactaria and FYM.
6. Economizing the use of labour by way of using the sugarcane sett cutting machine, bullock-drawn cane planter, semi-automatic tractor drawn cane planter, tractor-mounted pit digger, bullock-drawn weed mulcher, wide spawth spray boom, sugarcane detrasher and harvester.
7. Weed control through herbicides, timely application of herbicides and wed cultural operation, pest and disease control measures.
8. Optimum use of water.
9. Timely harvesting and proper use of implements for harvesting and quick transporting of sugarcane from farm to factory.
10. Use of drip or sprinkling irrigation tools

Sugarcane economy is the crucial sector in the sugar scenario, since 70 per cent of the conversion cost is incurred on sugarcane. Sugar recovery depends on the quality of sugarcane vis a vis it's crushing within a period of 4.5 hours after its harvesting. Harvesting and transportation of the sugarcane from farm to factory plays a significant role in maintaining the maximum level of sugar recovery. Roads should be developed for smooth and quick transport of the sugarcane. A road cess levied on per ton of sugarcane is collected by the State Government from the sugar factories. Ultimately, the farmers are paying for better roads. Feasibility lies in permitting the sugar factories to retain the

amount of road cess and utilize the same towards the repairs and development of roads required by them for smooth transportation of sugarcane to the factories.

Chart 3.3: All India Area, Production and Productivity of Sugarcane 2007-08 to 2016-17



	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Area	51	44	42	49	50	50	50	51	50	45
Productivity	69	65	70	70	72	68	71	72	71	68
Production	348	285	292	342	361	341	352	362	348	306

Source: DES, Ministry of Agriculture & Farmers Welfare

The sucrose content in sugarcane can be increased by replacing low-sucrose sugarcane varieties to high-sucrose sugarcane varieties. Sugarcane contains 10 to 15 per cent sucrose, 60 to 70 per cent water and 15 to 20 per cent of fiber, depending upon the cane variety, agro-climatic conditions, under which, it is grown and the managed. The use of cane maturants or ripeners for enhancing sucrose content in sugarcane is commercially established practice world over. Application of modern technologies is practically not feasible due to small size of the farms in India. Thus, there is an exigent need to identify new class of cane ripeners which can bridge this gap.

Two important committees on sugar industry viz., Mahajan Committee (1998) and Tuteja Committee (2004) have offered several recommendations for the development of sugar industry. The Mahajan Committee observed that, the sucrose yield in India was lower than Australia, Mexico and USA. This was not only due to climatic factors and the system of payment for sugarcane on tonnage basis without link to sucrose content but the inability of the research institutions to evolve suitable high sucrose varieties of cane for different agro-climatic conditions. So, there is a need to take steps towards evolving high-sucrose sugarcane varieties. The countries like Brazil, Australia, U.S.A. etc., have recorded sugar recovery percentage of around 14, while the sugar recovery in India has

remained stagnant at around 10 per cent and 11 per cent in the State. There is a need to develop a sugarcane breeding institute to take steps towards evolving improved technology for improving sugar recovery (Mahajan Committee, 1998).

4.3 Cost of sugarcane

The cost of sugarcane production (CoP) is one of the important determinants of Fair and Remunerative Prices (FRP). The CoP is estimated with help of the questionnaire prepared by the Commission. (See Appendix to this chapter) The ABC cost norms are adopted for calculating the cost of sugarcane cultivation. Besides, other important factors such as demand and supply market prices of sugar and its by-products, inter-crop price parity, the likely impact of FRP on consumers, rational utilization of natural resources like land and water are also considered in the pricing formula. Table 4.4 accounts for the cost f sugarcane cultivation in Maharashtra estimated by CACP for the year 2016-17.

There is volatility in sugarcane supply to the sugar factories due to which, the sugar factories would not be in a position to arrange for harvesting and transportation of sugarcane in time. Over-maturity of sugarcane leads to loss in weight during the excessive supply of cane resulting further to poor recovery of sugar and lower sugarcane price. There is a need for evolving suitable technology in order to avoid delay in harvesting and transportation of sugarcane to the sugar factories. In this connection, the possibility of staggering of planting period to ensure continuous and regular supply of sugarcane can be explored by undertaking a computer based research work. Sugarcane supply is expected to decline due to the drought conditions in the sugarcane growing states may boost imports after three years of surpluses. Sugarcane planting in India is set to fall to the lowest in four years as the worst droughts in four decades scorches fields in the main producing region.

The sugarcane growers face with the problems of labour shortage particularly for harvesting and transportation. Therefore, harvester combine is introduced by the sugar factories with Govt subsidies. This is evolving to facilitate timely harvesting and transportation of sugarcane. However, the small size of the holding limits the use of machines for harvesting.

The growing period of sugarcane needs to be reduced by evolving short-duration sugarcane varieties, such as Co 62175, Co 7804 and Co 8371, Co 265. Profitability of

sugarcane production considerably increases due to reduction in the growing period. Drought situation affects the productivity of sugarcane. There is a need to have drought-resistant sugarcane varieties. GM technology can be applied to develop such varieties. Brazil has recently approved the GM sugarcane known as CTC 20 BT sugarcane variety for combating to the borer disease on the sugarcane, which costs the country to five billion US dollars per year.

The area under different sugarcane varieties in the State is illustrated in Table 1. Co 86032 variety of sugarcane constitutes large percentage of cultivated area in the State followed by Com 265.

Table No 4.1

Area under Different Sugarcane Varieties [Zone wise %]

Zone	South		Central		North-East		State	
Sugarcane Varieties	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10
CO740	0.14	0.42	0.00	0.01	0.16	0.00	0.08	0.16
CO8014	0.96	0.96	0.49	0.24	0.86	0.06	0.72	0.47
COC671	8.07	7.13	1.91	27.21	39.35	50.76	19.81	24.21
CO86032	56.18	68.79	63.24	60.22	45.87	40.03	56.75	59.56
CO94012	1.35	1.86	1.92	2.56	3.20	4.17	2.07	2.61
VSI434	0.29	0.32	0.13	0.08	0.52	0.18	0.28	0.19
COM265	14.97	7.52	16.40	8.13	5.97	2.88	13.36	6.90
COVSI9805	0.22	0.19	0.28	0.06	1.00	0.02	0.44	0.10
CO92005	13.78	--	0.00	--	0.04	--	4.21	--
OTHER	4.04	12.81	0.63	1.49	3.03	1.90	2.28	5.80

If the farmers are trained in all aspects of sugarcane cultivation and crop protection measures, the quality and quantity of sugarcane may increase. Young farmers can take on this responsibility in time. Non-adoption of recommended practices affects the productivity of sugarcane adversely. For example, farmers use nitrogenous fertilizers excessively, resulting in imbalance in fertilizer use. This is followed by continuous usage of excessive water which had led to a tremendous depletion of soil fertility. Water is

often used in excess of requirement in producing sugarcane. Soil salinity is growing in the sugarcane belt (Jugale, 2012). The co-operative lift irrigation schemes should be converted into Water Users Associations. Equitable water distribution model can be developed by these WUAs under the threat of Chikotra River Project (Jugale, 2015).

The incidence of woolly aphid is higher under more humid conditions, which prevails heavily in irrigated areas characterized by application of more than the recommended dosage of fertilizers. Unlike the System of Rice Identification (SRI), a strategy developed by the ICRISAT-WWF is now working on applying similar principles and farm-based methods in sugarcane and in sugarcane farming. This technology is known as Sustainable Sugarcane Initiative (SSI) (NABARD, 2010). Odisha state is the beginner in using this technology. The SSI technology is used in Andhra Pradesh, Uttar Pradesh, Maharashtra, Punjab and Tamil Nadu in a limited manner. Successful adoption of SRI technology in rice cultivation led to the adoption of SSI technology in Odisha. The World Wildlife Fund and has launched a scheme for "improving water productivity in agriculture" under which SRI technology is an outcome of its efforts. This strategy ensures low consumption of water, lesser seed input, low fertilizer use and comparatively less labour input than the conventional method. There is an urge to receive necessary assistance from the Govt for exploring the possibility of adoption of SSI technology in other sugarcane growing states also, not only for ensuring lower consumption of water but also for increasing the profitability of sugarcane cultivation through cost minimization (NABARD, 2010).

The cost of cane harvesting and transporting goes to Rs 10000 to 12000 crores in India. It is being paid by the farmers out of their cane bills. This cost is calculated on the average basis. The persons engaged in this activity are large, on the whole coming from the drought prone zone of the state. This class of migrant workers is the ecological refugees of the state and neighboring states. Now a day, machine is used for harvesting the cane. The harvesting capacity of such machine is 250 tons per day. It employs seven tractors for transporting the cane from field to factory.

4.4 Universe of SMP/FRP of sugarcane

The pricing of sugarcane is governed by the statutory provisions of the Sugarcane (Control) Order, 1966 issued under the EC Act, 1955. Prior to 2009-10 (FRP) sugar season, the Central Government was fixing the Statutory Minimum Price (SMP) of sugarcane and farmers were also entitled to share profits of a sugar mill on 50:50 basis as per the Bhargav formula. The sharing provision was introduced in the Control Order as Clause 5A in September, 1974. But it remained virtually unimplemented mainly on account of delays in the announcement of profits by the mills. The Sugarcane (Control) Order, 1966 was amended w.e.f. 22.10.2009 and the concept of SMP was replaced by the Fair and Remunerative Price (FRP) of sugarcane. Some states (Haryana, Punjab, Tamil Nadu, Uttrakhand and Uttar Pradesh) announce the State Advised Prices (SAP), which remained higher than the FRP. State Administered Prices are based on social-political considerations, without any transparent policy issues laid down as criteria and no relation to sugar price is linked. Dual cane pricing distorts cane and sugar economy and is contributing majorly to cane price arrears and cyclicality.

Presently, there is no relationship between cane and sugar price in India. But the major sugar producing nations like; Brazil, Australia, Thailand, Mauritius, even Kenya and Tanzania have established such linkage. The Brazilian Govt in 1999 has adopted sugarcane payment model named “CONSECANA” (the Council of Sugarcane, Sugar and Ethanol Producers in the State of São Paulo). Approximately 70,000 independent farmers supply around 40 percent of the cane processed by Brazilian sugarcane mills. To ensure fair and equitable relationships between growers and millers, these groups are established as an innovative sugarcane payment system. It is a private sector arrangement whose main objective it to share risks between sugar and ethanol producers and sugarcane growers.

The “CONSECANA” payment system is based on two fundamental principles:

- The price paid to cane producers is proportional to their share of industrial revenue. On an average, sugarcane production accounts for 60 per cent (70% in India) of total sugar and ethanol production costs. Therefore, sugarcane growers receive around 60 per cent of the agro-industrial revenue.

- The industry pays more for sugarcane with higher sucrose content. The value of sugarcane is based on the so-called Total Recoverable Sugar (or ATR in Portuguese). ATR corresponds to the amount of sugar available in the raw material minus the losses in the manufacturing process.
- The revenue of cane grower is proportional to industry's revenue in Brazil. Cane costs account for 60 per cent of total sugar and ethanol production costs. Therefore, the sugarcane grower receives on an average 60 per cent of the agro-industrial revenue. Price of sugarcane supplied by each grower depends on the level of that the product contains. Quantification of the sugar contained in sugarcane is determined in terms of TRS (Total Recoverable Sugar).

The Nandakumar Committee has recommended a formula in 2010. It recommended for fixed per cent of sugar, bagasse and molasses realization reflected in cane price. The SMP/FRP in India is a key element of the sugar industry. The cost of production of sugar on sugarcane remains around 65-70 per cent. Cane growers are the owners of the co-operative sugar factories. They process their cane collectively and produce sugar and other by-products.

The sugarcane pricing during 1930s was a very crucial issue, as the ownership belongs to private sector. The profitability of sugar industry mainly depends on the extent of exploitation of the cane growers since their share in total industrial cost remains 65-70 per cent. The Tariff Board in 1930 took initiative in introducing statutory minimum price for sugarcane. Pricing of sugarcane hence, became a statutory phenomenon. Sugar and sugarcane later became the controlled commodities. Sugar has been brought under the purview of essential commodities. The shortage of sugar compelled the Govt to impose control on it. Levy sugar and release of sugar through tendering are the strategies introduced to protect the Govt interest. Consumers were prioritized prior to 1950s, while the growers were simultaneously implied later.

Due to shortage of sugar in the open market, the Govt of India in 1967-68, imposed a control on sugar, which worked effectively for the purpose of sugar factories hence forth. This had provided a way for sale of sugar by tender system rather than an open market auctions. The price of sugar through this had gone up to Rs.485/- (Kopergaon experience) during the sugar season; 1967-68.

Table 4.2

Projected Cost of Sugarcane for the Sugar Season 2018-19 (Rs/qtls)

States	Cost at state specific recovery rate			Cost at 9.5% recovery rate			Cost at 10% recovery rate		
	A 2	A2+Fl	C2	A 2	A2+Fl	C2	A 2	A2+Fl	C2
AP	155	176	257	154	174	254	1612	184	268
Karnataka	106	131	183	94	116	161	99	122	170
Maharashtra	132	155	200	110	129	167	116	136	176
TN	148	176	214	159	189	229	167	199	241
UP	117	161	237	114	157	231	120	165	243
Uttarakhand	93	125	2012	95	127	206	100	134	217
All India	123	157	219	115	148	206	122	155	217

Source: CACP Calculations, 2018-19

It is seen that the cost of production (C2) by all states and all India is in ascending order of cost with their corresponding relative shares in total production of sugarcane. The all India cost of production (C2) for season 2018-19 adjusted for 10% recovery is Rs 217 per quintal. The modified cost which includes transportation and insurance charges of Rs 27 per quintal comes to Rs 244 for ensuing season.

Since the Rangarajan Committee Report, the industry groups (private and co-operatives) are very earnestly recommending the Govt of India to trace for the total decontrol of sugar; as it is controlled commodity under Essential Commodities Act.

The premium of the sugarcane price higher than the recommended CACP price at 9.5 sugar recovery was proportionately very less than the SMP/FRP. It was first noticed by Kakasaheb Wagh; then President of Maharashtra State Co-operative Sugar Factories' Federation (*Sakhar Sangh*) through Annasaheb Shinde; then State Minister for Agriculture, Govt of India. A Committee under the Chairmanship of Talwar K. R. (Assistant Secretary to Sugar) was appointed to review the matter. The Committee recommended following the proportionate ratio to the main SMP/FRP. The Bhargav Committee; then supported the case in 1974 on the basis of 50:50 equal share of income earned out of additional sale of sugar higher than the SMP/FRP going to the factory and the farmers proportionately. This in fact, should be 25:75 basis points respectively as per the expertise during the period with Co-operative Sugar Factories Federation (*Sakhar Sangh)*, which was not positively implemented. On the contrary, with the special efforts of Shivajirao Patil; then President of the *Sakhar Sangh* at all India level, the higher rate of

premiums against the main SMP/FRP was got approved for next 5 years. After that, it had been brought to the proportionate level as suggested by the Bhargav Committee.

Similar was the case with the consideration of transport and harvesting cost of sugarcane, which was not taken up in the Bureau of Industrial Costs and Price (BICP) norms for determining levy sugar price. On the contrary the private sugar factories' federation; ISMA was captivating the benefit of this facility. Of course, this injustice on the part of the co-operative sugar factories had been removed temporarily. But injustice on the part of the co-operatives in this regards continued.

The sugar factories are compelled to pay the SMP/FRP. The cost incurred on transport and cane harvesting is included in the SMP/FRP. The BICP do not take up this cost in determining the costing norms of the sugar mills. More than 60-61 per cent of the overall costs are shared by the sugarcane as one of the important raw-material of the industry and that to, it is not under the control of the mill owners. Jute and sugarcane enjoyed the SMP earlier and FRP recently. The sugarcane prices as indicated by the CACP are constantly growing. The cost of sugarcane cultivation calculated by the CACP with A, B, C costing norms consists of the fixed cost, variable cost and imputed values of the immovable asset. The SMP is being deliberately kept low as it had direct bearing on determining levy sugar price based on BICP formula. The cane growing states that the cost of cultivation data has largely been ignored by the CACP while recommending the cane prices. This has virtually forced them to declare separate set of prices at the state-level. The over-pitching of state-advised price is more a populist measure than a commercial decision so as to appease the cane growers.

On the contrary the sugar prices are slowly increasing as compared to the growing conversion costs of sugar. Some state Govt does not allow the SMP/FRP formula; indeed they follow the State Advisory Prices (SAP). The economy of the small and marginal farmers selling the canes to the large sugar factories at a prevailing cane prices fixed by the CACP is not sustainable to the cane growers, consequently, Govt needs to provide a basic level of price and payment protection. The sharing of the proceeds beyond a minimum level is better done by creating competitive market for sugarcane or a market linked price sharing formula rather than Govt diktat.

The cane growers are demanding the SMP/FRP to their cane to the tune of the cost of cultivation. While fixing the FRP of the sugarcane, following points are taken into account;

a) The cost of production of sugarcane;

b) The return to the grower from alternative crops and the general trend of prices of agricultural commodities;

c) The availability of sugar to the consumers at a fair price;

d) The price at which sugar produced from sugarcane is sold by producers of sugar;

e) The recovery of sugar from sugarcane;

f) The realization made from sale of by-products viz. molasses, bagasse and press mud or their imputed value (inserted on 29.12.2008); and

g) Reasonable margins for growers of sugarcane on account of risk and profits (inserted on 22.10.2009).

The SMP/FRP is determined on the basis of the sugar recovery of 9.5 per cent, with a corresponding hike in the SMP/FRP as measured in terms of a premium for the each fraction of 0.01 per cent rise in sugar recovery. Premium is determined proportionately. Assuming an average sugar recovery of 12 per cent as the basic recovery and the additional premium (9.5% + 0.01% fraction measured up to the highest average sugar recovery obtained by the sugar unit during a crushing season), the cane price per ton of sugarcane is determined. The gross SMP/FRP thus, at the rate of 12 per cent sugar recovery excluding the harvest and transport costs of sugarcane shall be the SMP/FRP of sugarcane. The SMP/FRP is compulsory on the part of the sugar factories. This may be the base line price of the sugarcane to be paid at the beginning of the sugar season as an advance sugarcane price to the cane growers. The second, third and henceforth installments of sugarcane prices (as the case may be) can be linked to the sugar price sold in the market under the Govt guideline during the end of the season or till the erosion of the sugar stock produced during a season. This process may continue even during the next sugar season. The matrix is hypothetically prepared for sharing the proceeds between the farm and factory so as to avoid the conflicts centered on the sugarcane price (Jugale, 2007).

The average value (in Rs) of sugar against one ton of sugarcane crushed remains the same for the five categories of sugar recovery at the sugar price of Rs. 30 and Rs. 35 as estimated in Table 4.3 respectively (see columns 7 and 11). Similarly, the share of sugarcane value at the market price of sugar at the rate of Rs. 30 and Rs. 35 (as indicated in columns 8 and 12) remains same for the five categories of sugar recovery. Even the difference between FRP and the cane price is reciprocal to the cost percentage share at 70 per cent, which remains the same for five categories of sugar recovery (see columns 9 and 13).

Dr. C. Rangarajan Committee has made this valuable suggestion in 2012. But, instead of confining this percentage at 70 per cent, the share of sugarcane cost should remain equal in revenue sharing formula like Brazilian model. Hence, the formula for the sugarcane pricing should remain reciprocal to the share of cost of sugar production. If the share of sugarcane cost is 71.9 per cent of the total cost of sugar production, then the revenue earned out of the sale proceeds should be shared at the same 71.9 per cent rate, which is revenue to the cane suppliers in co-operatives.

At present, we are being compelled to assure a stable income to the sugarcane growers on the back of a volatile sugar commodity, which is not beneficial to both farmers and the factory. Sugar is traded on spot basis and levy basis. Purchase through levy sugar is not beneficial to the factories. Spot sugar prices are volatile. Sugarcane is planted once and then harvested two-three times at yearly intervals. Planting decision is taken almost three years before the sugar is actually sold. There is a need to guarantee of sharing the sugar proceeds at the forward price signal at the planting time. The Karnataka State Sugar Federation had suggested (to Dr. Rangarajan Committee) that, the share of cost and sugar proceeds between the farmers and the factory should be equal. The co-operative sugar enterprises indeed belong to the farmers. This has been accepted by the Rangarajan Committee (2012).

The CACP has further suggested that the Government should switch over to a hybrid sugarcane pricing formula, which is composed of revenue sharing principle as suggested by Rangarajan Committee with some Minimum FRP (MFRP). The CACP in its earlier report for 2015-16 seasons had recommended adopting a hybrid approach. According to this approach a combination of Revenue Sharing Formula (RSF) and FRP

are adopted while fixing the sugarcane price. "Under this approach farmers' realization from the cane would be higher when sugar prices are on upswing. However, farmers may end up getting lower prices than the FRP during the period of downward cycle of sugar prices. If this situation occurs, the farmers should be paid the FRP up front and the difference between FRP and prices determined by RSF should be met by Sugar Stabilization Fund (SSF). This recommendation essentially has three components namely (i) FRP, (ii) RSF and (iii) SSF and all these were to be implemented as an 'atomic whole' for the viability of the sugar industry". (CACP, 2016-17). All three components of hybrid pricing approach are being implemented.

"The Commission has recommended a Fair and Remunerative Price (FRP) for sugarcane at Rs. 255/qtl at 9.5 per cent recovery level for 2017-18 sugar season. With every increase in recovery by 0.1 percentage point, the FRP will increase by Rs. 2.68/qtl. Considering the all India average recovery rate at 10.60 per cent, the FRP recommended would work out to Rs. 284.48/qtl (or Rs 2844.80 per ton of sugarcane). FRP recommended for every 0.1 percentage point (upto 13.5) increase in recovery is given in Table 4.1. The Commission projects A2 +FL cost of production of sugarcane at Rs 145/qtl and cost C2 (inclusive of cost of transportation and insurance premium) at Rs 227/qtl corresponding to 9.5 percent recovery level for 2017-18 sugar season.

Table 4.3

FRP Recommended and it's linking with RR, Sugar Season 2017-18

(Rs./qtls)

Basic Recovery Rate	FRP linked with RR	Basic Recovery Rate	FRP linked with RR
9.5	255.00	11.6	311.28
9.6	257.68	11.7	313.96
9.7	260.36	11.8	316.64
9.8	263.04	11.9	319.32
9.9	265.72	12.0	322.00
10.0	268.40	12.1	324.68
10.1	271.08	12.2	327.36

10.2	273.76	12.3	330.04
10.3	276.44	12.4	332.72
10.4	279.12	12.5	335.40
10.5	281.80	12.6	338.08
10.6	284.48	12.7	340.76
10.7	287.16	12.8	343.44
10.8	289.84	12.9	346.12
10.9	292.52	13.0	348.80
11.0	295.20	13.1	351.48
11.1	297.88	13.2	354.16
11.2	300.56	13.3	356.84
11.3	303.24	13.4	359.52
11.4	305.92	13.5	362.20
11.5	308.60	13.6	364.88

RR: Recovery Rate

Source: Sugarcane Price policy for the Year 2018-19, CACP, 2018.

The CACP expect a rebound in the production in 2018-19 due to good monsoon in 2018 and the prices are likely to remain stable. The western Maharashtra is having a highest average sugar recovery of 12.50 per cent, which would work out to {3350 x (12.50/100) * (75/100)} = Rs 314/qtl (CACP). Due to uncertainty of the future sugar prices, the revenue sharing principle as indicated by CACP needs to be combined with MFRP, which can be set at half a standard deviation from the trend of sugar price of rs 3350 per quintal of sugar. The MFRP is based on the cost of the cultivation. The first advance price for the co-operatives may be determined on this basis, and the corresponding cane prices may be determined on the basis of revenue sharing in the sugar proceeds during the year. The sharing of sugar proceeds is estimated at Rs. 30/kg and Rs. 35/kg. (See Table 4.4)

The average recovery of sugar from sugarcane in Maharashtra remained highest in Kolhapur, South Satara and Sangli districts of Maharashtra due to the climatic conditions prevailing in the districts. (See table 4.2) The lowest recovery is observed in Bihar, Andhra Pradesh and Haryana states.

Table No 4.4

Fair and Remunerative Price of Sugarcane in the Country

Sugar Season	FRP (Rs/quintal)	Minimum Recovery %	Premium for every 0.1% increase
2009-10	129.84	9.50	1.36
2010-11	139.12	9.50	1.46
2011-12	145.00	9.50	1.53
2012-13	170.00	9.50	1.79
2013-14	210.00	9.50	2.21
2014-15	220.00	9.50	2.32
2015-16	230.00	9.50	2.42
2016-17	230.00	9.50	2.42
2017-18	255.00	9.50	2.68
2018-19	275.00	10	2.75
2019-20	275	10	2.75

Source: Sugarcane Price policy for the Year 2018-19, CACP, 2018.

It indicates that, the A2, FL, C2, gross value, returns over A2 and A2 + FL cost of cultivation of sugarcane crop is estimated for the crop season 2015-16.

Maharashtra always was sufferer in harnessing the benefits of Government policies. In fact, the State was notwithstanding from the overall sugar scenario in India. Oodles of misunderstanding, misconceptions and mis-behaviour cases were in concert with sugar marketing through tender system. The UP sugar prices always remained higher by Rs. 100/- (on an average) than the other states in India (Marathe, 2010).

Table No 4.5

Cane price Payable to farmers as a % of Value of Sugar

Sugar season	Ex-mill sugar price (Rs/qtl)	Cane price paid to farmers (SAP) (Rs/qtl)	State recovery rate (%)	Total sugar value from 1 qtl of cane (Rs/qtl)		Farmers share in total revenue (cane price paid to farmers/total sugar value) * 100		Cane price payable to farmers under revenue sharing formula (75% of total sugar value from 1 qtl of cane)
				As state recovery rate	At 9.5% recovery rate	As state recovery rate	At 9.5% recovery rate	At 9.5% recovery rate
Maharashtra								
2010-11	2592.96		11.30	293.00	246.33			184.75
2011-12	2859.79		11.67	333.74	271.68			203.76
2012-13	2988.75	220.00	11.45	342.21	283.93	64.29	77.48	212.95
2013-14	2759.58		11.47	316.52	262.16			196.62
2014-15	2340.21	245.00	11.67	273.10	222.32	89.71	110.20	166.74
2015-16	2950.28	171.00	11.37	335.45	280.28	50.98	61.01	210.21

Source: Calculated by the Commission based on data from Directorate of Sugar, DFPD

Table No 4.7

Sugarcane: Break-up of Cost of Cultivation in Maharashtra (Rs/per hact)

Cost items	2016-17	2014-15	2013-14
Operational Cost	103861.42	143965.79	121180.88
Human Labour			
Casual	23620.37		
Attached	769.43	1214.68	2116.88
Family	17578.90	21819.98	12890.54
Total	41968.70	57275.15	49022.06
Bullock Labour			
Hired	3549.31	5817.96	4097.77
Owned	1203.54	2101.30	1808.25
Total	4752.85	7919.26	5906.02
Machine Labour			
Hired	16243.88	18952.32	19808.67
Owned	603.66	900.43	451.32
Total	16847.54	19852.75	20259.99
Seed	3082.41	9034.64	5615.31
Fertilizers	14553.98	18938.94	20162.32
Manure	1498.29	6249.90	2429.60
Total	16052.27	25188.84	22591.92
Insecticides	505.21	782.94	377.69
Irrigation Charges	15577.00	16727.16	11037.87
Interest on Working Capital	5075.44	7185.05	6370.02
Miscellaneous	0.00	0.00	0.00
Fixed Cost	50672.88	49398.71	49750.12
Rental Value of Owned Land	34326.20	33276.51	41340.93
Rent Paid for Leased-in Land	0.00	0.00	0.00
Land Revenue, Cesses & Taxes	351.89	274.80	265.84
Depreciation on Implements & Farm Buildings	1260.02	1249.00	915.05
Interest on Fixed Capital	14737.77	14598.40	7228.30
Total Cost	154534.30	193364.50	170931.00

Source: CACP, 2017-18 and 2019-20.

Table No 4.6

Gross and Net Returns of Sugarcane (TE 2015-16)

State	Cost A2	Cost A2+FL	Cost C2	Gross value	Gross returns over A2		GRO A2+FL		Net Return	
					Rs/ha (GVO/A2)	% (Rs/A2)	GRO/A2*100	% (Rs/A2+FL)	GVO-C2	% (Rs/A2+FL)
AP	80071	94250	151882	189251	109180	136	95001	101	37369	25
Kar	57779	70937	111545	160063	102283	177	89125	126	48518	43
MH	116898	136955	184906	214041	97143	83	77086	56	29135	16
TN	107622	127692	165161	242148	134526	125	114456	90	76987	47
UP	38445	53087	94793	155469	117023	304	102381	193	60676	64
UK	36179	48224	87127	143012	106833	295	94788	197	55885	64
All India	65297	81359	124649	176725	111428	171	95366	117	50076	42

Source: CACP using CS Data

Table No 4.8

Sugarcane: Break-up of Cost of Cultivation in Maharashtra (Rs/per hectare)

Cost items	2016-17	2014-15	2013-14
Operational Cost	103861.42	143965.79	121180.88
Human Labour			
Casual	23620.37		
Attached	769.43	1214.68	2116.88
Family	17578.90	21819.98	12890.54
Total	41968.70	57275.15	49022.06
Bullock Labour			
Hired	3549.31	5817.96	4097.77
Owned	1203.54	2101.30	1808.25
Total	4752.85	7919.26	5906.02
Machine Labour			
Hired	16243.88	18952.32	19808.67
Owned	603.66	900.43	451.32
Total	16847.54	19852.75	20259.99
Seed	3082.41	9034.64	5615.31
Fertilizers	14553.98	18938.94	20162.32
Manure	1498.29	6249.90	2429.60
Total	16052.27	25188.84	22591.92
Insecticides	505.21	782.94	377.69
Irrigation Charges	15577.00	16727.16	11037.87
Interest on Working Capital	5075.44	7185.05	6370.02
Miscellaneous	0.00	0.00	0.00
Fixed Cost	50672.88	49398.71	49750.12
Rental Value of Owned Land	34326.20	33276.51	41340.93
Rent Paid for Leased-in Land	0.00	0.00	0.00
Land Revenue, Cess& Taxes	351.89	274.80	265.84
Depreciation on Implements & Farm Buildings	1260.02	1249.00	915.05
Interest on Fixed Capital	14737.77	14598.40	7228.30
Total Cost	154534.30	193364.50	170931.00

Source: CACP, 2017-18 and 2019-20.

Table No. 4.9

Sharing of the Sugar Proceeds among Farm and Factory

Daily crushing capacity (TCD)	Sugar recovery[1]	Cane (MT) crushed during 180 days (col. 1 x 180 days) (in lakhs)	Sugar production (col.2[1]x 3) (Kg. in lakhs)	FRP (Rs. Per ton of sugarcane)[2]	Value of sugar produced @ Rs.30 per Kg. (Rs. in lakhs) (col.4xRs.30)	Average value (Rs.) of sugar against 1 ton of cane crushed (co 6 ÷ 3).	Share of cane value in the market price (as defined in col 6) of sugar[3]	Difference Between FRP and share of cane in sugar proceeds (col 8-5)	Value of sugar produced @ Rs.35 per Kg. (Rs. in lakhs) (col 4 x 35)	Average value (Rs.) of sugar against one ton of cane crushed (col 10÷3)	Share of cane value in the market price (as defined in col 10) of sugar[3]	Difference Between FRP and share of cane in sugar proceeds (col 12-5)
1	2	3	4	5	6	7	8	9	10	11	12	13
3000	9.5	5.40	513	1700	15390	2850	1995	295	17955	3325	2327.5	627.5
	10		540	1789.5	16200	3000	2100	310.5	18900	3500	2450	660.5
	10.5		567	1879	17010	3150	2205	326	19845	3675	2572.5	693.5
	11		594	1968.5	17820	3300	2310	341.5	20790	3850	2695	726.5
	11.5		621	2058	18630	3450	2415	357	21735	4025	2817.5	759.5
3500	9.5	6.30	598.5	1700	17955	2850	1995	295	20947.5	3325	2327.5	627.5
	10		630	1789.5	18900	3000	2100	310.5	22050	3500	2450	660.5
	10.5		661.5	1879	19845	3150	2205	326	23152.5	3675	2572.5	693.5
	11		693	1968.5	20790	3300	2310	341.5	24255	3850	2695	726.5
	11.5		724.5	2058	21735	3450	2415	357	25357.5	4025	2817.5	759.5
4000	9.5	7.20	684	1700	20520	2850	1995	295	23940	3325	2327.5	627.5
	10		720	1789.5	21600	3000	2100	310.5	25200	3500	2450	660.5

	10.5		756	1879	22680	3150	2205	326	26460	3675	2572.5	693.5
	11		792	1968.5	23760	3300	2310	341.5	24255	3850	2695	726.5
	11.5		828	2058	24840	3450	2415	357	25357.5	4025	2817.5	759.5
5000	9.5	9.00	855	1700	25650	2850	2850	295	29925	3325	2327.5	627.5
	10		900	1789.5	27000	3000	3000	310.5	31500	3500	2450	660.5
	10.5		945	1879	28350	3150	3150	326	33075	3675	2572.5	693.5
	11		990	1968.5	29700	3300	3300	341.5	34650	3850	2695	726.5
	11.5		1035	2058	31050	3450	3450	357	36225	4025	2817.5	759.5
6000	9.5	10.80	1026	1700	30780	2850	2850	295	35910	3325	2327.5	627.5
	10		1080	1789.5	32400	3000	3000	310.5	37800	3500	2450	660.5
	10.5		1134	1879	34020	3150	3150	326	39690	3675	2572.5	693.5
	11		1188	1968.5	35640	3300	3300	341.5	41580	3850	2695	726.5
	11.5		1242	2058	37260	3450	3450	357	43470	4025	2817.5	759.5
7000	9.5	12.60	1197	1700	35910	2850	2850	295	41895	3325	2327.5	627.5
	10		1260	1789.5	37800	3000	3000	310.5	44100	3500	2450	660.5
	10.5		1323	1879	39690	3150	3150	326	46410	3675	2572.5	693.5
	11		1386	1968.5	41580	3300	3300	341.5		3850	2695	726.5
	11.5		1449	2058	43470	3450	3450	357		4025	2817.5	759.5

Notes: 1.By crushing one ton of sugarcane, if 95 kg of sugar is produced then sugar recovery remains 9.5%, similarly, if sugar is produced at 115Kg, then recovery will be 11.5%.

1. The FRP for the season 2012-13 is Rs. 1700 for the base sugar recovery of 9.5%, and for every 1% of incremental of recovery a premium of Rs. 179 is estimated as per the recommendations of CACP.
2. It is assumed that the share of cane cost in the conversion cost of sugar is around 70%. This % should be reciprocal to the revenue earned by selling the sugar proceeds and should go to the cane growers as sugarcane price.

4.5 Cane arrears

The problem of cane price arrears has assumed a serious proportion in case of state sector factories as well as cooperative sector units, particularly in UP, Bihar, Punjab, Haryana, Rajasthan and Madhya Pradesh where the reckoning of the arrears is done with reference to the state-advised prices. In other states like Maharashtra and Tamil Nadu, the cane price payments are staggered in two installments - first SMP fixed by the Centre is paid and later the additional price being the difference between the state-advised price and the SMP. The state government authorities who have the responsibility of ensuring cane price payments are inclined to adjust such arrear payments against land revenue and to issue recovery certificates. Sugar mills would have to face another serious problem soon and this is partly the making of the state governments which have unrealistically high state-advised cane prices notwithstanding the fact that the producers of other sweeteners like 'gur' and 'khandsari' are purchasing cane at half the price fixed for sugar.

Present system leads to major swings in cane price payments, which ranges between 55 per cent to even over 100 per cent of sugar price. Against the FRP of Rs. 170 per quintal for the last sugar season (Sept 2012-Oct 2013), UP has declared the highest SAP at Rs. 280 per quintal (The prices for early and rejected/unsuitable varieties of cane have been hiked to Rs 290 per quintal and Rs 275 per quintal compared to Rs 250 per quintal and Rs 235 per quintal respectively), followed by Haryana and Punjab at Rs. 240, Tamil Nadu at Rs. 225 and Maharashtra at Rs. 190. The sugar mills in UP had bought total cane worth over Rs 19,000 crores from farmers through sugarcane societies. Since the mills get two weeks to settle dues without interest penalty, the net payables stood at Rs 16,838 crores. The private and cooperative mills in UP have paid nearly Rs 11,582 crores till March 22, 2013 with the arrears standing at Rs 5,256 crores (Business Standard**,** March 27, 2013).

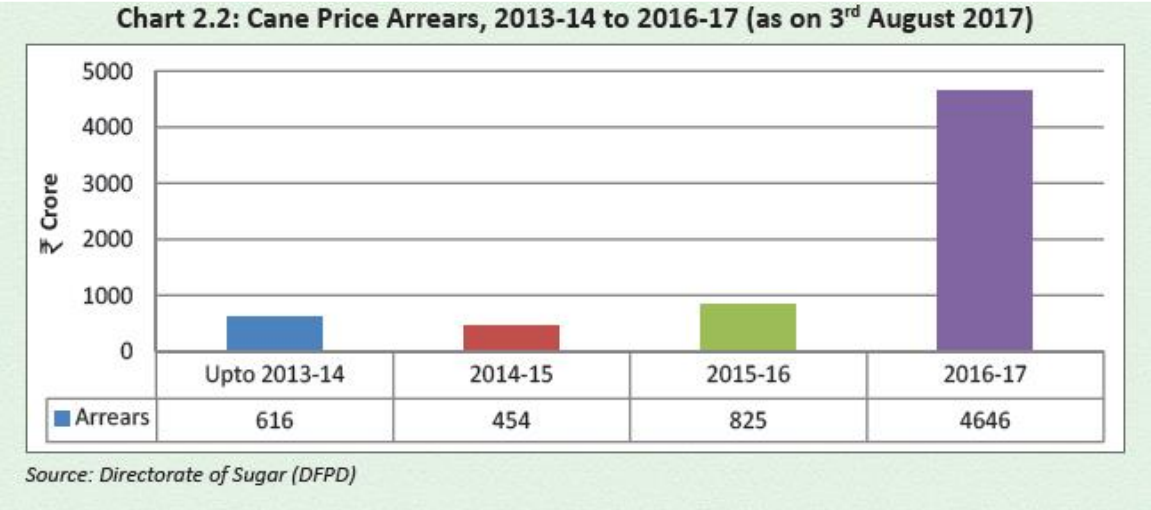
The cane arrears for sugar season 2014-15, which were Rs.15,593 crores on 31st July 2015, stood at Rs. 602 Crore on 26th July 2016, as most of the arrears were paid by the mills. The arrears for sugar season 2015-16 were about Rs. 5,696 Crore (significantly lower than last season) on 26th July 2016. State wise cane arrear position as on 26th July 2016 is given in Table 4.6.

Table 4.10

Cane Price Arrears 2008-2014

Sugar season	Position as on	Total price payable	Price paid	Arrears	% of arrears on price payable
2009-10	30/5/2010	37529	36378	1151	3
2010-11	30/5/2011	42295	40099	2196	5
2011-12	30/5/2012	49761	44637	5124	10
2012-13	30/5/2013	58541	50662	7879	13
2013-14	31/5/2014	55910	41815	14095	25
2014-15	31/7/2015	65113	49520	15593	24
2015-16	26/7/2016			7484.6	13.5

Source: Directorate of Sugar, DFPD quoted in CACP, Sugarcane Price Policy, 2016-17 and 2017-18.



Source: CACP, 2019

Cane arrears to farmers stood at Rs 9,361 crores till early month for the year 2015-16 season ending September, while Rs 780 crores is outstanding for the previous season. During the 2014-15 season, he said, cane arrears had touched nearly Rs 22,000 crores but after several government interventions have come down to Rs 780 crore of which Rs 191 crores pertains to UP, the country's second largest sugar producing state. Total cane price payable to farmers across all cane producing states stands to Rs 60,000-65,000 crores a year. Maharashtra being a major cane processing state has cleared 96% of

the dues on account of the cane arrears during the 2015-16 seasons. However, the arrears payable by the state stood at Rs. 1158 crores during the season 2018-19. While the total arrears payable in India stood at Rs. 17684 crores during the same period.

The CACP has appraised the performance of 519 operational sugar mills during 2016-17. Out of these, 464 mills currently owe arrears amounting to Rs. 15593 crores to cane cultivators in contrast to no amount outstanding against 55 mills (See CACP Report). The top 30 sugar mills have the outstanding dues owing to the arrear in excess of Rs.100 crores stands high among the average crushing capacity close to 10,000 TCD as compared to 3,000 TCD (55 mills). This counters the principle of economy of scales and thus presents a paradox. The Commission has recommended to study, at least of these 85 sugar mills for this dichotomy. The CACP has recommended, a four pronged strategy comprising (i) free movement and sale of by-products of sugarcane, (ii) de-reservation of sugarcane area, (iii) removing minimum distance criterion and (iv) adoption of hybrid approach in determining sugarcane prices i.e. combination of Revenue Sharing Formula (RSF) and FRP.

Sugar mills in Maharashtra owe farmers to Rs 371 crores as dues of the cane arrears for the year 2011-12. Farmers are yet to receive payments. Payments are due from 51 sugar co-operatives and 11 private mills. Last year, the State Government had agreed to pay. The Government had agreed to a rate of Rs 2,050 per ton as the first advance for mills in Sangli, Kolhapur and Satara; Rs 1,850 per ton for mills in Pune, Ahmadnagar and Solapur; and Rs 1,800 per ton for the rest of the mills in the state. The government had taken up the matter with several factories. Out of 171 mills, around 140 mills have made cane payments to farmers. Of the remaining 31 factories that still have to make payments.

4.6 Supply Chain Management (SCM) of sugarcane

The SCM or the schedule of cane harvesting and transporting (H & T) of a sugar factory is one of the internal activities of the sugar mills. The sugar factories have to concentrate on the quality and the variety of sugarcane for their profitability. But these aspects are least cared by the sugar mills. Sugar factories should work during peak sugar recovery. By the end of September of the year change in the climate is normally indication of the monsoon retreat and the beginning of the winter season. The sugar recovery starts to grow during the period and stand still up to March end or at the most second week of the April. With increase in the summer heat the sugar recovery comes

down. During a span of 180 days, the available or registered sugarcane should be harvested and crushed by the mills for preparing the sugar. Hence, the SCM of the sugarcane is one of the crucial and critical issues in the production management of a sugar factory.

The harvested sugar has to be crushed in the milling section before 5 to 8 hour of cane cutting. The time required for loading, transporting, waiting at the Gavan section i.e. crushing point or deloading point and to and fro weighing should be lessened. It is estimated that the sugarcane supply at the crushing point should be made available to supply the crushing needs for next three hours. If the crushing capacity of the mill is 5000 TCD, it means every hour a mill has to crush the sugarcane to the extent of 208 to 210 tons of sugarcane. It means around 20 cane-loaded trucks or tractors should be available for crushing during next three hours. The excess supply of cane at this point may cause the deterioration of weight of the cane and even the quality of sucrose declines. The juice in the sugarcane immediately get infected by sucrose eating bacteria, which increases the cost of sugar production, because the sugar factories have use more chemicals to kill the bacterial infections in the cane. Loss of weigh is a economic loss to the farmers and the bacterial infection is a loss to the mills. Obviously, the SCM plays a significant role in this process. the quality of the cane has to be maintained for the efficient functioning of the mill. Sugar is basically formed in the standing crop in the fields. The mills only process the cane and extract the sugar from the canes.

Cane variety is another crucial issue of sugar recovery. Farmers prefer to cultivate the Co 265 variety of sugarcane, since its weigh remains high, while the sugar mills prefer Co 86032 variety of sugarcane, because of its high content sucrose in the variety. The later cane variety (i.e. Co 86032) contains high amount of sucrose as compared to earlier variety of sugarcane (i.e. Co 265). Volume of ratoon crop of the later cane variety remains further less due to loss of buds in the field during cane harvest. Consequently, the sugar factories normally pay high amount of cane price (ranging from Rs 10 to 20 per ton) for the ratoon crop of Co 86032 variety.

The members and non-members of the cooperative sugar factory have to register their area under sugarcane crop at the time of plantation. The plantation of *Adsali*sugarcanebegins by August-September of the year. And the *Suru* plantation of sugarcane begins from October to November. The cane harvesting schedule is prepared

on the basis of the date of plantation. Obviously, the *Adsali* crop will be harvested first and then *Suru* plantation. The harvesting of ratoon crop starts after harvest of the plantation crop. During the excess or shortage of sugarcane, the harvesting schedule disturbs. The factories with high crushing capacities cannot maintain this schedule properly. The small factories maintain their sugar recovery at the higher side. The profitability is based on the sugar recovery. Both farmers and the factory rewards by high sugar recovery.

The sugar factories are least bothered of the quality of sugarcane and transport of the cane within the scheduled time for crushing. Consequently, they attain less sugar recovery during the crushing days. The farmers who have registered their area of sugarcane to a factory falling under the jurisdiction or out of jurisdiction, normally, reverts their agreement if harvesting is delayed and forwards their sugarcane to other sugar factory without intimation to the earlier sugar factories. As a result the crushing schedule dismantles. During the shortage of sugarcane such incidences took place. The members' sugarcane is preferred first in the cooperative enterprises even when a non-member has also registered his area for crushing. The Govt provides subsidies during the excess cane supply to the farmers and the sugar mills. Even during surplus production of sugar the Govt provides short term subsidies for export of sugar so as to clear the domestic market and also clear the cane arrears.

The private sugar factories are very sincere in marketing of cane area registrations and SCM, because they don’t have a guarantee of supply of cane for crushing. Their Cane Development Department (CDD) is very ardent and remains fervent in this aspect. While the CDD in a cooperative sugar factory is very devoted and remain zealous in maintaining the H and T schedule flawless. The state should encourage development of market-based long-term contractual arrangements and phase out cane reservation area and bonding. (Ken Research, 2015).

The upcoming advancements in technology will further augment the sugar recovery rate in the country. The production and consumption of sugar is inclined to grow in future. Apart from the volatility of cane prices and the arrears to be paid, the farmers will continue to cultivate the sugarcane in future, since the crop is sturdy and affordable and labour-saving. The consumption of the sugar is inclined to grow by 2.8%

apart from the growing diabetic patients in India. The growth in population obviously increases the demand for sugar from food and beverage industries.

Table No. 4.11
Calculated Values of FRP for the Sugar Season 2013-14

(Note: Calculation is based on the formula given by the CACP assuming that the sugar recovery of the respective sugar factories is considered for the sugar season 2012-13)

Sr. No.	Plant Name	Name and Address of Sugar Mill	Recovery (%)	FRP for the year 2012-13 (Rs. per quintal)	Estimated FRP for the sugarcane to be paid during the season 2013-14 assuming the recovery in col.4*	Estimated average sugar price for the year 2013-14 (Rs. per quintal)	Estimated sugarcane price for the year 2013-14**
1	2	3	4	5	6	7	8
1	Vishwas	Chikhali,	13.1	234.44	303.52	Rs. 3200 per quintal	314.40
2	Mahankali	Kavathe Mahankali	11.6	207.59	268.72	-do-	278.4
3	Gadhinglaj	Gadhinglaj,	12.3	220.12	284.96	-do-	295.2
4	Phaltan	Shakharwadi	11.3	202.22	224.18	-do-	240.00
5	Raigaon	Raigaon	11.6	207.59	224.87	-do-	278.40
6	Hemarus	Chunnehatte, Raggale (KH)	12.8	229.07	227.65	-do-	307.20
7	Sillod	Sillod	10.9	195.06	220.00	-do-	261.60
8	Satpuda	Sahada	10.3	184.32	221.86	-do-	247.20
9	Ambajogai	Ambasakhar	11.7	209.38	225.10	-do-	280.80
10	Faizpur	Faizpur	10.5	187.90	222.30	-do-	252.00
11	Jamani	Jamani	9.9	177.16	220.92	-do-	237.60

12	Wain Ganga	Teh. Maholi Road	9.3	170.00	-0.46	-do-	223.20
13	Ujana	Ujana	11.8	211.17	225.33	-do-	283.20
14	Mudkhed	Degaon	11.9	212.96	225.57	-do-	285.60
15	Pangri	Pangari	11.4	204.01	224.40	-do-	273.60
16	Ranjani	Ranjani, Kallam	12	214.75	226.90	-do-	288.00
17	Pangaon	Pangaon	12.2	218.33	226.26	-do-	292.80
18	Aravindnagar	Tundar	11.6	207.59	224.87	-do-	287.40
19	Sheshnagar	Sheshnagar	9.7	173.58	220.46	-do-	232.80
20	Dokare	Dokare	10.2	182.53	221.62	-do-	249.60
21	Bela	Khursapur (Bela)	9.5	170.00	220.00	-do-	228.00
22	Pratibha Nagar	Pratibhanagar, Vihamandava	5.7	170.00	-8.81	-do-	136.80
23	Karamveer	Ranwad	11.5	205.80	224.60	-do-	276.00
24	Materwadi	Materewadi	11.2	200.43	223.94	-do-	268.80
25	Sanjivani	Takli	11	196.85	225.75	-do-	264.00
26	Pravaranagar	Pravaranagar	12.3	220.12	226.50	-do-	295.20
27	Malegaon	Malegaon	11.9	212.96	225.32	-do-	285.60
28	Sant Dhamaji	Shiranadagi	12.1	216.54	226.03	-do-	290.40
29	Sangola	Waki (Shivane)	10.2	182.53	221.62	-do-	244.80
30	Takaliwadi	Takaliwadi	13	232.65	228.12	-do-	312.00
31	Mhalunge	Mhalunge	13	232.65	228.12	-do-	312.00
32	Sonari	Sonari	10.2	182.53	221.62	-do-	244.80
33	Pimpaldara	Pimpaldara- Padsale	11	196.85	225.75	-do-	264.00
34	Hiradgaon	Hiradgaon	10.1	180.74	221.39	-do-	242.40
35	Jakraya	Watwate	12.4	221.91	226.73	-do-	297.60
36	Bhagwantnagar	Uplai	12	214.75	214.75	-do-	288.00
37	Shriram	Phaltan	11.41	204.01	224.43	-do-	273.84
38	Krishna	Rethare Bk	12.11	216.54	260.06	-do-	290.64
39	Bhuinj	Bhuinj	11.95	214.75	225.68	-do-	286.80
40	Marali	Daulatnagar (Marali)	12.07	216.54	225.96	-do-	289.68

41	Sahyadri	Yeshwantnagar	12.43	221.91	226.80	-do-	292.32
42	Shendre	Shahunagar – Shendr	12.18	218.33	226.22	-do-	292.32
43	Walwa	Rajaramnagar	12.29	220.12	226.47	-do-	294.96
44	Hutatma	Walwe	13.3	238.02	228.82	-do-	319.20
45	Atpadi	Sonarsidhinagar	11.37	204.01	224.34	-do-	272.88
46	Warana	Warananagar	12.65	227.28	227.31	-do-	303.60
47	Panchaganga	Ganganagar	12.17	218.33	226.19	-do-	292.08
48	Kumbhikesari	KuditreKarvir	12.98	232.65	228.07	-do-	311.52
49	Bidri	Bidri (Mouninagar)	13.45	241.60	229.16	-do-	322.80
50	Bhogawati	Shahunagar (Parite)	12.7	227.28	227.42	-do-	304.80
51	Datta	Dattanagar	12.38	221.91	226.68	-do-	297.12
52	ChhatapatiShahu	Kagal	12.83	229.07	227.73	-do-	307.92
53	Jawahar	Hupari–Yalgud	12.37	221.91	226.66	-do-	296.88
54	Rajaram	Wategaon	12.85	230.86	227.77	-do-	308.40
55	JeurAdinath	Shelgaon-Bhalwani	11.51	205.80	224.66	-do-	276.24
56	Ajara	Ajara	12.96	232.65	228.03	-do-	311.04
57	KoregaonJarandeshwar	Chimangaon	12.44	221.91	226.82	-do-	298.56
58	Sonhira	Wangi	11.72	209.38	225.15	-do-	281.28
59	Udaisinghrao Gaikwad	Sonawade	12.29	220.12	226.47	-do-	294.96
60	Kagal Taluka	Hamidwada-Kaulage	12.79	229.07	227.63	-do-	306.96
61	Rayat	Shewalewadi	11.88	212.96	225.52	-do-	285.12
62	Sharad	Narande	12.9	230.86	227.88	-do-	309.60
63	Kranti	Kundal	12.27	220.12	226.42	-do-	294.48
64	Indira Gandhi BhartiyaMahilaVikas	Tambale	12.07	216.54	225.96	-do-	289.68
65	Sarvodaya	Karandwadi	12.83	229.07	227.72	-do-	307.92
66	MohanraoShinde	Mohannagar	11.6	207.59	224.87	-do-	278.40
67	D.Y. Patil	Dnyanshantinagar	12.36	221.91	226.63	-do-	296.64
68	Vitthal Sugars	Mhaisgaon	11.66	209.38	225.01	-do-	279.84
69	Jaywant	Dhawarwadi	11.52	205.80	224.68	-do-	276.48

70	Sant Eknath	Paithan	10.65	191.48	222.68	-do-	255.60
71	Vasant	Pusad	10.6	189.69	222.55	-do-	254.40
72	Marathwada	Dongarkada	12.12	216.54	226.07	-do-	290.88
73	Godavari Dudhana	Pathari	11.64	207.59	224.96	-do-	279.36
74	Purna	Basmathnagar	11.78	211.17	225.24	-do-	282.72
75	Jai Bhavani	Georai	10.51	187.90	222.34	-do-	252.24
76	Samarth	Mahalala	11.01	196.85	223.50	-do-	264.24
77	Manjara	ChincholiraoVilasnagar	12.4	221.91	226.73	-do-	297.60
78	Shetkari	Killari	11.01	196.85	223.50	-do-	264.24
79	Shankar Golegaon	Phulenagar	11.41	204.01	224.43	-do-	273.84
80	Majalgaon	Mithand	10.98	196.85	223.43	-do-	263.52
81	Chopda	Chopda	9.56	171.79	220.13	-do-	229.44
82	Astoria Agro & Allied Industries (Pushpadanteshwar	Samsherpur	9.6	171.79	220.23	-do-	230.04
83	Sipora Bazar	Raosahebnagar	10.6	189.69	222.55	-do-	254.40
84	Murum Vitthal	Murum, Murum-	11.58	207.59	224.82	-do-	277.92
85	Gangamai	Babhulgaon	10.83	193.27	223.08	-do-	259.92
86	Dwarkadhish	Sheware	10.66	191.48	222.69	-do-	255.84
87	Vikas	Nivli	11.7	209.38	225.10	-do-	280.80
88	ChhatrapatiSambhajiRaje	Dindayalnagar	10.66	191.48	222.69	-do-	255.84
89	Dr. Babasaheb Ambedkar	Keshegaon	11.69	209.38	225.08	-do-	280.56
90	Yogeshwari	Laxminagar	11.91	212.96	225.59	-do-	285.84
91	Jay Mahesh	Pawarwadi	11.44	204.01	224.50	-do-	274.56
92	Shambhu Mahadev	Havargaon	11.13	198.64	223.78	-do-	267.12
93	Sant Shiromani MarutiMaharaj	Maulinagar, Belkund	11.27	202.22	224.10	-do-	270.48

94	Reva	Niwada	12.79	229.07	227.63	-do-	306.96
95	Saibaba	Shivani(BK),Gondri	10.71	191.48	222.80	-do-	257.04
96	Sagar	Thirthpuri	10.45	187.90	222.20	-do-	250.50
97	Samrudhi	Renuka Nagar	11.27	202.22	224.11	-do-	270.48
98	Jagruti Sugar & Allied Industries	Talegaon	12.57	225.49	227.12	-do-	301.68
99	Aryan Sugars	Khamgaon	5.09	170.00	-10.23	-do-	122.16
100	Girna	Bhausahebnagar	10.19	182.53	221.60	-do-	244.56
102	Niphad	Bhausahebnagar	10.3	184.32	221.85	-do-	247.20
103	Nasik	Palse	10.6	189.69	222.55	-do-	254.40
104	Vasantrao Dada Patil	Vithewadi	11.03	196.85	223.54	-do-	264.72
105	Kopergaon	Kolpewadi	11.29	202.22	224.15	-do-	270.96
106	Ganesh	Ranjangaon (Khurd)	11.31	202.22	224.19	-do-	271.44
107	Ashok	Ashok nagar	11.4	204.01	224.40	-do-	273.60
108	Rahuri	Rahuri	10.44	186.11	222.18	-do-	250.56
109	Shrigonda	Shrigonda	10.85	195.06	223.13	-do-	260.40
110	Sangamner	Amrutnagar	11.87	212.96	225.49	-do-	284.88
111	Dnyaneshwar	Bhende	10.94	195.06	223.34	-do-	262.56
112	Vridheswar	Vrideshwar	11.15	200.43	223.82	-do-	276.60
113	Jagadamba	Rashin	11.37	204.01	224.33	-do-	272.88
114	Mula	Sonai	11.21	200.43	223.96	-do-	269.04
115	Parner	Pangri	11.01	196.85	223.50	-do-	264.24
116	Someshwar	Someshwarnagar	11.35	204.01	224.29	-do-	272.40
117	Chhatrapati	Bhavaninagar	11.7	209.38	225.10	-do-	280.80
118	Bhima	Patas	11.37	204.01	224.33	-do-	272.88
119	Vighnahar	Junnar	11.36	204.01	224.31	-do-	272.64
120	ShankarraoMohite-Patil	Akluj	11.28	202.22	224.13	-do-	270.72
121	Shankar Sahakari	Sadashivnagar	11.32	202.22	224.22	-do-	271.68
122	Siddeshwar	Kumathe	11.19	200.43	223.92	-do-	268.56

123	VithalGursale	Venunagar	11.84	211.17	225.42	-do-	284.16
124	Bhima	SikandarTakli	11.88	212.96	225.52	-do-	285.12
125	Ravalgaon	Ravalgaon	10.52	187.90	222.37	-do-	252.48
126	Saswad Mali	Malinagar	11.66	209.38	225.01	-do-	279.84
127	Pandurang	Shreepur	12.16	218.33	226.17	-do-	291.84
128	Chatrapati	KasabaBhavada	12.35	221.91	226.61	-do-	294.40
129	Indapur	Bijawadi	10.96	196.85	223.38	-do-	263.04
130	Tasgaon	Turchi	12.35	221.91	226.61	-do-	294.40
131	Rajgad	Nigade	10.78	193.27	222.97	-do-	258.72
132	Agasti	Agastinagar	11.66	209.38	225.01	-do-	279.84
133	Padamshree Dr. Vithal Rao Vikhe Patil	Kaij	11.24	200.43	224.03	-do-	269.76
134	Sant Tukaram	Kasarsai –Darumbre	11.66	209.38	225.01	-do-	279.84
135	Ghodganga	Nhavare	11	196.85	224.64	-do-	264.00
136	Bhimashankar	Ambegaon	11.76	211.17	225.24	-do-	282.24
137	Cane Agro Energy (I)	KhanpurBhalwani	11.42	204.01	224.45	-do-	274.08
138	Saikirpa	Devdaithan	10.75	193.27	222.90	-do-	258.00
139	VitthalraoShinde	Gangamainagar	11.75	211.17	225.22	-do-	282.00
140	LokneteBaburao Patil	Laxminagar	11.38	204.01	224.36	-do-	273.12
141	Nira Bhima	Shahajinagar	10.89	195.06	223.22	-do-	261.36
142	Shri Makai	Bhilarwadi	11.65	209.38	224.98	-do-	279.60
143	Kukadi	Pimpalgaon Pisa	10.98	196.85	223.43	-do-	263.52
144	ShreenathMhaskoba	Patethan	11.03	196.85	223.54	-do-	264.72
145	Anurag	Mewat	11.07	198.64	223.64	-do-	265.68
146	Baramati Agro	Shetphalgade	11.61	207.59	224.89	-do-	278.64
147	DharashivSakhar	Chorakhali	11.49	205.80	224.62	-do-	275.76
148	Daund Sugar	Alegaon	11.97	214.75	225.70	-do-	287.28
149	Mukteshwar	Dhaegoan	11.41	204.01	224.43	-do-	273.84
150	Siddhanath	Tirhe	10.15	182.53	221.51	-do-	243.60
151	Prasad Sugar & Allied	Vambori	10.76	193.27	222.92	-do-	258.24

	Agro Products						
152	Venkateshkrupa	Jategaon BK	11.11	198.64	223.73	-do-	266.64
153	Bhairavnath-Unit -Ii	Vishal Solapur	11.23	200.43	224.01	-do-	269.52

***** Calculated with formula as; the price of one quintal of sugarcane at Rs. 220 for the basic recovery of 9.50 and Rs. 2.32 for the additional premium of sugar recovery of 0.01(CACP, 2013)**.**

****** Calculated with formula as; sugar recovery/100 * average sugar price * 75/100 as share of cane price in the sugar price (CACP)**.**

Source: Information in col.4 and 5 is from- Ministry Of Consumer Affairs, Food And Public Distribution, (Department of Food and Public Distribution), New Delhi, Order No. G.S.R. 697(E)/Ess.Com./Sugarcane, 22nd October, 2013

CHAPTER V

VALUATION OF SUGARCANE ECONOMY

The valuation is based on the current prices of the variants specified in earlier part of the exploration. Farm and factory sectors are considerations in the exploration. An input and output valuations are taken into account.

5.1Input costs pumped in the rural economy

Input costs are measured in terms of operational costs, human costs, bullock costs. Machine costs, fertilizers and manures costs, insecticides, irrigation charges, interest on capital and working costs, fixed costs, rental values, taxes and cess and depreciation etc. (see Table 4.8 and 5.1).

Table No 5.1

Breakup of Sugarcane Cultivation in Maharashtra 2015-16 and 2016-17 (Rs/hectare)

Cost items	2016-17	1015-16
Operational cost	103861.42	141436.89
Human labour		
Casual	23620.37	33756.46
Attached	769.43	995.00
Family	17578.90	25462.15
Total	41968.70	60213.61
Machine labour		
Hired	16243.88	22334.85
Owned	603.66	867.44
Total	16847.54	23202.29
Fertilizers and Manure		
Fertilizer	14553.98	18474.93
Manure	1498.29	3796.47
Total	16052.27	2271.40
Insecticides	505.21	678.23
Irrigation charges	15577.00	15222.94

Interest on working capital	5075.44	6822.04
Miscellaneous	00.00	00.00
Fixed cost	50672.88	48986.21
Rental value of owned land	34326.20	34424.51
Rental paid for leased-in land	00.00	00.00
Land revenue, cess and taxes	351.89	346.17
Depreciation on implements and farm building	1260.02	1231.63
Interest on fixed capital	14734.77	14983.90
Total cost	15453430	190422.90

Source: Price Policy for Sugarcane, CACP, 2019-20, pp. 70.

1. The area under the sugarcane crop in the state during the season 2017-18 was 9, 02,000 hectares. The cost of cultivation as estimated by the CACP during the season stood at Rs 1, 54,534.30 per hectare. Based on this data, it is estimated that around Rs 13,939 crores was pumped in the rural economy with a multiplier effects of three, which further goes to three times of this cost i.e. Rs 4,18,170 crores. Similarly, the total cost of sugarcane cultivation during 2018-19 season remained at Rs. 1, 90,422.90 for the same area under sugarcane. There is a hike in the cost by Rs. 35,888.60 per hectare. The total money pumped in the economy by way of cultivation costs goes to Rs. 17,519 crores, which again is circulated with multiplier effect of three, i.e. the liquidity in the rural Maharashtra goes to Rs. 5, 25,567 crores. There is a net rise of income by Rs. 3,580 crores during the 2018-19 seasons.

2. The sugarcane crushed during the season 2017-18 was to the tune of 2,963 lakh tons. The FRP paid for the cane during the same period was Rs. 2,844 per ton. It means the cane price directly infused into the rural economy was to the tune of Rs.84, 267.72 crores. This has also the multiplier effects with three times growth in money supply in the general (both rural and urban economy) economy with the growth value of Rs. 2, 52,803.16 crores.

3. The sugar production during the year 2017-18 was 107.08 lakh tons, whose value at the rate of Rs 31,859 per ton of sugar prevailing during the year goes to Rs. 3,41,146.17 lakh. This money again circulates at the rate of multiplier three in the

economy. Around Rs. 10 lakh crores of liquidity is created in the economy by way of sugar.

4. The daily wages in the state remained between the ranges of Rs. 255 to 280 during the season 2017-18. The harvester workers get Rs. 300 per ton as their charges of harvesting as per the tripartite agreement signed by the Govt., factory and the workers' union. The cane crushed during year 2017-18 was 2,963 lakh tons; multiplied by Rs. 300 per ton goes to Rs. 88,890 lakh. This money directly goes to the drought area of the state from where the migrant harvest workers are coming for the harvesting for four-five months. Besides, the transport workers receive hiring charges for their vehicles based on the distance of cane transported. The amount paid to them always remained equal to the harvest workers. There will be another lot of injecting the money in the rural economy to around Rs 1000 crores.

5. The bio-electrical price of co-generation in the sugar factories stay behind at Rs 5.50 per unit. The total electricity generated by the sugar mills in Maharashtra during is

6. The price of molasses was in the range of Rs. 3200 to 3500 per bulk liters.

7. The price of bagasse produced in the factories was averaged at Rs 2168 per MT. the state sugar factories are producing around 1000 MW electricity through cogeneration process by using bagasse as its raw-material. The price for the unit of electricity produced by this process was paid at the rate of Rs 4.98 in 2011-12. Now it has been raised to Rs 5.50 per unit. One MW means 1000 units/1000 kwH (kilo watt per hour). Around Rs 5.50 crores of income is being generated through cogeneration projects in Maharashtra. This energy is bio-energy, could produce any green house gases or does not harm the environment. The benefits of eco-friendly atmosphere are also accountable through environmental economic accounting system. In near future this energy is going to rise up to around 7000 MW.

8. The compost generated as from the waste was sold at the average price of Rs. 868 to 900 per MT.

9. The scrap created in the machinery sector was sold at the average price of Rs. 25 per KG.

10. The ENA was valued to Rs. 43 to 46 per liter.

11. The price of ethanol sold by the sugar factories was priced to Rs. 40 to 46 per liter during the reference period.

12. The ash generated in the factory process was priced to Rs. 145 to 150 per KG.

13. The CO^2 price received by the sugar factories was Rs. 1100 to 1200 per cubic meter.

14. The wages received by the harvest and transport workers was averaged to Rs. 300 per MT. more than 2.50 lakh harvest workers were employed in the sugar factories during the season. The average price received by the vehicles was Rs. 400 per MT of sugarcane. More than 15 to 20 lakh vehicles were employed during the season.

15. The price of press mud received was averaged to Rs. 540 to 550 per MT.

16. The export subsidy received by the factories who complied 100% of the quota provided by the GOI was aggregated to Rs. 1081.14 per quintal of sugar during the season.

17. Basic utilization of bagasse as raw material continues to be as a fuel. Dry bagasse contains 40% cellulose, 30% pentasone and 20% lignin. It is suitable raw material for paper industry. 30% of cellulose requirement comes from agricultural residues. However, since the mills are scattered all over the country, collection of surplus bagasse poses a problem and makes paper units uneconomical. Efficient utilization yet to come up. The price of bagasse is going high around 2500 rupees per ton. This by-product now a day is used for co-generation purpose, where the factory can generate electricity for its own purpose and surplus by earning money by selling energy to the state electricity grid. Bagasse is used as captive fuel in the mill as most efficient power. The mills can be able to save bagasse to the extent of 10% of its production. The potential for co-generation and export of power to the grid after meeting mills own requirement of energy is estimated by expert bodies, at 3600 MW by 1996-97. All sugar factories have not exploited its huge potential like other countries (like Hawaii, Mauritius etc.) where co-generation of power from sugar mills has become a dependable source for supply of power. Bio-fuel and bio-energy are becoming the main products in the sugar mills. We should call energy cane instead of sugarcane.

CHAPTER VI

SUGAR SECTOR IN THE STATE

This chapter is devoted to the internal management of the sugarcane processing in the industry. The sugar industry is expected to operate jointly with the cane farming, by-products and the product mix approaches. The whole production exercise is to be handled within limit of around 25 to 30 per cent of the total cost of the sugarcane processing or sugar production processes. Sugarcane, as an industrial raw-material, shares a large amount of total expenditure of the sugar factory. It is the main raw material of the industry. Around 75 to 80 per cent of the total cost of the sugar factory is being shared by the sugarcane. Hence, the competitiveness of the industry is contingent on the turnaround management of the integrated farm-factory management. The production management is explored with this approach.

6.1 Collective approach

The industry follows its own economics. Among the total cost of production of sugar, conversion cost is the main element. The factory management has to maintain its efficiency in controlling this conversion cost. The conversion cost is nothing but the cost of production of the sugar as a final product. Application of modern technology minimizes this cost. This cost excludes the cost on sugarcane as raw material to the sugar industry. Costing of the sugar production activity is primarily linked to;

A) Sugarcane farm economy, which includes; choice of cane variety, input and resource use (land and water), low cost of cane production techniques, maintaining high sugar recovery, feasible and sober Government policy, efficiency in cane harvesting and transport etc.

B) Sugar (industrial) economy consisting of low conversion cost, high technical efficiency, ROE, maintaining valuation matrix, by-products, product mix, product flexibility etc.

C) Consumers' concerns includes, their choice, consumption basket, level of disposable income, product substitutes, standard of living, market destination, range of products and food habits of the consumers etc.

We always overlook such linkages with the different stakeholders. The sugar economy cannot neglect the sugarcane economy and the consumer's concerns and vice versa. The consumers should also prepare to pay the sugar prices at least equal to the cost of conversion. There is an urge of integration and linkage of almost all activities being carried out both in farm and factory levels. There are various phases of activities brought up in their respective locations. For example;

Phase - 1 includes integration or linkages of Industry + Agriculture + Services sector. Since it is an agro-industry, such linkages became very crucial and responsible. The sugar industry has further forward and backward linkages. The economics of linkages envisages the fact that, when overall industrial growth rate decelerate agricultural prices tends to increase, but in respect of agro-industries and that to sugar industry, agricultural prices (cane prices) tends to increase as a direct effect of the demand-supply gaps in raw-material (i.e. cane). If the industrial deceleration is caused by raw-material supply, the raw-material prices tends to increase and if the deceleration is caused by low demand for final products (i.e. sugar assuming the supply of cane is abundant) agricultural prices tends to decline. But in the sugar economy;

a) The demand for sugar is constantly increasing,
b) The supply of sugar is fixed with industrial capacities,
c) The supply and demand of sugar is governed by sugarcane supply,
d) The demand for sugarcane is also fixed with the registered crushing capacities,
e) The supply of cane is governing the whole sugar economy.

Under the rehabilitation in phase - 2 includes innate links with the cane growers, sugar production and the sugar consumers in general. The Government policy as usual, plays a significant role in controlling the sugar economy in an effective manner. Perhaps, the industry is controlled since long due to this reason and various other reasons. Now, under the regime of decontrol, all agencies related to the industry are expected to be freed from the control. Every agency is free to act as per its strategy. Consequently, the private sector is also opposing the move of decontrol. On this situation, Public-Private-Partnership (PPP) can play a very significant role in making the industry to work for the benefit of all concerned stakeholders in the industrial set up.

Box 3. 1

- *Factory was more important in 1932.*
- *Agricultural economy became significant in 1934.*
- *Consumers were significant before 1965 (i.e. prior to the CACP)*
- *Co-operative sector was economical in 1950s.*
- *Private sector is economical in 2000s*
- Water requirement for production of one kg of sugar 2068 litres.

Box 3.2

The matter of concern to industry and agriculture is;

- *Agriculture is urban biased, whereas economic development is industry biased.*
- *Short run macro policies fails to appreciate agriculture's importance*

Under phase – 3, each sector is expecting to link their activities to the economies of scales. The economies of scale can be retained constant by way of *learning by doing* techniques. The workforce should always be updated with the growing technology. The on-job training, extension activities, continuing education will definitely inspire the workforce to improve their efficiencies. Besides, a sense of belongingness can be generated and advocated on the background of disembodied technological progress of the sugar units. The share of phase 3 in the overall costs is around eight to nine per cent. The average cost of sugar per quintal is calculated for cooperative sugar in Maharashtra (see Table 3.2, VSI, Pune).

6. 2 Cost of sugar (Conversion cost)

The key measure of sugar factories' productivity is production efficiency, which captures the transformation rate of sucrose into sugar; in other words, it is the ratio of sugar production to the volume of industrialized sucrose. The costs incurred on this are known as conversion costs. The conversion cost is the costs incurred for converting sugarcane into crystal white sugar. This cost covers the costs on power, chemicals and consumables, salary and wages of the sugar workers, packing cost, repairs and maintenance, interest on term loan and working capital, depreciation and overhead costs

etc. The percentage of conversion cost in the total cost of production of sugar is around 20 to 25 per cent. It stands between 18 to 28 per cent in Maharashtra. With the rise in prices these costs tends to increase.

The major sources of income of the sugar factories consist of the income earned out of the sale of sugar, sale of molasses and bagasse, and the sale of other by-products produced if any. Excluding the cost on sugarcane, the sugar factories have to incur some of the cost for converting the sugarcane into sugar and other by-products, e.g. electricity through co-gene section and other sources of energy, water, and consumables like gunny bags, management cost, salaries and wages, bonus, working capital, interest on deposits, maintenance, insurance, depreciation, factory overheads, chemicals and other miscellaneous expenses.

There is no uniformity on these expenses, even when the unit (per M.T. of sugar) cost also differ from factory to factory. More details of cost differences in 106 sugar co-operatives during the 1995-96 are discussed in the work of Jugale (2000). However, bigger the units the more it gains in saving the costs as their overheads are less.

The cost on salaries and wages is also uneven. On an average 410 workers work for only 110 days along with less sugar recovery. On the contrary, the private sugar factories work for 247 days with product mix and product flexibility along with processing of by-products with a high sugar recovery during the sugar seasons.

The cost of sugar has been considered by two approaches viz.

a) Forward working approach and

b) Backward working approach.

In the former case, the price of raw-material is fixed earlier in which the implication of efficiency can be shown and in the case of later, the prices of raw-materials are paid after the sale of sugar or the prices are realized prior to the sale of sugar; meanwhile advance prices are paid to the cane owners. An approach (a) is being followed by the private sector and (b) approach is being adopted by the co-operative sector.

The industry is always facing the problem of growing costs and losses. The profitability of the industry was only 5.4 per cent in 1986. The public sector profit was 5.3 per cent, private sector profit was 2.8 per cent and that of co-operative sector, it was only 1 per cent, which was due to rising input prices during the period. Only four sugar

factories during the period were in profit with Rs. 5.03 lakh only. The total loss of 75 factories was Rs. 368 lakh. The loss making business has continued even during 1998. The Godbole Committee has estimated the loss to the tune of 698.18 crores.

The RBI study also shows that, the percentage of the cost of input was 70-77 per cent in the total output. The cost on wages and salaries constitute to 10-14 per cent, depreciation 2-3 per cent, interest to the tune of 4-5 per cent and other costs constitute to 7-8 per cent in 1985-86. The same with little variation continues even today. Various constraints are being faced by the industry due to its characters, control and linkages. The general industrial constraints are briefly discussed in the corresponding sections.

The direct cost of sugar manufacturing normally remains the same for almost all sugar factories, but costs on interest and the depreciation differs. Old factories save some costs due to their internal and external economies. When the sugar prices are decelerating, the new units may incur losses. Besides, the viability size of cane crushing of a sugar unit should get increased in such cases, so as to economize the costs.

The Indian sugar industry's losses are set to rise 60 per cent in the 2013-14 crushing season (November-October), owing to rising production costs and a fall in realizations. According to an estimate by rating agency CRISIL, the sugar industry would record a loss of Rs 1,600 crores in the crushing season 2013-14, against an estimated Rs 1,000 crores loss in the last season. In the 2010-11 seasons, the industry's losses stood at Rs 400 crores.

6.3 Demand, supply and related constraints

The demand, supply and other related constraints are due to low investment in the industry sector apart from its natural conditions. Incentives like subsidies, tax holidays and price policy have been declared with Government initiations. Particularly, urban investment should increase through industrial investment. Some investable funds can also be directed towards agriculture sector. This will help to express the demand for sugar in the market. Normally, demand for sugar is fixed and can be identified provided all other factors remaining the same. The industries like, confectioneries, bakeries, carbonated beverages accounted for around 65-70% of the total sugar consumption in India. This demand is likely to increase further with expansion of food and beverages industries in the country during the next five years.

Box 3.3

Incentives for new sugar mills

Reimbursement of Central Excise Duty on Sugar.

Exemption of Purchase Tax on Sugarcane.

Exemption of Stamp Duty and Registration Fees on purchase of Land.

 Grant of 10% Subsidy on Capital Investment (Plant and Machinery) to a maximum of Rs. 10.00 Crores, whichever is less.

Incentives for distillery and ethanol units

 Exemption of Administrative Charge on Molasses.

 Reimbursement of Sales Tax (VAT) on Molasses.

 Exemption of Stamp Duty and Registration Fees on purchase of Land.

 Grant of 10% Subsidy on Capital Investment (Plant and Machinery).

Incentives for setting-up co-generation power units

 Exemption of Electricity Duty on Co-generated Power.

 Exemption of Stamp Duty and Registration Fees on purchase of Land.

 Grant of 10 % Subsidy on Capital Investment (Plant and Machinery).

 Laying of Transmission Line from Factory to Grid Station by Electricity Board.

The UP Govt had provided some incentives to the industry in last decade. Consequently, the sugar prices of UP sugar factories remain less by Rs. 2 as compared to Maharashtra sugar factories. Besides, the UP could able to harness the market of seven sister states (north eastern states) of India with less of transport cost. The UP Govt further provided subsidies to the transport cost of sugar.

The Maharashtra state produces (see Table 3.1) three times more sugar than its actual consumption requirements. Obliviously, its marketing strategy be properly designed, managed and handled. Hence, the role of State Sugar Federation is very crucial. At present the Federation is not empowered to deal with such activities. The complexities of market prices and levy prices always became controversial and debatable issue. Hence, it is eliminated from the system. The state level industrial policies in UP and Bihar, strategically, managed to keep levy prices higher than the market prices.

On an average, we have to export by 22-25 million tons of sugar every year. Sugar output in India was around 24.6 million tons in 2012-13, beating consumption of

22.5 million tons, leaving a surplus of 2.1 million tons for the export market. Production of sugar may fall by eight per cent to 23.2 million tons in 2013-14. Since then the production variants due to drought situation in the cane growing states.

In normal cases, we have to find out the best season of the export. Exports in 2013-14 were estimated to 500,000 tons, when domestic prices fall below the global levels. International prices are continued to remain at low levels and have fallen by 15.7 per cent in 2013 onwards. This tends to continue till 2019. The global sugar market may continue to be in a surplus. Market intelligence is required to be adopted. Sugar storages in nearby market places have to be identified so as to save some time in transition. This will help to catch the market quickly. Moreover, product mix and product flexibility is to follow by rights. The private sector is very sincere in this aspect.

Investment constrains

The costs are rising due to the investment in by-products or such other activities related to the sugar industry. Particularly, the interest costs are rising constantly. In fact, the required infrastructure is developed in the factory areas. But the market failure is always experienced by the industry; for which, Government intervention is the only remedy. The scales of the economies along with agricultural prices are fixed, but the price of industrial output is not fixed or stands indefinite. So, the snag comes to the industry. Industrial investment has to be financed by any means. The financial burden should be cross subsidized.

Table No.6.1

Statewide Production of Sugar

States	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Sub-tropical region	105.9	91.9	50.7	61.5	71.5	86.2	93.0	85.2	91.0	87.5
Bihar	4.8	3.4	2.2	2.6	3.9	4.5	5.1	6.0	5.3	5.0
Haryana	6.8	6.0	2.3	2.5	3.9	4.9	5.1	5.4	5.7	5.4
Punjab	5.5	5.3	2.4	1.8	3.0	3.9	4.4	4.7	5.4	6.7
Uttarakhand	5.3	4.0	2.2	2.9	3.1	3.3	3.4	3.0	3.3	2.7
UP	83.5	73.2	41.5	51.7	57.6	69.6	75.0	66.1	71.4	67.8
Tropical region	172.9	167.6	94.8	125.2	168.3	173.8	154.8	154.8	187.9	155.4
A. P.								6.8	5.7	5.5
Telangana								3.3	3.2	2.8
AP + Telangana	19.2	13.4	5.9		10.1	11.4	9.8	10.1	8.9	8.3
Gujarat	13.9	13.7	10.2		12.7	10.0	11.3	11.8	11.5	11.1
Karnataka	25.4	28.4	16.8		36.4	38.7	34.4	41.6	49.9	40.0
Maharashtra	90.1	90.8	46.0		90.7	90.0	79.9	77.2	105.2	86.1
TN	24.2	21.4	16.0		18.4	23.8	19.3	14.2	12.6	10.0
Others	3.2	3.5	1.2		3.8	3.5	4.1	5.5	5.7	4.3
All India	282.0	263.0	146.8	188.0	243.5	263.4	251.8	245.5	284.6	247.2

P = Provisional

Source: Directorate of Sugar, DFPD, GOI, quoted in CACP, 2017-18

Table No 6.2

Element wise Average Cost per Quintal of Sugar of Co-operative Sugar Factories Crushing at More Than 90% Capacity for the Year 2012-13

Sr. No.	Particulars		Sugar Zone of Maharashtra			
1	Cane cost	Cane price	South	Central	North-East	State
2		H & T	2135.72	2171.33	1927.34	2128.91
3		Purchase tax	366.00	417.54	411.72	396.15
	Total cane cost 1, 2, & 3		54.86	62.17	52.89	58.18
4	Cash Conversion Cost	Power	2556.58	2651.04	2391.95	2583.24
6		Chemical and Consumable	12.48	12.13	11.86	12.23
7		Salary and Wages	24.46	30.78	29.32	28.07
8		Packing	196.34	188.60	175.72	190.23
9		Repairs and Maintenance	44.75	53.35	48.38	49.32
10		Overheads	81.72	96.38	87.80	89.50
	Total Cash Conversion Cost [5+6+7+8+9+10]		95.28	87.48	103.88	92.51
11	Depreciation		455.03	468.72	456.96	461.86
12	Interest On	Working Capital	51.54	44.48	62.92	49.49
13		Term Loan	28.07	26.30	13.32	25.43
14		Deposit	9.01	19.44	3.40	14.09
	Total Interest		162.07	168.69	166.81	166.42

	[13+14+15]					
17	Conversion Cost [11+12+16]		668.64	681.89	686.69	677.77
	Total Cost of Production per quintal of sugar [4+17]		3225.22	3332.93	3078.64	3261.01

Table No. 6.3

Performance of sugar mills in Maharashtra from 1988-89 to 2000-01

Sr. No.	Characteristics	Seasons												
		1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
1	2	03	04	05	06	07	08	09	10	11	12	13	14	15
1	Installed sugar mills	101	101	101	101	105	108	109	111	116	120	128	N.A.	143
2	Installed capacity (lakh TCD)	N.A.	1.77	1.93	2.00	2.22	2.36	2.44	2.48	2.68	2.82	3.06	3.26	3.56
3	Sugar mills not in operation	06	05	05	02	06	11	02	04	11	25	09	N.A.	06
4	Sugar mills in operation	95	96	96	99	99	97	107	107	105	95	119	123	137
5	Gross Crushing days	142	202	210	204	148	124	198	218	136	156	181	192	158
6	Sugarcane crushed (lakh tonnes)	238.01	366.18	382.84	376.32	297.20	246.66	459.94	514.58	310.13	345.77	479.00	570.95	576.49
7	Sugar production (lakh tonnes)	26.29	39.23	41.19	42.13	33.60	27.45	50.25	53.94	34.45	38.47	53.37	65.03	67.05
8	Capacity utilization	N.A.	108.74	91.62	92.30	91.64	85.79	89.63	89.61	85.83	87.31	90.03	90.86	99.36

	(%)													
9	Recovery (% of cane)	11.04	10.72	10.76	11.19	11.32	11.14	10.93	10.48	11.11	11.13	11.16	11.40	11.64
10	Lost hrs. % to available hrs.	N.A.	16.72	15.59	13.62	15.20	18.75	16.13	16.16	17.78	17.31	17.17	15.12	12.62
11	Pol (% of cane)	N.A.	N.A.	13.01	13.40	13.42	13.17	13.06	12.71	13.20	13.13	13.21	13.40	13.62
12	Share of State in country's sugar production (%)	30.03	35.84	34.32	31.43	29.00	28.00	35.14	32.69	N.A.	28.50	34.43	N.A.	36.44

Source: Compiled from various Technical Reports of VSI, Pune

Table No. 6.4

Profile of sugar mills in Maharashtra from 2001-02 to 2013-14

Sr. No.	Characteristics	Seasons												
		2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Installed sugar mills	160	179	148	186	187	188	193	195	199	209	215	226	229
2	Installed capacity (lakh TCD)	3.91	4.31	4.40	4.464	4.469	4.55	4.71	4.77	5.01	5.36	5.58	5.96	6.25
3	Sugar mills not in operation	25	19	48	84	45	25	19	48	57	42	42	54	72
4	Sugar mills in	135	160	136	102	142	163	174	147	142	167	173	171	157

	operation													
5	Gross days	135	135	90	82	121	189	182	107	170	186	157	132	134
6	Sugarcane crushed (lakh tons)	483.87	534.74	290.39	194.58	445.71	798.83	762.27	400.27	613.90	802.16	771.27	700.48	678.75
7	Sugar production (lakh tons)	56.13	62.21	31.71	22.17	51.98	91.00	90.74	45.79	70.67	90.53	89.82	79.94	76.10
8	Capacity utilization (%)	101.76	99.39	93.95	84.07	99.54	94.98	92.12	97.41	94.51	92.96	97.64	105.83	101.75
9	Recovery (% of cane)	11.62	11.68	10.94	11.42	11.68	11.39	11.94	11.46	11.55	11.31	11.66	11.43	11.45
10	Lost hrs. % to available hrs.	12.10	13.42	15.27	20.15	13.76	14.56	15.68	15.30	15.44	15.63	12.95	9.81	11.46
11	Pol (% of cane)	13.54	13.62	12.87	13.30	13.59	13.42	13.90	13.36	13.46	13.26	13.59	13.38	13.35
12	Share of State in country's sugar production (%)	30.28	30.88	23.32	17.51	27.42	32.16	34.41	31.50	37.37	37.11	34.10	31.78	31.17

Source: Compiled from various Technical Reports of VSI, Pune

Supply bottlenecks

Supply of sugarcane is the important supply factor of the sugar industry. Low cost technology, agrarian institutions, efficient use of the resources, infrastructural facilities are some of the pre-conditions of low cost supply of inputs to the industry. But the prices of sugarcane are consistently growing, and no relevance to the industrial debacle. The supply of sugarcane as compared to private sector units, by virtue of co-operation, the sugar co-operatives enjoys the non-constrained supply of sugarcane, since the sugarcane growers are the owners of the co-operative units; no problem of supply of sugarcane arises. But the cane growers are not bound to supply cane to their own units. In most cases the co-operatives are abused by the cane growers. A kind of redundancy occurs due to the selfishness of the sugar administrators. Even the members of the sugar factories are reluctant to adopt such practices.

The CACP has recommended the prices of sugarcane (SMP/FRP) after taking into account various factors (CACP, August, 2012). The Commission has recommended supply side and demand sides of pricing; viz. (1) Supply side pricing compares the SMP/FRP with the actual costs of production of sugarcane by the farmers, after adjusting for their recovery rates. (2) Demand side of pricing compares the SMP/FRP, after adjusting for their recovery rates, with the sugar prices. The demand side pricing is always considered better way of distributing the value created in the cane-sugar value chain between two main stakeholders *viz.* the farmers and millers.

Valuation matrix

All sugar factories should be able to concede the method of valuation matrix. This helps to understand the health of the sugar units. Accordingly, discomforts can be removed with effective strategies. The case of out performer is given below so as to confirm and compare the factories' health.

In most cases the partial or single factor productivity is employed as a most common practice. It is a ratio of total output to the quantity or number of other factors for which productivity is to be estimated. It gives a much distorted picture of the productivity. So, total factor productivity is employed in the context of resources efficiency. Various theories have been developed by the economists of late. (See, S.P. Singh and Shivi Agarwal, 2006)

P. Prince Dhanaraj (www.hss.iitb.ac.in/ties07/paper/ts5/psD/6.doc *date: 20th June, 2013)*has estimated average annual growth rates of total factor productivity in sugar industry during the period from pre-reform period (1982-90) and post-reform period (1991-98). For Maharashtra it stands at -3.6 and 0.04 during the pre-reform period (1982-90) and post-reform period (1991-98) respectively. The overall TFP of the Maharashtra sugar industry was estimated at -1.8 during 1982-98.

L factor cost

Clause 5A of the Sugarcane (Control) Order, 1966 prescribes a formula for sharing the profits earned by a sugar factory. In simple terms it is written as;

$$RL \div 2$$

Where;

R is realization from sale of levy and free sale sugar and

L is the unit cost of production.

The L factor is actual cost of producing one unit of sugar and it is declared zone-wise by the Directorate of Sugar. Based on the L factor and the financial accounts of the sugar factories, the State Government determines the liability of each sugar factory for paying the additional cane prices. Unfortunately, the Directorate of Sugar did not declared the L factor in time. The Government should declare the L factor within three months of the close of a sugar season (CACP). 1975-1995, the period of conflict regarding fixation of levy sugar price caught in controversy, when sugar was partially decontrolled in 1967-68. Levy sugar was less than the open market price on which, GOI borrows sugar from the sugar factories. Some private units in 1970s filed a petition against this injustice. GOI pleaded the case stating that, the levy price + open market sugar price – sugarcane price + processing cost, the remaining surplus was estimated as return on capital invested as per the Tariff Commission norms; which remained not less than the estimated value of Tariff Commission.

On 11 July, 1975, GOI, after winning a case in High Court, begun to restructure the process of fixing the levy sugar price; under it, the sugarcane cost + conversion cost + return on capital invested were estimated as cost components, which was deducted from the open market sugar price acquired by the sugar factories, the surplus remaining was

diverted to levy sugar quota; which was termed as levy sugar price. Bhargav Commission meanwhile, worked out a *modus operand* of sharing the surplus earned out of the difference between levy sugar price and open market sugar price; which was equally distributed among sugar factories and the cane-grower farmers on 50:50 bases.

The sugar factories opposed this because;

(i) This division was not as per the legal jurisprudence,

(ii) The sugar factories demanded imposition of full control over the sugar industry, and

(iii) In Maharashtra, the final sugarcane price was fixed by the end of the season, where it goes very difficult to fix the levy sugar price and sugarcane price.

GOI took it granted that, the UP state's minimum cane price at 8.5 sugar recovery could be paid by the sugar factories in Maharashtra, whereas the conversion cost was ideally estimated on the basis of high sugar recovery in Maharashtra. This has imposed to exploit the Maharashtra sugar tycoons (both industry and farmers) all the time. As a result of this, the A.P. State received Rs.117, Maharashtra Rs.142 and Bihar Rs.44 per qtls. U.P. received highest levy sugar price than open market price. As a result of this, competition in hiking the sugarcane price started among the sugar factories in UP belt.

Consequently, all sugar factories have initiated to file a petition against this vicitudinal action of the GOI. The interim relief was granted by the High Court with rise in sugar price.

L factor is estimated as the surplus earned out of open market sale of sugar, which is distributed among the volume of levy sugar and per-unit (qtls.) and the price of levy sugar is estimated. Actually, the levy sugar price is determined on the basis of SMP of cane + crushing days + quantity of cane crushed + sugar produced + sugar recovery etc.

A formula of L factor for conciliation was agreed both by private and co-operative sugar units with a consensus on the basis of sugar season (days) + quality of cane crushed + sugar produced + sugar recovery. This conciliation formula was agreed due to the reason that, large amount of difference between levy sugar and open market sugar prices plus excise went on accumulated due to delay in the decision. So, sugar factories prepared for conciliation. The L factor was approved by the Supreme Court.

The conversion cost of sugar is endorsed in table 3.3.

The domestic sugar prices remained higher than the international prices. As a result the industrial export has come down due to the non-remunerative sugar prices during the period.

Source CACP, 2019

6.4 Sugar: as a by-product

The industrial economics of the sugar has enormous opportunities of developing vertical and horizontal economic activities with ever ending links with the services sector. The industry manifests varieties of rural development enterprises and the micro enterprises in the rural area. Hence, it is always termed as a “growth centre” with “pull” and “push” factors activated in rural Maharashtra. It has varieties of by-products, which can be developed as a main industrial activity rather than sugar. Besides, the import export dynamics are also helping to grow the sector horizontally. In most of the professionally managed sugar units in abroad, sugar is produced as a by-product. This is because of the high value products produced out of the by-products like bagasse and molasses.

The sugar industry has five main aspects. One, dealing with production of quality sugarcane in the farms, second, direct sugar production, thirdly, production of ethanol, fourthly, the production and processing of the by-products (Bagasse and Molasses) fifthly production of manures. The whole industrial activities need efficient management

with competitive outlook in the respective areas. These aspects cannot be disconnected for their costing and revenue accounting since they are interlinked to one another.

Table No. 6.6

India sugar balance from 2007-08 to 2013-14(Lakh tons)

Sugar	Season (October-September)						
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
1	2	3	4	5	6	7	8
Opening stocks	115.30	95.01	33.41	49.83	57.29	66.82	92.00
Production	263.60	145.39	189.12	243.94	263.43	251.41	244.15
Imports	--	25.18	42.48	--	--	7.25	12.70
Consumption	220.00	230.00	210.00	207.36	220.00	230.00	237.79
Exports	49.60	2.17	2.00	26.00	33.90	3.48	25.58
Ending stocks	109.30	33.41	53.01	60.41	66.82	92.00	93.27
+/- Production	-20.10	-118.18	43.73	54.82	19.49	-12.02	-7.26
+/- Percent	-7.08	-44.84	30.08	28.99	7.99	-4.56	-2.89
+/- Consumption	16.40	10.00	-20.00	-2.64	12.31	10.00	7.79
+/- Percentage	8.12	4.55	-8.70	-1.26	5.92	4.55	3.39
Stock % Consumption	49.68	14.53	25.24	29.13	30.37	40.00	39.22

Source: Various reports of Cooperative sugar. (Compiled from various Technical Reports of VSI, Pune)

Conclusions

The sugar is basically produced in the farm. It is only extracted from the cane in the sugar factory. As a result the quality of the cane does matter, which is least cared by farmers as well as the factories. The crushing capacity plays an important role in extracting the sugar from cane. The recovery is an important tool to recognize this. Let us see its economics and universe of its determinants.

CHAPTER VII

TECHNICAL EFFICIENCIES IN THE FARM AND FACTORY

The concept of technical efficiency is intrinsically related to the estimation of a production frontier since efficiency measures can only be defined with respect to a benchmark i.e., an ideal level of performance (Sunil Kumar and Nitin Arora, 2012). An efficient sugar unit would produce the maximum possible sugar proceeds from a given set of sugarcane by using the various mechanical and technological operations. Simply, the technical efficiencies are defined as the mill efficiency performed from cane crushing to the production of quality sugar during the season. Theses efficiencies are concerned to the milling sector.

7.1 Objectives

(1) To estimate the average technical inefficiency level of sugar industry in Maharashtra.

(2) To determine relative technical and non-technical inefficiencies of the co-operative sugar plants in Maharashtra.

7.2 Technical efficiencies parameters

Following parameters are considered in maintaining the technical efficiencies in the sugar production processes.

1. No of crushing days (min)
2. Factories in operation
3. Cane crushing capacity (lakh TCD)
4. Cane crushed (lakh tons)
5. Percentage utilization of crushing capacity (min)
6. Reduced Mill Efficiency (RME) – Mittal- % (min)
7. Reduced Boiler House Efficiency (RBHE) % (min)
8. Reduced Overall Efficiency (ROE) –Mittal - Gundu Rao % (min)
9. Pol per cent in cane
10. Sugar production (lakh tons)
11. Sugar recovery per cent cane

12. Sugar losses per cent cane (max)
13. Lost hours per cent to available hours (max)

The technical efficiencies like RME, RBHE, ROE, capacity utilization and sugar losses remained positive in almost all years as indicated in the Table 4. The lost hours are negatively responding in comparison to the standard norms. The ROE as estimated by the Mittal - Gundu Rao method, minimum percentages remained slightly higher than the standard norms, which is because of other positive responses of the technical efficiencies during the season.

The Study group on Conversion Costs-1996 had identified some of the technical norms as an indicative principle of the costing of sugar production.

12. Pol percentage for 2000 TCD (1987 specifications) 2.3 per cent, for 1250-2000 TCD (1973 specifications) 2.6 per cent.
13. Final purity of molasses 30 per cent
14. Loss of cane juice in press mud 0.07 per cent to 0.10 per cent
15. Normative loss should include bagasse, molasses, press mud and other undetermined losses
16. Pol percentage can be measured on the basis of normative losses
17. Last five year's sugarcane quality and productivity
18. All above norms should be applied to factory wise/ zone wise
19. 100 per cent capacity utilization
20. Waste of time only 10 per cent
21. While planning for the crushing season, cane availability and quality of cane should be considered
22. Consumption of steam at rate of 25 to 27.5 per cent

These technical efficiencies are considered by all sugar co-operatives in Maharashtra. Above norms are applicable to the factories below 1250 TCD. With higher capacities the norms stands higher. The scale of economies becomes effective with an increase in the capacities. The economic size of the capacities are not justified by the technical committees so for appointed. However, in most cases it is seen that, with an increase in the crushing capacities, the sugar recovery deteriorates, which is one of the important parameter of technical efficiency. The overall sugar production increases with rise in

sugar recovery. One per cent increase in sugar recovery means increase of sugar production by 10 kg for every ton of sugarcane crushed. Using the panel data of 239 sugar units for the period from 1980/81 to 1984/85, Ferrantino and Ferrier (1995, have analyzed the technical efficiency of Vacuum-Pan Sugar industry in India using the technique of SFA (stochastic frontier analysis). The study says that the small sugar factories were more efficient. The public-owned firms were less efficient than the private and co-operative sugar firms.

There is a wide range of differences of technical efficiencies in the co-operative sugar units, which occurs because of a variety of factors such as access to technology and its operations, structural rigidities and weaknesses, differential incentive systems prevailing from *gavan* (cane cartridge, where the loaded cane is thrown for crushing) section to the final production, level of overall profitability and farm sector inefficiencies etc.

Table No.7.1

Summary of Technical Performance of Cooperative Distilleries in Maharashtra state

Particulars	Financial year (Apr/Mar)	
	2011-12	2010-11
Production capacity (million Ltrs/300 days) considering all distilleries	763.5	750.0
No of distilleries reported performance	53	53
Average net working days	203.30	181.26
Molasses consumed (million tons)	1.610	1.334
Alcohol produced (million litres)	441.62	363.68
Average fermentation efficiency (%)	89.70	89.83
Average distillation efficiency (%)	98.48	98.43
Recovery of Alcohol (litres/ ton of molasses)	274.28	270.51
Capacity utilization (%)	67.99	55.99

Source: NCUI, Cooperative Movement at a Glance, 2019

Table No 7.2

Element wise Average Cost per Ton of Sugarcane Crushed of Cooperatives Sugar factories crushing more than 90% capacity

Particulars		Sugar Zone of Maharashtra			
		South	Central	North-East	State
Cane cost	Cane price	2659.61	2449.07	2188.98	2497.88
	H and T	455.78	470.95	467.61	464.81

	Purchase tax	68.44	69.06	61.52	67.93
Total cane cost (1+2+3)		3183.83	2989.08	2718.11	3030.62
Cash conversion cost	Power	15.49	13.68	13.47	14.29
	Chemical and consumables	30.46	34.71	33.30	32.94
	Salary and wages	244.51	212.72	199.58	223.20
	Packing	55.72	60.17	54.95	57.87
	Repairs and maintenance	101.77	108.71	99,71	105.01
	Overheads	118.65	98.68	117.99	108.54
Total cash conversion cost (5+6+7+8+9+10)		566.60	528.67	519.00	541.85
Depreciation		64.31	50.24	71.47	58.17
Interest on	Working capital	155.66	138.68	170.46	148.89
	Term loan	35.07	29.67	15.13	29.85
	Deposits	11.30	21.87	3.83	16.53
Total interest (13+14+15)		202.03	190.22	189.42	195.27
Conversion cost (11+12+16)		832.94	769.13	779.89	795.29
Total cost of production per ton of cane crushed (4+17)		4016.77	3758.21	3498.00	3825,91

Source: NCUI, Cooperative Movement at a Glance, 2019

Table No. 7.3 Technical Efficiency of Co-op. Sugar Factories in Maharashtra (state averages)

Sr. No.	Items	Expected norms	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
1	No of crushing days (min	160	189	181	107	170	186	157
2	Factories in operation	-	163	173	145	142	167	172
3	Cane crushing capacity (lakh TCD)	-	4.552	4.669	4.747	4.99	5.35	5.5
4	Cane crushed (lakh tons)	-	789.83	761.83	400.13	613.90	802.15	771.25
5	% utilization of crushing capacity (min)	100	94.98	92.00	97.67	95.03	93.23	98.83
6	Reduced Mill Efficiency (RME) – Mittal- % (min)	95	94.97	95.13	94.91	95.22	95.06	95.17
7	Reduced Boiler House Efficiency (RBHE) Gundu Rao % (min)	90	90.08	90.55	90.69	90.70	90.58	90.71
8	Reduced Overall Efficiency (ROE) –Mittal - Gundu Rao % (min)	85.5	85.56	86.14	86.08	86.36	86.11	86.34
9	Pol % cane	-	13.42	13.90	13.36	13.45	13.26	13.59
10	Sugar production (lakh tons)	-	91.00	90.70	45.78	70.66	90.54	89.82
11	Sugar recovery % cane	-	11.39	11.94	11.46	11.54	11.31	11.66
12	Sugar losses % cane (max)	2.2	2.049	1.988	1.917	1.931	1.968	1.959
13	Lost hours % to available hours (max	10	14.56	15.77	15.31	15.63	15.63	12.95

Source: Technical Efficiencies of Sugar factories in Maharashtra, (various years), VSI, Pune.

CHAPTER VIII

NON-TECHNICAL EFFICIENCY IN FARM AND FACTORY

The non-technical efficiencies in fact, add to the value. There are limitations on application of technical efficiencies. Whatever is supplied as input, it can be processed without wastage. The value of sacrifice by a factor of production remains equal to the value it generates i.e. input values are equal to output values without considering the market values. If the market value of the input and output differs, then the value may not remain same. A machine cannot add surplus on behalf of the management. To put a control on the wastage is the only efficiency left for maintaining the technical efficiencies. The non-technical efficiencies are controlled and managed by the human being. Ultimately, if it works with sacrifice, which is possible, can yield higher than their sacrifice. In this perspective, non-technical aspects play a significant role in generating additional values to the enterprises. Non-technical efficiencies should be considered apriority.

8.1 Raw sugar export-import dynamics

Export of the raw sugar was initially thought of in 1970, when there was a shortage of 2-3 lakh tons of sugar for export purpose. GOI, consequently, then compelled all sugar factories to produce raw-sugar. The raw sugar at the time of dispatch from ports became stony hard and the industry faced so many problems of exporting the raw sugar during the period.

Of late, most of the privately owned sugar factories are interested in processing the imported raw sugar and converting it into white sugar for export under buy back system. This has become a profitable activity in the sugar industry. Without headache of the cane price and other controls, a unit at its own can operate freely for the entrepreneurial benefits. Its significance can be understood from the Table No. 8.1.

Table No. 8.1

Import Trade Matrix – 2016-17 (in MT)

Period	Import of raw sugar*	Export of raw sugar*	Import of white sugar	Export of white sugar	Total imports	Total exports
October	443329	2807	126	229773	44455	232580
November	235107	5713	91	161186	235198	166899
December	244467	1256	126	233413	244593	234669
January	313941	1389	176	197974	314117	199363
February	88631	2783	52	168614	88683	171397
March	158580	1110	86	179235	158666	180345
April	80500	1194	45	160074	80545	161268
May	80651	954	40	138936	80691	139890
June	343873	4709	214	145892	344087	150601
July	307105	7537	00	161322	307105	168859
August	111428	23261	94	127285	111728	150546
September	272679	848	49	169161	272728	170009
Total	2680291	53561	1099	2072865	2681390	2126426

* Estimated. Monthly data unavailable.

Source: Industry and the Trade Source, Gain Report, Global Agricultural Information Network, 2018.

The State has all feasibilities of having a sea-ports and air-ports along with the trade logistics required for the global trade. Timely adjustments and policy initiatives are essentially be managed at par with the import and export dynamics. There is a separate organization to deal with this dynamics, but it is not strategically managed. The private players are so sensitive in this respect. The co-operatives do not have commodity intelligence to manage this dynamics.

8.2 Intellectual capital

The human capital is crucial and critical in sugar industry. Human capital is a net worth of human being, comprising intelligence, emotion, joy and sense of belongingness. It ought to contribute its best uses unless supported by other type of organizational structures and the resources like, financial, physical and technological. In order to achieve effective performance of all these resources; they should interact with a given capacity. Human capital attempts to control over all other resources. Human being strives to derive meaning out of their existence for which they try to maintain a balance between the time spent on their organizational activities and commitments with sense of belongingness. It can be gauged by the financial results. So, financial indicators are very important in determining the efficiencies. Besides, the human beings should collectively interact with meaningful existence. This leads us into the realm of emotional intelligence and its importance in binding the resources through the sense of "WE". (Ms. Lynda Gratton, London Business School, 1999)

We propose in time;

To build visionary capabilities,

To develop future sensing capabilities,

To create a people centered strategy,

We strive for;

Understanding the meaning in organizations to;

Create adaptation and flexibility,

Develop systematic thinking.

We have a soul;

To understand emotional capital,

To focus on fairness process,

To build psychological contacts.

In most of the private sugar units' intellectual capital is practicably employed with the sense of feeling by "WE". The components of this capital are classified in to five groups.

a) Credibility Capital- it is a competitive capital, also generates sense of belongingness.

b) Efficiency Capital- it confesses the overall technical and non-technical efficiencies along with each worker's efficiency.

c) Corporate Infrastructure Capital- it generates the linkages with all resources, which helps to make perfect decisions.

d) Human Capital- it contains the training and orientation in professional activities while working on the work assignments.

e) Customer Capital- it concerns to timely payments of all liabilities to its customers.

If these capitals are applied to the co-operative factories for their development to the possible extent (because there are various constraints in applying these capital segments) then, there will be a sea change in the efficiencies of the sugar mills. The co-operatives are very happy with social segments of the industry. In fact, initially it was required for industrial convergence. Now it should be divergent in its activities without loan burden on the set up.

8.3 Six important factors

The industrial activities in sugar factories are integrated with farm and factory sectors. Sugar is produced in the farm. Obviously, the quality of the cane has to be improved by adopting the recent knowledge of nano sciences and GM technology. More than 70 per cent of the cost of sugar industry is shared by sugarcane as its raw material. Both farm and factory sectors want to be restructured and reconstructed.

The sugar industry should follow the six important factors to attain surplus or profits in converting the cane into sugar and other by-products.

1. Sugarcane quality- sugar recovery, micro irrigation system, economical use of inputs, high sucrose content cane varieties with an adjustment to agro-climate/geo-climatic conditions etc will increase the cane quality.
2. Sugarcane transports system – mode and methods of transport, road efficiency, localization, rail-road linkages etc. will help to crush the fresh sugarcane, which is commendable for profits of the sugar factories.
3. Technical efficiencies – RME, RBHE, ROE, capacity utilization, and reduction in crushing period, use of bagasse and molasses and production of by-products etc will further increase the productivity of sugar.
4. Administration and management as intellectual capital with sense of belongingness will improve the productivity.

5. Following the art of product mix, product flexibility, product combination, quality, sales and marketing (internal and external) management, distribution, and export etc will improve the marketing efficiencies of the sugar factories.

6. Government policies towards partial decontrol and delicensing of sugar industry will improve efficiencies of the sugar industry.

8.4 Demand for sugar export zone

Sugar being an agent of food and energy, needs security, not only for the consumption purpose alone but more than its sustained basic of security and energy demand in the country and abroad. Exports or imports become critical when there are adversities caused by excess supply or excess demand in the domestic market. Stabilization is urged at the critical level of export or imports of sugar. Additional domestic market management and additional exports or imports leads to clear the market through buffer stocks, monthly release mechanisms, product mix, product flexibilities in the industrial operations. The flexibility in by-product processing with the matching market situations will survive the industry during unethical hit caused by the state policies or the open market policies. India has potential to target export market at high processes in Bangladesh, Sri Lanka, and low prospect in Pakistan.

The demand for special sugar zone or sugar export zone can be introduced for the benefit of all concerned agencies. Particularly, Sangli, Kolhapur and south Satara districts should enjoy the facilities of special sugar zone.

8.5 Decontrol of the sugar industry

Decontrol and delicensing are the twin objectives of globalizing the sugar industry during the post WTO regime. Delicensing has been introduced with a free hand to the industry as a macro economic reform during the last 15 years. The *License Raj* has been given up by simplifying the licensing procedures. Aerial permissions within the radius of 15 km has been considered by the State Govt. Accordingly, 15 co-operatives and 54 private sugar factories were granted the aerial licenses to the promoters of the sugar factories in Maharashtra in 2012. They have to comply with the Form A for the aerial licensing and Form B for the actual beginning of the crushing season.

Decontrol is under consideration since last 20 years, but it has been constrained due to antagonism of the private as well as co-operative sugar factories. The Rangarajan Committee (2012) has recommended a total decontrol of the sugar industry. Decontrol

means withdrawal of the Govt control and support to the industry. The decontrol includes;

1. Withdrawal of levy system and release mechanism

The present levy system (90% sale of sugar by tendering the sugar at market price + 10% sale of sugar to the Govt at administered price) for all sugar units including co-operative, private and public sector factories was an important decision of the Government when sugar supply was abundant and there was a very marginal difference between levy price and the market price of the sugar. It was supported by both private and co-operative sectors. The factories were very happy in complying this in respect of social obligations. When the price gap between the market price and the levy price widened with rising demand for sugar throughout the world, the sugar factories started confessing that, levy is an obstacle to the factories' profitability. Meanwhile, the cane growers started agitations for gaining higher cane prices. The Govt did not increase the levy price of the sugar. Levy sugar is supplied to the BPL families through PDS and to the Military. Around 30 million tons of sugar is supplied through this system. Now, the sugar factories are persuasive to purchase this quota at the market price. The State Govt under the new system is expected to purchase the sugar in the open market for the supply of sugar to the BPL families, but subject to the cap of sugar price at Rs. 32 per kg.

Similarly, there was a total control on the release of the sugar to the consumers. Every month the Central Food Ministry was releasing the quota to each sugar factory for the open market sale of the sugar by tendering the supply of sugar. The traders file their tenders and make an agreement with the sugar factories. This release mechanism was a well-established system. The sugar factories (both co-operatives and private) were in favour of this mechanism. This is decontrolled now. But, there is a possibility of exploiting the sugar factories by the traders. The traders' lobby will exploit the sugar factories by manipulating the sugar prices in the open market. The 100 per cent free release mechanism may create so many problems. The role of Sugar Federations (both private and co-operative) will be awfully responsible and also requires developing a systematic release mechanism with a sense of commodity intelligence, which is very difficult to the co-operative sugar factories today. Violation of the

orders may occur very frequently for which strict rules and regulations have to be followed as a matter of self-imposed disciplinary rules, which is also difficult to follow.

2. *Abolition of MSP*

The SMP is imposed on sugar and jute in India. The Report of the Indian Sugar Committee, 1920 (Para 317-26) had recommended a scheme of SMP for sugarcane to the growers. During the period, the sugar industrialists (capitalists) were not willing to pay the remunerative prices to the cane growers. It was ruled out by Indian Tariff Board, 1931 on the ground of its impracticability. Simala Sugar Conference, 1933 had also resolved to bestow SMP, but the industrialist had opposed the SMP. The revised Sugarcane Control Order, 1950 and 1960 imposed the statutory minimum price for the sugarcane.

The SMP has been renamed as Fair and Remunerative Price (FRP) in 2009. The SMP/FRP will go as a policy to decontrol the industry. This will not provide justice to the cane growers, but fair competition will ascertain the gains. Of course, those who are paying more than FRP, there arises no problem of FRP, but those who are not paying fair and remunerative price limit, there may arise a problem of arrears, which is alarming since a decade. The cane suppliers will be exploited by the sugar factories, particularly, from the private sugar enterprises. The co-operatives are managed by the farmers themselves, so there is no problem of FRP. After deducting the conversion costs, the revenue earned by selling the sugar is distributed among the cane suppliers.

3. *Priority sector status*

Complete decontrol may not endow with an opportunity to demand for some priorities to this sector. However, for the benefit of the factor, it will certainly boost the industry unlike the status of export zone. The impositions of the Essential Commodities Act will also go under decontrol. Simultaneously, agriculture may not remain the priority sector. Even today, priority in certain aspects is a farce.

4. *Withdrawal of the seven legislative provisions*

The seven legal provisions as indicated above have protected the sugar industry. These provisions are likely to be withdrawn in a phased manner. Otherwise, new legislative provisions are expected to be replaced in a due course of time.

The ISMA has welcomed the Rangarajan Committee report. Prior to this report various Committees have reviewed the possibilities of decontrol of the sugar sector. The careful suggestions were made to decontrol the sugar sector by Thorat Committee and Rangarajan Committee. Major recommendations of the Y. S. P. Thorat Committee are as follows;

1. Farmers' income should be targeted rather than the price of cane.
2. Sugarcane price should be fixed on the basis of norms that ensure a positive net return to the farmer, enable farmer to attain a share of the high profits whenever sugar prices rule high, and take in to account the total earning potential of not only sugar but by-products also.
3. The SMP (which should continue as an interim arrangement) should include the value of bye-products based on normative values so that the initial cane payment fairly reflects the value of cane. SMP should be the only basis for cane price payments across the country.
4. Over the long term, Government should withdraw its control from fixing the price of sugar cane, after ensuring that a stable mechanism exists for fixing prices on the basis of well-defined norms, acceptable to the farmers and mills.
5. Mill wise reservation of cane area may be scrapped.
6. The mills should source cane directly from farmers and any intermediary organizations that do not serve farmer's interest should be removed from intermediation through legislative action.
7. Mills need to undertake comprehensive cane development programmes and substantially raise the awareness and skills of farmers.
8. The consumers belonging to the poorer sections should be protected through a targeted public distribution system.
9. The sugar required for PDS could be procured from the market without resorting to levy and similar other mechanisms.
10. Sugar should be removed from the list of essential commodities along with the phasing out of levy and market release mechanisms.
11. To break the vicious cycles in sugar and cane production and prices, it is necessary that the entrepreneurs should (1) be made free to produce sugar, ethanol

or other products from out of their plant and (2) be allowed to set up stand alone units producing only ethanol or other derivatives directly from sugarcane juice.

12. The states have to be persuaded to be reasonable in controlling the movement of molasses and also in taxing ethanol and its derivatives.

13. The levy and market release mechanism for sale of sugar may be completely done away with in a phased manner over a three year period.

14. The minimum distance between two sugar mills should be maintained at 25 KM with a provision for relaxation of the same for allowing new mills to enter when existing mills are not functioning well.

15. The sector should be decontrolled, with the decontrol measures being calibrated for completion of the process over five years.

16. The desired policy response for stabilization of cane and sugar production and their prices comprises offering full flexibility to sugar mills in manufacturing of any product from cane, support to investment in new capacities for direct production of alcohol, ethanol and derivatives from cane, permission for setting up stand-alone ethanol units, creation of cogeneration capacities and dismantling the market release mechanism for sugar.

17. The Exim policy with respect to sugar should be stable and provide a reasonable assurance of continuity to all stakeholders for a given period of time; this would provide the confidence to entrepreneurs for making investments in export manufacturing.

18. A Technology Mission on Sugarcane, which should address the issues relating to the sector from a techno-economic knowledge base, is required to guide the initial phase of productivity improvement.

19. Government should set up a Sugar Regulatory Authority (SRA) through an act of Parliament and confer upon it suitable powers for market conduct regulation and growth of the sector.

Dr. Rangarajan Committee has made a very concrete and clear recommendation for decontrolling the sugar sector. Major recommendations of the Committee are as under;

1. Decontrol of sugar sector in all respect.

2. The actual payment of cane dues to farmers in two stages - first upfront when the FRP (fair and remunerative price) is paid and the second after six months, when the ratio is calculated. This would mean that FRP will be a guaranteed price, whereas after the six months, the realized value from the sale would be calculated and anything over and above the FRP would be paid to the farmer.
3. The committee has also suggested dropping the levy obligation on the sugar mills. Currently, about 10 per cent of the mill's total production has to be sold at government-set price, to supply under the public distribution system (PDS).
4. Stabilizing export-import of sugar. There is a need to stabilize export-import of sugar as it directly affects domestic demand and prices.
5. Barring two key regulations with respect to fixing sugarcane price and sharing of 70 per cent revenue by sugar firms with farmers.
6. Freedom to mills to sell sugar in the open market and having a stable export and import policy.
7. Removal of controls on by-products like molasses, bagasse and others.

8.5 Urge of steady holding of sugar prices

The sugar prices worldwide are forecasted to fall around 19 per cent by 2013 as supply remains above demand (Financial Services Group Rabobank). Sugar prices in India are likely to remain steady for next 24 months with a range of Rs. 35 to Rs.40 per kilogram. The linear projected gap between production and consumption is widening indicating a less production to meet the growing demands of sugar.

The World Bank Prospective Group has forecasted the world sugar prices in September, 2012. The actual and nominal sugar prices are indicated in Table 8. The trend indicates that the world sugar prices are declining. It is a ghastly gauge to the Indian sugar industry; particularly, for the Maharashtra State, where more than 33 per cent India's sugar is produced will slap nastiest both to the farm and factory. The State Govt should look in to the serious policies towards the growth of this industry. The off season activities have to be accelerated. The alternative by-products of the industry need to be processed for profitable industrial business. The processing of the raw sugar and its import policies have to be seriously thought of.

Table No 8.3

World Sugar Price (Nominal and Actual) Forecasting

Years	Actual sugar prices (in ¢/kg)	Nominal sugar prices (in ¢/kg)
1980	82.9	63.2
1990	28.6	27.7
2000	20.2	18.0
2010	41.6	46.9
2011	46.6	57.3
2012	39.8	48.0
2013	36.6	45.0
2014	31.9	40.0
2015	29.7	38.0
2016	28.9	37.7
2017	28.2	37.4
2018	27.5	37.1
2019	26.8	36.8
2020	26.1	36.5
2025	22.9	35.0

Source: World Bank, Development Prospects Group.

http://www.worldbank.org/prospects/commodities

World sugar prices are projected to decline from historical highs to average higher in real terms to 2020-21. The margin between raw and white sugar is expected to decline from the high level in 2010. World sugar prices are expected to follow a wave pattern, similar to the past decade, as a result of a continuation of government policies that intervene in sugar markets in the world and the production cycles in India, that cause large, periodic swings in trade between imports and exports. Subsequently, the cycle in India enters the down phase leading to a shortfall in production and the need for large imports to meet consumption needs that boost the world price in 2015-16. The upturn in the cycle then recommences leading to a further drop in world prices in 2017-18 and so on.

Brazil, as the leading sugar producer and dominant global trading nation, has attained the status of a “price setter” on the world market with international sugar prices usually correlated with its relatively low production costs. The size of the annual sugar cane crop in Brazil, together with its allocation between ethanol and sugar production are

key factors underlying the projection of international sugar prices to 2020-21. Sugar production in Brazil is expected to continue to account for less than 50% of its enormous sugarcane harvest which should approach 1 bt by the close of the decade (OECD FAO, 2011).

In the case of India's role of policies in the sugar production cycle, it is stated by OECD, FAO (2011), that,

> "Against a backdrop of recurrent large swings in production, sugar demand in India has been growing steadily at about 4% per year over the past 10 years. Therefore, the domestic production and consumption balance moves from periods of surpluses and deficits, leading to often significant changes in the trade position. For instance, in 2007/08, exports reached 4.7 Mt (9.7% of world exports), but in 2009/10, these were replaced by imports of about 4 Mt (7% of world imports). These changes in trade channel the swings in domestic production to the international sugar markets, contributing to its volatility, especially during periods of global market tightness. The potential for expanding sugar production in India exists and can be fully exploited if adjustments were introduced to ensure a market driven relationship between sugar and sugarcane prices. Also, relaxing some of the existing measures, such as the monthly releases, could provide sugar factories with some cash flow flexibility. The use and valorization of sugarcane by-products, such as ethanol, electric power, and other derivatives, can cushion against low sugar prices and other market risks. Clearly, the liberalization of the sugar industry can only be undertaken within the context of broader domestic reforms, because of the linkages on both demand and supply sides that prevail in agricultural commodity markets." (pp 129-130)

Table 8.4 exhibits the projection of the sugarcane, sugar beet and sugar production in the world up to the year 2020-21. The production of raw sugar is likely to grow by 209408 thousand tons, while the consumption of raw sugar is expected to grow by 207481 thousand tons during 2020-21.

8.6 Opportunity matrix

All sectors involved in sugar activities need to follow opportunity matrix. Leveraging these opportunities, however, depends upon various factors. Besides, the industry should know the possibilities of by products and machinery required for

producing those commodities. The value by-products need to be identified properly. Proper opportunity matrixes have to be developed. This will guide the growing private enterprises in the sector. The co-operatives by virtue will enjoy the supply of raw material. Even the collective enterprising abilities are higher in co-operatives. The private sector needs to develop the guild or syndicates for their common benefits. The large scale sugar factories will be benefited by this. There is a danger in large scale production of sugar in private sugar; because there is no control over the raw material i.e. sugarcane.

The opportunity matrix includes;

a) Product innovations.
b) Sugar prices – both domestic and international.
c) Cyclicality of management.
d) Productivity improvements.
e) Domestic level of consumption.
f) By-products in the industrial processing.
g) Product mix and product flexibility.

The high impact opportunities are largely untapped; if tapped, they are tapped traditionally. So, transportation of opportunities would be critical from strategic and financial imperatives. Basically, they require modifying the regulatory policies and facilitating towards multi-sector growth of the sugar industry. The key regulatory measures are required to ensure level playing field by reducing regional and regulatory distractions. Efficient use of natural resources is imperative to the farm and mill level efficiencies.

The sugar related transformation opportunities requires regulatory policy environment for facilitating and ensuing level playing field by reducing the regional and regulatory distortions, through operational area approach. The farm and factory level efficiency usage of resources be enhanced by strengthening the farmer-miller relations. Cane pricing is crucial in this regard. Reducing the cyclicality and insisting for the better managements even at the down turns with national-international linkages, through monthly release mechanism scheme and levy price scheme is possible through efficient managerial tricks. The better sugar price risk management is one of the strategies in opportunity matrix without de-linking the social objectives, because co-operatives are the social organizations, the social base cannot be denied at any cost of the social interests.

In the past, some of the core industries like textile, power, insurance, telecom, fertilizer and cement have traversed the transform action path by evolving such regulations. Sugar sector has similar type of business and hence needs regulatory initiatives in the following areas.

1. Significant improvement in performance,
2. Scope for investment,
3. Public Private Partnership strategy,
4. Integration of small and big players, efficient and inefficient players in the market,
5. Positive social impact.
6. Command area,
7. Cane pricing – sugar pricing matrix through by-products and recovery, region specify variations, early and late maturing varieties, MSP for subsistence risk etc.
8. Creation of independent regulators.

8.7 Consumers' profile, sugar prices and sugar policy

The sugar policy in normal case is oriented towards cane growing, sugar workers (both factory and farm) and sugar management or manufacturing of sugar and the consumers. Prior to 1960, consumers were at the central place of all policies. After passing up of the Sugarcane Order in 1960, the producers were apriority considered in the overall sugar policy issues. Compared to other sweetening agents, in its forward and backward linkages their pricing links are complex and complicated. Hence, the policy matters are playing a pivotal role in sugar scenario. A ban on jaggery production was concern to protect the sugar industry.

The State was to produce sugar to the tune of 100 lakh tones by the end of 2010. Presently, it is producing around 65-70 lakh tons for which, more than 15 lakh hectares of land area is required to cultivate sugarcane with a required productivity of 100 MT per hectare. Due to the drought conditions in Maharashtra, the cane supply has reduced phenomenally.

Of late, the consumer profile has changed with the rise in income of the lowest and the middle strata of the population, there is hardly a little change in their purchase of sugar and tea with a change in the prices of both. This is an indicative of the fact that, the

income effect on the demand for sugar is less elastic. This kind of typical attitudes of the consumers in the category of poor population indicates their choices for the use of sugar in day to day life style of the people. Consumers' response to rise in sugar prices needs to be identical with their sustainability.

Furthermore, there is a consumer protection through various measures, which also necessitates the meeting of nutritional requirements for a majority of population. The risk sustenance of the consumers has a significant impact on consumers' health.

As indicated by the nationwide survey, industrial and small business sector accounts for 66 per cent non-levy sugar consumption. The FAPRI has estimated the domestic consumption to grow at the compound average growth rate of 1.9 per cent over the next 10 years. The USDA has estimated the domestic consumption in India to grow by 4 per cent from 2005-06 to 2011. The Centre for Industrial and Economic Research has measured the domestic consumption to grow at 5.4 per cent CAGR during 2004-2015. The range of growth of consumption so far estimated by above agencies is from 1.9 per cent to 5.5 per cent. It will be around 22.08 MT to 33.3 MT in 2017. Today, it is 19.2 M.T. This is a historic growth (of 3.8% CAGR) in the history of 16 years. The fundamental cause of their growth is growth in GDP and population. Population is estimated to remain stable at the current levels. (ISMA, Hand Book on Sugar Statistics, 2006).

Table No. 8.4

World Sugar Projections **(***Crop year)*

		Avg,08/09-10/11est	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
OECD[1]												
Sugar Beet												
Production	mt	155	145	144	147	149	152	154	156	156	157	157
Biofuels use	mt	17	18	19	20	23	26	28	29	30	30	30
Sugarcane												
Production	mt	110	113	116	115	116	118	120	123	126	127	128
Sugar												
Production	ktrse	36554	35104	35636	36092	36259	36730	37119	37664	38139	38376	38576
Consumption	ktrse	43529	43860	44538	44889	45140	45380	45686	46019	46372	46684	47039
Closing stocks	ktrse	14167	12830	12179	11920	11967	11988	12086	12408	12798	13101	13364
HFCS												
Production	kt	12734	12993	12819	12885	12977	13096	13199	13303	13384	13492	13580
Consumption	kt	12763	12756	12604	12650	12721	12811	12902	12981	13018	13091	13150
Non-OECD												
Sugar Beet												
Production	mt	67	75	76	77	78	80	83	85	85	85	86
Sugarcane												
Production	mt	1 518	1 546	1 619	1 642	1 686	1 723	1 765	1 828	1 867	1 926	1 981
Biofuels use	mt	340	380	409	444	482	509	538	560	589	630	670
Sugar												
Production	ktrse	122 370	138 235	144650	143366	144523	147574	155712	161507	163405	167358	170832
Consumption	ktrse	117928	124726	12947	13233	13511	138473	142984	147399	151534	156011	160442
Closing stocks	ktrse	45120	48087	53624	54401	52669	51682	54329	58343	60174	61493	61740

HFCS												
Production	kt	1181	1456	1495	1537	1574	1611	1645	1678	1708	1742	1777
Consumption	kt	1142	1547	1565	1627	1684	1750	1797	1855	1927	1997	2061
World												
Sugar Beet												
Production	mt	221	220	220	224	227	232	237	240	241	242	244
Area	mha	4	4	4	4	4	4	4	5	5	5	5
Yield	t/ha	51	51	51	51	52	52	53	53	53	54	54
Biofuels use	mt	17	18	19	20	23	26	28	29	30	30	30
Sugarcane												
Production	mt	1627	1659	1734	1757	1802	1841	1885	1951	1993	2054	2109
Area	mha	23	24	25	25	26	26	26	27	28	28	29
Yield	t/ha	69	68	69	69	70	71	71	72	72	73	74
Biofuel use	mt	340	380	409	444	482	509	538	560	589	630	670
Sugar												
Production	ktrse	158925	173339	180286	179458	180783	184304	192831	199170	201544	205733	209408
Consumption	ktrse	161457	168586	173985	177522	181051	183853	188670	193418	197906	202695	207481
Closing stocks	ktrse	59286	60917	65802	66321	64637	63671	66415	70750	72972	74594	75104
Price, raw sugar[2]	USD/t	492.8	509.5	365.4	383.2	478.8	525.9	451.3	406.6	408.8	410.9	408.1
Price, white sugar[3]	USD/t	550.2	614.2	464.1	472.4	550.1	608.7	543.5	503.3	506.7	509.6	507.8
Price, HFCS[4]	USD/t	528.1	500.3	534.0	533.6	536.3	531.2	539.6	542.6	538.9	534.2	535.9

Note: Crop year: Beginning crop marketing year - see the Glossary of Terms for definitions.
RSE: raw sugar equivalent. HFCS: High fructose corn syrup
1. Excludes Iceland but includes EU6 members that are not members of the OECD (Bulgaria, Cyprus, Latvia, Lithuania, Malta and Romania).
2. Raw sugar world price, ICE Inc. No11 f.o.b, bulk price, October/September.
3. Refined sugar price, White Sugar Futures Contract No. 407, Euro next market, Liffe, London, Europe, October/September.
4. US wholesale list price HFCS-55, October/September.
Source: OECD and FAO Secretariats, OECD-FAO Agricultural Outlook - 2011-2020 pp. 132.

The price sensitivity of sugar in India is very high. The Govt policies are meandering towards the consumers rather than producers. The price sensitivity and sustainability level of all types of sugar consumers desires to be weigh up properly. The global sugar market remains most volatile of all commodity markets. The main factor contributory to this volatility is policy-induced production swings in India.

Box 4

Price Drivers

- Improved festive demand
- Domestic and global in sugar due to excess production
- Another bumper sugar year on the cards
- Govt announced spate of measures to help sugar sector overcome glut but not very effective yet.

Box 5

OUTLOOK:

Short Term (1 Week): Slightly firm in the short term on festive demand

Medium Term (1 Month): Likely to ease back due to huge domestic and global glut.

Long Term (3 Months): Subdued due to huge excess stocks.

A longstanding feature of the Indian sugar market is the cyclical nature of production, where 2-3 years of surplus are followed by 2-3 years of deficit. The cycle appeared after an increase in 2006-07 to 30.1 Mt, 33% over the record 2002-03 crop; sugar output declined to 15.2 Mt in 2008-09 and 28 Mt in 2010-11. Trade generally follows a similar trend. Weather patterns of course are a key factor as sugarcane yields are greatly affected by the level of rainfall, notably during the critical monsoon season. Even after withdrawal of the levy sugar and release mechanism the government regulates sugar trade via export limitations and marketing restrictions, such as limits on private stockholdings. Sugar factories in India are caught in a price-cost squeeze with low sugar prices and relatively elevated fixed sugarcane costs in the years of surplus production. When the sugar units struggle to pay obligatory price to the farmers, growers eventually substitute alternative crops like soybean. This corresponds to the trough of the cycle.

Inelastic supply of sugarcane exists due to the perennial nature of sugarcane, which cannot lead the farmers to adjust quickly to the realities of the market, hence prolonging the upside and downside phases of the cycle.

8.8 Financial rescue

The sugar industry in the State is mainly dependent of the financial support for running the season properly. Even they need working finance for running the day to day industrial activities. Most of the District Co-op Banks are on the verge of collapse due to the finance supplied to the sugar factories. The DCCBs advances at a very short margin at 85 per cent, which is risky due to the volatile sugar prices during the corresponding period. As a result the non-performing asset is growing. This is one of the reasons of not financing credit to the agriculture sector.

The reluctance of the financial institutions and the banks to provide term loans as well as working capital has crippled the Indian sugar industry. These institutions have started looking at the sugar industry as a very high-risk industry. The scheduled commercial banks having developed high risk perception of the sugar industry have become extremely weary in enhancing the cash credit limits to the mills to the requisite levels. Year after year the arrears of sugarcane farmers are increasing, which has affected the well being of sugarcane farmers. Therefore, Government should ensure easier and cheaper credit facilities to the sugar industry, which is primarily required by it for timely disbursement of sugarcane prices of millions of sugarcane farmers.

CHAPTER IX

ECONOMICS OF BY-PRODUCTS

The sugar mills in a nut cell are becoming energy complexes and produce not only sugar but also alcohol, ethanol, power and other downstream products. Sugarcane and sugar production processes create number by-products; molasses and bagasse as the main by-products, which can further be processed for producing other manufacturing commodities. Most of the distillery units are attached to the sugar mills in India.

9.1 Black gold: economics of ethanol vs. spirit

Bioelectricity fits in environmental sustainability, because it is generated from biomass left over from sugar and ethanol production. It uses th e waste as its primary source. Bioelectricity by definition is a renewable, efficient and sustainable source of energy. Of the 521 sugar mills 181 units are having the distillery units attached to the mills with a capacity of 9600 kilo litres per day. The distillery units manufacturing ethanol are 128 with a capacity of 6655 kilo litres per day. About 25 percent of molasses are reserved for potable liquor in UP. The price paid to it is less than one-fourth of the market price being offered by the chemical industry.

Ethanol is a much-discussed by-product in the sugar industry, since the petroleum industry has also took keen interest in it. The international crude prices have crossed $100 per barrel. Consequently, there is an urge to find out alternative tools to meet the rising demand for fuel. Ethanol is one of the best alternatives to the petroleum. Of late, the Govt. of India has declared that, petroleum fuel will contain at least 5 per cent of ethanol (Press News, November, 2012). The world's ethanol production has reached 62.03 billion liters in 2007. Its production in India has crossed 2000 million liters during the same year. Indian demand for ethanol was seven billion liters in 2010 at 10 per cent and 5 per cent blending rate of fuel in gasoline and diesel respectively. The price of ethanol in the market is Rs. 27 per litre during November, 2012, where as the price of spirit is Rs. 30 per litre. India's participation of hydropower in total installed generating capacity in 2006 was 15.3 per cent, when world mean was 16.4 per cent. The highest percentage of participation was 98.5 per cent in Norway and followed by 83 per cent in Brazil. Compared to the petroleum

production, the production of ethanol is less. Supply of ethanol will not match the petroleum production in near future.

Sugar factories prefer to produce spirit rather than ethanol due to the conditions led down by the fuel producing companies to supply the ethanol at the cost of sugar factories to the fuel centres. This is an extra burden on the sugar factories. Obviously, the sugar factories prefer to produce spirit. Besides, spirit is a raw material for producing nearly 27 types of chemicals. Therefore there is an urge to fetch the required machineries at the subsidized rates. A single sugar factory cannot make its investment in such machineries. It exhorts to act collectively. There is a possibility of increase in the price of spirit in future.

The future of fuel energy is not petroleum, but a renewable energy. Ethanol has the potential to become the most viable energy resource of all, if the right policies are put in place to offer security and infrastructure for its production. Ethanol and bioelectricity can be produced and delivered for 365 days a year and 24 hours a day. The Chinese Government is moving gradually to establish a more aggressive domestic bio-fuels policy. Under which, the China's National Energy Bureau has announced the goal of using five million tons of ethanol during the period from 2011 to 2015.

The city of São Paulo (Brazil) has introduced the Ecofrota program in February of 2011, which includes modern versions of the ethanol-powered buses used in Stockholm. The buses were manufactured in Brazil by Swedish automaker Scania. About half of all city buses in Stockholm now run on ethanol. The entire fleet of buses is proposed to be converted in to ethanol fuel use by 2025 eliminating the use of fossil fuels (UNICA). The urban passenger transport system in Maharashtra at the prominent cities like, Mumbai, Pune, Kolhapur, and Nagpur can be developed on ethanol. Govt policy towards this end has to be enhanced with technical support. With appropriate investments and public policies, ethanol can play a leading and strategic role in the diversification of the global energy matrix, as world demand for the biofuels is already projected to increase 40 per cent by 2035 (UNICA). A series of agreements were signed in April, 2012 focusing on the development of biofuels for aviation, which has increasingly looked as an alternative solution to cut CO^2 emissions (UNICA). Airbus, Boeing and Embraer, the top three aircraft manufacturers in the world are pledged to work together for developing a affordable aviation biofuels (March 22nd, 2012 in Paris).

The export of molasses was one of the profitable businesses. Some private companies have earned crores of profit in trading the molasses. Molasses is used in cattle feed in USA, UK as a winter season feeding dose to the cows. Now-a-days number of by-products is produced through molasses, viz industrial alcohol, acetone, and some other items in the process. About 95 per cent distilleries in India are based on sugarcane molasses. Total production of molasses has reached to 11.70 million MT and 2.574 billion liters of ethanol in 2010. The source like sugar beet, sweet sorghum and cereals grains can be used for the production of ethanol.

At the conventional route of sugar recovery of 11.50 per cent for a 4000 TCD unit, the sugar production will be 4600 quintals per day, the FM production at the rate of 3.64 per cent will be 145.60 MT per day. The ethanol production will remain at 36.996 KLPD with revenue earning of around Rs. 8 lakhs per day at the current prices.

Its economics is worked out in Table No. 9.1 below. In fact the economy of the sugar industry is much considerably potential in its by-products. Processing on the by-product is the main industrial activity in Cuba and Brazil. The product mix and product flexibility is the essentials of the successful sugar industry. On an average one ton of molasses produces 300 litres of spirit.

In Maharashtra, sugar production till 28th February 2019 was 92.10 lakh tons, compared with 84.54 lakh tons produced last year same period. In the current 2018-19, 23 mills have closed their crushing operations in the State while 170 sugar mills were operating till March end. On the corresponding date in last season 18 mills had closed their operations while 169 mills were in operation during the same period. Industry has claimed that for the first time in the history of Indian sugar industry, sugar mills have offered to supply around 51 Crore liter of ethanol produced from B heavy molasses and sugarcane juice, which will help reduce sugar production.

Ethanol blending percentage as on 17th June 2019 has been increased to 6.20% as compared to 0.67% in supply year 2012-13. Ethanol blending was 0.67% in 2012-13, 1.53% in 2013-14, 2.33% in 2014-15, 3.51% in 2015-16, and 4.22% in 2017-18. Now it is proposed to increase by 10%, which will bring down the sugar production obviously. However, product flexibility can be obtained by the sugar industry. Similarly, ethanol purchase for the blending programme has risen from 15.4 Crore liter in 2012-13 to 38 Crore liter in 2013-14, 67.4 Crore liter in 2014-15, 111.4 Crore liter in 2015-16 and 150.5

Crore liter in 2017-18. About 127.5 Crore liter of ethanol had already been purchased by June 17, 2019 in the current ethanol supply year. Oil marketing companies have allocated 268.73 Crore litres for the full year 2018-19. The ethanol supply year begins in October.

Of late, Sugar industry in Maharashtra has sought Central Government's permission to convert the surplus sugar back into ethanol. The Central Government has decided to discourage excess production of sugar and instead promote ethanol made from sugarcane. Of the 83 Crore liter of ethanol procurement quota given to Maharashtra, the industry has signed contracts for supply of 69 Crore liter. Of the contracted volume, 35 Crore liter was for supply within the state and 34 Crore liter for out of the state.

The Central Government had received applications from nearly 200 sugar mills for installing ethanol capacity, of which 114 projects have already been approved, which would add nearly 25 per cent to the existing ethanol capacity. The GOI has insisted the sugar industry groups to make investments in ethanol production projects. As a result the highest investment from Maharashtra is proposed to book for Rs 2250 crores by the end of 2018-19 seasons (Business Standard, February 7, 2019).

The possibilities of developing this enterprise are being discussed seriously by the State Government. Most of the sugar units are also seriously thinking of developing this area in their premises.

Ethanol is one of the complementary to the hydropower in Maharashtra. A clean energy matrix can be developed through ethanol. Sugarcane bioelectricity is the outstanding among such source. It has the following characteristics; (Nivade Jose de Castro, et al, 2008),

1. Cost competitiveness,
2. Seasonal complementarities in relation the rainfall pattern
3. Maturity of the sugar and ethanol industry
4. Contribution to reduction of GHG emissions
5. Proximity to the demand centres

Molasses for many decades have been fully controlled in every aspect i.e. price/movement/end use etc. In 1993, the Central Govt. decontrolled the molasses. Most states have complied with the centre's directive but some state government's like Bihar, UP have reemployed controls like dual pricing, Movement end use controls etc. This is only helping in keeping free market molasses prices high leading making availability

difficult for distilleries and country liquor production thereby encourages illicit liquor production from Gur - hence more diversion of sugar cane (Kansal, FAO, 2019).

9.2 Economics of cogeneration

Bagasse is a by-product of sugar manufacturing process. It is a useful source of energy with a gross calorific value of about 9200 kJ/kg. It contains a very high level of moisture (around 50% by weight) and needs specially designed handling, feeding and combustion systems. The combustion systems are for dumping grate, pinhole grate and travelling grate. During the process the technologies have tended towards cogeneration, with advanced combustion. There are supplementary fuels like; coal, biomass and biogas (a by-product in an integrated sugar mill) are used for generating the heat.

Co-generation mechanism in sugar factories has two forms of energy; one form of energy is heat and other is electricity. The bagasse in the conventional technology of sugar industry is burnt in a boiler to generate high -pressure stream for driving the turbine. It is in turn drives an alternator through a steam turbine for producing electricity. The exhausted steam is condensed to water and sent back to the boiler. This efficiency is called as boiler house efficiency (BHE). The efficiency in this process remains less to only 35%. (ISMA) In a co-generation process, from where the electricity is produced with the high level efficiency to the tune of 75 to 90%. This is possible due to the low pressure exhaust steam coming out of the turbine is not condensed, but used for heating purpose. This saves bagasse as well a factory can generate electricity for its use. The excess energy is sent to the grid at the prescribed rates. It has a dual benefit to the sugar factory. The Central Electricity Regulatory Commission (CERC) and the State Regulatory Commissions are dealing with tariff, supply and distribution of energy and regulations of the co-generation. No state has been allowed to open access electricity exported to the state boundaries outside.

The evolution of sugar cogeneration has been marked by many milestones in plant specification, (Engineering & Product Development Team, Triveni Turbine, NOIDA, India. www.trivenigroup.com)such as:

- Increases in MW rating of captive power plants;
- Increases in pressure/temperature rating;
- Season/off-season operation;
- Maximized plant heat rates;

- Flexible fuel firing options.

The cost benefits of the mechanism have been improved during the process of development. The benefits may be quoted as under:

- Savings in energy cost through CHP plants;
- A revenue stream through sale of excess power to grid;
- Revenue through sale of carbon credits.

One ton of sugarcane when processed for sugar production around 300kg (depending on the recovery) bagasse is produced. The cogeneration units in India can generate nearly 2000 installed exportable capacity during a sugar season. The UP state has large amount share in it.

Bioelectricity generation is a function of the sugarcane harvest. However, its potentials also depend on the technology used. Efficiency in conversion of biomass into electricity is a technology oriented. New Greenfield projects in Brazil are currently adopting extraction-condensation technology, which allows energy surpluses with low costs. This technology generates up to 96 KWH per ton processed sugarcane, of which an average of 80 KWH can be exported from Brazil (Nivade Jose de Castro, et al, 2008).

An estimate given by the Ministry of Non-Conventional Energy Sources places co-generation at 3500mw by the sugar mills with Maharashtra and Uttar Pradesh with highest potential of about 1000mw each is taken up as a model. As against this, only 46 co-generation projects totaling 348.23mw capacity have been commissioned in 6 states (AP, Karnataka, TN, Maharashtra, Punjab, and UP) and 32 projects with an aggregate of 280.57mw capacity are under different stages of commissioning in 7 states. The cost of commissioning co-generation project with 87 at a boiler pressure comes to about Rs. 40 crores, which is more or less equal to setting up of a modern sugar mill. The cost of generation ranges from Rs. 1.50 to 2.75 per unit (Rs. 2.25 to 3.50 in the case of conventional power project) (CACP, 2005).

Each sugar factory with 5000 TCD produces 1500 tons of bagasse, of which 1000 tons is used as fuel for the factory with cogeneration plant, through which, 24 MW energy is produced, of which 6 MW energy is consumed by a sugar factory every day and the remaining is sold out. The price of bagasse in November, 2012 was Rs 2600 per ton. It has been increased by Rs 2800 per ton in 2016. It means the sugar factory is consuming the bagasse to the value of Rs 28 lakhs every day. A sugar factory with a cogeneration plant

can sell energy to around 18.67 MW at the approximate price of Rs 6.10 per unit. During the off season, a sugar factory produces 21.67 MW of energy.

A sugar factory with distilleries can pay the cane price to Rs 130 – 150 per ton of sugarcane and Rs 160 – 200 per ton if the factory possess cogeneration unit (these calculations are made in May, 2012). Collective and coordinated efforts are essential for harnessing this potentiality. To co-operatives, it is very easy to organize.

The Thorat Committee has estimated the investment requirement in cogeneration for utilizing the present output of bagasse to be about Rs 37000 crores in 2012-13. The seasonal nature of cogeneration units and fluctuating bagasse availability the payback period of investment remains long. When long payback period is compounded with uncertainties in power sale and pricing, sugar mills find it hard to come to investment decisions in cogeneration units. Even the purchase price of the energy also matters the investment in co-generation.

About 7000 MW additional power could be generated through bagasse based cogeneration projects in the country. Sugar industry is traditionally practicing cogeneration by using bagasse as a fuel. With the advancement in the technology for generation and utilization of steam at high temperature and pressure, sugar industry can produce electricity and steam for their own requirements. It can also produce significant surplus electricity for sale to the grid using same quantity of bagasse. For example, if steam generation temperature/pressure is raised from 400^{o}C/33 bar to 485^{o}C/66 bar, more than 80 KWh of additional electricity can be produced for each ton of cane crushed. The sale of surplus power generated through optimum cogeneration would help a sugar mill to improve its viability, apart from adding to the power generation capacity of the country. In Maharashtra 66 sugar cooperatives are producing 1000 MW electricity through cogeneration process.

CHAPTER X

'H' AND 'T' WORKERS: ECOLOGICAL REFUGEES

The place of the farm and the factory workers in the sugar industry is high up in the industrial processes. The farm sector workers are known as the harvest and transport workers (H & T workers). They are unorganized. However, their unionization had been formed first prior to the unionization of sugar workers. The H & T workers are classified as per the nature of the work they perform. Their wages are determined by the tri-partite agreements between Govt, industry and the workers' unions. The industrial relations always remained controversial. Now a day, H & T workers are called as *Majors* not *Kamagar*. Means they are the contractual workers, hence, they are not concerned to the factory set up. However, various judicial verdicts say that they are the part of the sugar industry. To break away from this, the sugar factories in Maharashtra have established the cooperative labour societies, contractual labour associations and NGOs for supplying the H and T workers through the labour vendors some time. The labour vendors too have formed such societies and associations. Their administration is not concerned to the sugar factories. Their entity remained diverse. Each *Macadam* (head of the workers of 10 harvesters) has a tractor or cart pulled by a small tractor.

10.1 Workers' role in sugar industry

The workers' involvement in the industry is categorized into; (a) industrial or factory workers and (b) farm workers (harvest and transport workers). The role of factory workers in maintaining all types of technical and non-technical efficiencies is immense. In the case of technical workers, since it is mostly mechanical in nature, the workers vis-à-vis their economical efficiencies remained higher than the average expected level. (See, the technical efficiencies – in the working results of sugar factories, VSI).

The efficiency of the harvest and transport workers is more important in maintaining the highest sugar recovery. Timely harvesting, transporting and crushing of cane are highly essential. The delay in transporting and crushing after the harvest may cause deterioration in volumetric weight and the sugar recovery, which is a loss to the farmers and sugar factories simultaneously.

The farmers are paid their sugarcane prices on the basis of volumetric basis, whereas, the sugar factories through conversion cost are responsible for rational costing of the industrial processing. In this case in some places in UP, the idea of rail cane is thought of. Cane suppliers can establish a grid at the central places from where the private sugar factories can get the cane.

The nexus between private and co-operatives in the State should be looked into different perspectives, because, the co-operators are forming the private enterprises in the State. Consequently, they are managing the demand and supply of sugarcane properly. There should be an effective linkages developed through State initiatives or the by collective efforts. Taking into account the failure of the co-operative efforts in the State, the linkage failure is losing the potential benefits of the sugar industry. It is being bagged by the private sugar enterprises. Unlike the intellectual capital, the industrial commitment towards profitability should be taken in to account.

The sugar mills in Brazil have collectively signed on to the National Commitment to Enhance Working Conditions in the Sugarcane Industry for which each sugar unit has received "Committed Company" certificates. This idea is developed and introduced in 2009. National Commitment is a three-party agreement that involves the sugarcane industry, workers represented by labour organizations and the Federal Government. The agreement identifies best labour practices already in place, which go beyond legal requirements and makes them mandatory for companies that sign on. The goal is to speed up the adoption of best labour practices and continuously improve labour conditions in the sugarcane industry. The certificates are awarded after an intense verification process conducted by major auditing firms like; Audilink, Deloitte Touche Tohmatsu, Ernst & Young Terco, KPMG and UHY Moreira (UNICA Note).

Sugar industry is mostly dependent on unorganized farm sector, almost known as cane harvesters and transport workers. These workers are environmental refugees of the drought zone of Maharashtra, particularly from Latur, Beed, Barshi and Parbhani districts of the state. Since, last season i.e. 2009-10, the rate of migration is declining due to the development activities in the original places and better monsoon too at the original places of migrants. Consequently, the harvesting was delayed in the last season. The cane crushing was continued even after its less recovery in the cane up to May end. The rates of wages are also not revised since last five year, when they are to be revised for every three

years. The agitations are held occasionally for the demand of hike in their wages. During the season (2014-15) the problem was further became momentous, because of remunerative price paid for sugarcane during the last season. Consequently, the area under cane plantation has remained volatile. Migration depends on the degree of push factors in drought districts of the Maharashtra state and the pull factors available in the sugarcane belt.

Estimation of migrant cane harvesters and bullock-cart transporters is a big task. It can be estimated only at the level of each factory. On an average a gang of 10 workers harvest a truck or tractor load per day.

The wage rates of the migrant workers are again one of the crucial issues. Their wages are determined on tri-partite agreements for every three years. Minimum wage rates are applicable to the farm sector workers.

The industrial relations of the migrant workers in sugar factories remained very dynamic. The role of state government cannot be denied in establishing better industrial relations.

The sugar industry in western Maharashtra is facing the problem of shortage of harvest and transport workers since the last two sugar seasons. There are various reasons of migration like; pull and push factors existing in the original and the place of work. The sustainable livelihood of these workers is totally disturbed due to institutional reasons in the original and work places. This brings threat to the sugar industry vis-à-vis sugarcane economy of Western Maharashtra.

10.2 Types of migrant workers:

Generally, there are two types of migrant workers viz cane harvester and cane transporters, which includes, bullock carts, tractors and truck or lorries, etc. For the convenience they can be categorized in to;

(a) Direct centre harvest workers, linked to tractors and trucks. These workers are also known as head centered workers as they are carrying the cane loads on their heads from farm to the vehicle stationed nearby the farm corners. Normally a gang of 10 workers (male and female) are associated to a vehicle. These workers are the contract workers of the vehicle owners. The contractors make a contract for the supply of the harvest workers during the sugar season. The wage rates are fixed by the sugar factories' federation on tripartite agreements and

(b) Bullock cart owners/Cart pullers with small tractors and hired helping workers. The hired workers are associated with assisting and nourishment of the bullocks and owners' households and their children; mostly women and child workers and also for assisting the services to the dairy animals etc. The hiring rates are fixed by the transports / bullock cart workers. Mostly, these rates are fixed on the basis of their original places; whereas, the transport bills are obtained from the sugar factories as per the agreement with the sugar factory and the labour vendors.

Now-a-days group of workers purchases or hires the vehicles (mostly the tractors) from its owners and make a contract with the sugar factories to supply the sugarcane from farm to factory. Vehicle owner makes an agreement with the factory for supplying the sugarcane after its harvest.

10.3 Rate of migration:

The drought conditions in 1970s were the main push factors for the migration from drought zone to sugarcane belt in Maharashtra. On an average every sugar factory had a migrated the cane centered harvest workers to the tune of 2373 workers during the season. The number of bullock carts migrated was 664 with cart workers of 2 each in 1970-71. The average growth rate of these averages is continuously increasing during the corresponding period. (See Table 10.1)

Table No. 10.1

Average Migration of Head-centered Workers and Bullock Carts

Year	Average per factory migration of workers	Migrated bullock carts
1971-72	3676	758
1975-76	3336	829
1980-81	3469	637
1985-86	394	503
1990-91	4163	738
1-95-96	4218	802
2000-01	4308	849
2005-06	3809	727
2009-10	3150	660
2015-16*	2500	130

* A very short season due to shortage of sugarcane caused by drought conditions in 2014-15 agricultural season.

Source: 1. Field data of 25 sugar factories average from 1971-72 to 1990-91 (see Jugale V. B., ISLE Vol.38, No.4, 1995)

2.The data from 1995-96 related to the cooperative sugar factories in Kolhapur and Sangli districts – Author's survey.

The average number of HCW in each sugar factory was 4163 and the average number of bullock carts migrated to each sugar factory was 738 in 1090-91 seasons. This number has decelerating from 2001-02. This fall of migration is due to the growth (inclusive) activities in drought zone of the state and good monsoon during the period. The aggregate cane plantation since last two years has phenomenally increased due to remunerative price for sugarcane.

Table No. 10.2 indicate the position of estimated migration in Kolhapur and Sangli district during the sugar season 2010-11. This kind of estimation helps the sugar factories to plan for sugarcane harvesting period to the season.

Table No. 10.2

No. of Contracts Signed as on 31st August, 2010

Kolhapur District

Sr. No.	Name of factory	Contracts with			No. of Workers associated to	
		Bullock carts	Tractors	Trucks/Lorries	Tractors	Trucks/Lories
1	Warana	200	343	27	5145	405
2	Shri Datt Asurle	397	180	75	2160	900
3	Bhogavati Parite	200	250	70	3500	1400
4	Dudhganga Bidri	450	270	80	3280	1440
5	K.Kasari Kuditre	260	167	74	2004	1036
6	A.N.Gadhinglaj	500	175	50	2625	600
7	Chh..Rajaram K. Bavada	721	448	85	1896	1020
8	D.Y.Patil	0	146	178	1575	2340
9	Gaikwad Sonvade	10	22	187	220	1870

10	Sharad Narande	600	164	61	1485	600
11	S. Mandlik Hamidwada	720	185	320	2940	600
12	I.GandhiTambale	0	0	200	0	4000
13	D.R.K.Panchganga	1110	234	73	4300	1200
14	Shri Datt Shirol	500	398	67	3980	670
15	Doulat Halkarni	70	45	23	900	460
16	Jawahar Hupri	1008	79	405	6000	950
17	Ch. Shahu Kagal	563	181	34	2800	980
18	Ajara ShetGavase	20	140	74	2100	1480
19	Gurudatt Company	625	227	10	5448	240
20	Nalawade Sugars Co.	200	45	155	900	2790
21	Hemras Tech Rajgoli	0	200	50	4000	800
Kolhapur Total		**8,150**	**3,900**	**2,298**	**57,258**	**25,481**

Sangli District

Sr. No.	Name of factory	Contracts with			No. of Workers associated to	
		Bullock carts	Tractors	Trucks/ Lorries	Tractors	Trucks/ Lorries
1	Vasantdada Sangli	1188	221	38	3315	456
2	Vishwas Chikhali	200	138	35	1380	350
3	R.B.Patil Sakharale	1100	473	28	0	0
4	Sarvoday Karandvadi	58	203	26	0	0
5	Hutatma Ahir	787	201	25	2211	250
6	Manganga Atpadi	70	60	100	1400	2000
7	Mahakali K.Mahakal	100	45	145	500	1450

8	Sonhira Vangi	500	140	70	1400	700
9	Kranti Kundal	1170	196	22	3920	440
10	M. Shinde/Renuka Co	180	275	50	1000	6600
11	Dograi / Ken Agro Co.	437	118	48	1180	480
12	TasgaonTurchi	--	-	-	-	-
13	Yashwant Nagevadi	-	-	-	-	-
14	R.V. Dafale Jat	-	-	-	-	-
15	Ninaidevi Kokarud	50	80	47	1360	564
Sangli Total		**5,840**	**2,150**	**634**	**17,666**	**13,290**

10.4 Shortage of workers:

The sugarcane crushing capacity of the sugar factories in Sangli and Kolhapur is around 1.15 thousand tons per day. During the season 2010-11, the total sugar season available in number of days is around 180 days. The overall sugarcane crushing during the season is estimated to 206.91 lakh tons.

The expected sugarcane production is estimated to 271.16 lakh tons of sugarcane during the sugar season 2010-11. The cane available for sugar production is estimated to 222.29 lakh tons. Consequently, the surplus of 15.38 lakh tons of sugarcane may remain uncrushed. There is need to increase sugar season by 14-15 days, whose sugar recovery during the period remains very less. Consequently, it renders a loss of 20 to 25 Kg of sugar for a tone of sugarcane. This loss is being borne by the sugar factories. The farmers are paid the sugarcane price on the basis of weight not on sugar recovery.

When we divide this data to that of the available migrant work force, it is estimated that for the season of 180 days, each worker has to harvest and transport the sugarcane at the rate of 0.87 tons per day. This is a very difficult on the part of the workers and crushing of sugarcane to a sugar factory. The industry has to face the problem of shortage of workers to the tune of 9850 workers in two districts.

The rate of migration has come down due to the following weak push factors.

1. Better monsoon in drought zones of Maharashtra.
2. Development activities in the zone by way of integrated watershed development and infrastructural development activities.
3. Higher literacy rate in the drought zone. The workforce has diverted to industrial sector.
4. Rise in local wages.
5. Employment Guarantee Scheme in the drought area.
6. Educational incentives to the children at their original places motivated the workers to remain in their original places.

Following are some of the weak pull factors for the migration of the workers at the work places.

1. Low wages paid to the harvest workers. The agitations are held recently. The workers' union has cautioned the industry not to start the crushing unless their wages are revised. But due to their weak impact this slogan aborted. There is a possibility of extending the sugar season even during the low recovery period i.e. March, April. Consequently the state treasury will be burdened by addition compensation to the farmers.
2. Due to rise in temperature, the workers are reluctant to harvest the cane. The workforce at such situations goes back to their original places.
3. Hazardous sustainable livelihood at the destinations.
4. Rise in the prices of bullocks, rise in the costs of sicknesses of the bullocks and rise in the prices of fodder. etc.

10.5 Industrial relations

The industrial relations of the farm sector workers can be classified into two phases. In the first phase, the practice of appointing through labour brokers was adopted by almost all private and co-operative sugar factories. In the second phase, the appointment of farm sector workers is done through labour societies, trusts and other types of institutions, which are specially established by the factory management. This change took place due to the verdicts of the Labour Court, Industrial Court, High Court and Supreme Court (See a note below). According to the BIR Act, 1946 Section 3 (13), the farm sector workers are the employees of the sugar factories. But the factory sector refuses to accept it on the grounds that these workers are '*Mazdoors'* (temporary and seasonal)

and not the '*Kamagar'* (permanent employees). This verdict indirectly compelled the factory management to go for such trusts and societies so that they (workers) will be treated as employees of the trust and societies and not the sugar factories. Thereby the direct link of factory management with farm sector workers is avoided.

Some co-operative sugar factories have changed their bye-law. The earlier bye-laws state that, cane harvesting and transporting is the duty of the factory management. Now the new bye-law reads that cane harvesting and transporting is the duty of the cane field owners, and not the sugar factories.

Some sugar factories have stated to make a contract with the bullock cart owners and vehicle owners, whereby cane harvesting and transporting to factory gate becomes the exclusive duty of the vehicle owners. The cane fields to be harvested are allocated to each vehicle owner by the factory and not to the workers directly. Similarly, the payment of harvesting and transport changes is paid to the vehicle owners by the sugar factories and not directly to the workers. Therefore, most of contractors and supervisors (leaders of workers' team (10)) who is known as *mukadam* become the vehicle owners. Due to easy loan facility with the factory guarantee, the vehicles can be brought on installment basis.

The farm sector workers on their part basically concentrate on the increase in their wage rates i.e. cane harvesting rates and transport rates. They are not interested in whether they are the seasonal employees of the industry (i.e. the factory sector) or not. The factory sector workers and their trade unions have bothered to explore the fact that the factory sector workers are the employees of sugar factories according to the BIR Act, 1946. They have organized a few strikes. But no farm sector workers are really interested in either the BIR Act, 1946 or the verdicts of different courts due to their migratory and seasonal nature.

10.6 Wage negotiations

The severe droughts of 1972-73 propelled these workers to migrate towards the sugarcane belt for survival of their life and survival of their livestock. The harvesting and transport rate (fixed in 1968) prevailing during that period were Rs.4.20 per ton for cane harvesting to be paid to the HCW and Rs.3.20 per ton for the first mile with Rs.0.75 for every additional mile of cane transport through bullock cart.

The factory sector workers' representatives were very aggressive in implementing the wage revisions of farm sector workers in the process of sorting out their own

problems. This at last compelled the Government to make a Wage Award on November 26, 1979, and the wages were revised. Since then the declaration of Awards once in three years is a routine practice. Table 3 illustrates the rates of cane-cutting and cane transport since 1979.

A decision was made on the 26th November, 1979 to authorize the Chief Minister and Labour Minister to declare the wage rate for 1978-79 seasons. Accordingly on 30th October 1980 the rates were declared and were made applicable from April 1977-78 to the corresponding three crushing seasons. The wage differences if any were agreed to be paid before January 1981 in the presence of trade union leaders concerned so as to avoid paltry payments.

Meanwhile as decided in the Award of 30th October, 1980, a Committee under the Chairmanship of S. B. Patil was appointed to overview the unsettled problems of all sugar workers (farm and factory). The Committee's recommendations concerning to the farm sector workers were:

Table No. 10.3Rate of Cane-harvesting and Transport (Rs.)

Categories of workers	1992-93 to 1994-95	2000 to 2005	2009 to 2010	2015 to 2018
1. **Direct Bullock cart Workers**				
a. Cane Cutting	36.00	36 % increase Cane harvesting rate was Rs. 111 per ton of sugarcane	19 % interim increase Cane harvesting rate was Rs. 133 per ton of sugarcane	19 % interim increase Cane harvesting rate was Rs. 300 per ton of sugarcane
b. Cane transport up to 1 km	17.08			
c. Rate for each additional 1 km of cane transport	3.66			
2. HCWs	42.09			
3. TCWs	46.97			

Notes: HCWs - Head Centered Workers, TCWs - Truck/Tractor Centered Workers

(i) A fresh list of all farm sector workers should be prepared by a '*Mukadam'* (a supervisor or head of a workers' team) every fortnight,

(ii) Factory management should look into the problems of the farm sector workers,

(iii) The Government should grant financial assistance for construction of roads, and

(iv) The factory management should look into the provision of all basic amenities for the farm sector workers.

The wage rates fixed in October, 1980 continued up to the end of 1985. Following the two strikes of 1980 and 1986, on September 22, 1987 another Award was signed. New wage rates were introduced for crushing seasons from 1986-87 to 1988-89. Two other important decisions were taken in this award, viz.

(i) 50 per cent of leafy green head of the sugarcane stalk was allowed to be used by the workers and the remaining 50 per cent should be retained by the field owners, and

(ii) A committee headed by Dadasaheb Rupwate was appointed to overview the all-round problems of the workers.

The Rupwate Committee could only submit the revised wage rates in terms of an Interim Report on 28th June 1990. No final report was submitted by the Committee because of the non-consensus among the Committee members to accept the farm sector workers as the employees of the sugar industry as per the verdict of different Courts according to the BIR Act, 1946.

The current prevailing wage rates were fixed in 2005-06. The period of this award ended in 2008. The next Award was expected to be declared at the beginning of the 2010-11 seasons. Meanwhile an interim increase of 19% was declared, which is not accepted by the workers.

On an average a two workers of bullock cart can harvest one tone of sugarcane every day. But the capacity of work of the workforce is not fully utilized due to faulty harvesting schedules of the sugar factories. Every worker is getting half of the work done every day as compared to his working capacity.

10.7 Opera of contract labour

Labour contractors and sugar factories there is a link of their operations. Labour contractors with the team of their workers register the labour society or trust. The society

office moves along with the contractors. Contractors have again chain of links e.g. big contractors, small contractors, vehicle owner cum labour contractors, bullock cart contractors, etc.

The contractors or labour brokers have a direct personal interest in maintaining this workforce. Most of them have developed this as a profession. Commission is the major source of their income (normally 10 to 15 per cent of the earnings). The labour brokers have good relations with the factory management and vehicle owners. Some labour brokers even keep a fleet of vehicles in the changing scenario of industrial relations. The head gang man known as *Mukadam* is the closest friend of the labour brokers. This gang man keeps the harvesters under his control. He is paid for his service a commission from the earnings of harvester workers. The advances ranging from Rs.5 to 7 thousand per worker associated with truck and tractors and Rs. 8 to 10 thousand to a bullock cart owners are paid by the labour contractors through *Mukadam*. They charge certain (which is not institutional rate of interest) rate of interest on such advances. However, this depends on the will of the labour brokers. In some cases the rate of interest is higher than that of the commercial banks. The rate of interest varies from broker to broker. Indebtedness in the form of advances is indirectly binding on the workers to response for the contractor's agreement for cane harvesting, and perpetuates their vulnerability and submission. Paying such advances keeps the brokers very safe, because thereby the workers' migration towards destination is confirmed. Further, there have been unaccountable frauds made by contractors and *Mukadam* at the time of distribution of wage differences dues for periodic wage revisions.

10.8 Exploitation of farm sector workers

The exploitation of these workers can be further stated as follows:

1. No bonus is paid and no provident fund is contributed. There are no social security measures. No schooling facility is made available to the children of these workers;
2. The workers have no convenient, sufficient and protective shelter at their camps. They have to decamp frequently. Any damages of the material given by the sugar factory are recovered after the season;
3. The hours of work are not fixed and definite. There is no provision of vacation. There is no payment during the disturbances in the working of the sugar factory;

4. Cane harvesting, loading and transporting requires sufficient good health and experience in the job, but the workers face ill-health because of poverty and backwardness. They undergo pains, stains, irritations, wounds and many other physical ailments for which no protection is provided;
5. The bullock cart workers have to face the problems of health of bullocks, traffic troubles and damages of bullock carts, etc. Further, the hiring charges on tyre carts have to be paid even if the cart waiting for unloads. A couple of hours go waste in waiting for weighing and unloading;
6. There is no immediate implementation of the Awards; and
7. There is no compensation for death of bullocks, damaged carts, huts catching fire, etc. However, it depends upon the contractor's links with sugar factories.

10.9 Exploitation of cane farmers

The shortage of workers for harvesting and transporting of the cane from field to the factory leads to exploitation of cane farmers. These H and T workers in farm exploits the farmers by charging additional cane harvesting charges at the rate of Rs.100 per tonne additional other than the factory payment for the work during the shortage of workforce (Author's survey during 2009-10 seasons). Besides, the farmers were paid extra Rs.50-100 per vehicle as driver's allowances during 2009-10 seasons. This has now become a routine procedure in the cane belt. If any trouble takes place to the lorry or tractor in their transition, the whole cost of it has to be borne by the cane growers. The additional charge for refilling the scattered cane in a lorry or tractor ranges from Rs 500 to 1000. The vim and vigour of the workers has to be sustained by the cane growers.

10.10 Role of trade union

The foundation of the trade union movement in sugar industry was laid during 1936-1950. There were 12 private sugar factories when the Communist Part and other leftist fronts had begun to organize the trade union movement and agitate for the welfare of the sugar workers. Vinayakrao Mahadev Bhuskute of Haregaon (Shrirampur taluka) was the first to lead the agitation in 1936 against the Belapur Sugar Company. In 1946-47 the Kolhapur Mill workers under the leadership of Santaram Patil led an agitation of sugar workers. During the same period a strike was organized by Madhukar Bhise at Phaltan. In 1946, the Communist Party leaders of Ahmadnagar district like D B Kulkarni, Vasantrao Tulphule, Dhole, and Dhumane initiated organizing the workers of Godavari Sugar Mills,

Sakharwadi and Laxmiwadi and Changdev Sugar Mills. The socialist leader Gangadharro Ogale began to reorganise the trade union of sugar workers in Shrirampur taluka in 1944. Ravasaheb and Achutrao Patwardhan, with the help of Kishor Pawar, organised a trade union movement in Kopergaon taluka in 1946. The Ravalgaon agitation, Tilak Nagar strike, Belwandi *gherao*, Killari strikes, Vasantdada Kalvan strike, and Terna strike are some of the examples of unit level role of trade unionization. In 1980 and 1986 the State level strikes were declared by the factory sector trade unions as pointed out earlier and because of this the farm sector workers have gained a bit. The trade unions have knocked the doors of Judiciary and decisions and verdicts of which are in favour of the trade union. But the workers are still not united. However, some efforts have been made by some of the trade unions at the factory level. They are successful in their endeavors. The leaders like Subhash Jadhav and Anil Chougule have set their unionism in Bhogavati Sugar Factory with the help of unionization of local cane harvesters and transport workers. They do not have any occasion of taking the help of migrants. The unemployed youth of Konkan region is being used for the fart sector activities.

10.11 Conclusions:

Following are the persistent causes of non-unionization of the farm sector workers in the region.

1. They are seasonal migrant workers;
2. They are handled through labour brokers or contractors;
3. They always change the sugar factories as their work places;
4. Indebtedness, ignorance and illiteracy overwhelm them;
5. They are neglected by all user agencies and organizations; and
6. They need more orientation to get united.

Trade unionization is possible through labour brokers, but labour brokers are not interested to do so. They can only initiate unionization for wage rate hikes. Two notable strikes in 1980 and 1986 were successful, because of the initiative of the labour brokers. Consequently, the unionization of these workers is a real challenge indeed, for any organizing agency.

The major cause of migration is local economic distress caused by drought prone area and the drought conditions during the season. Some pull and push factors have

weakened the migration rate. The industry is in turbulence no doubt but it has caused the farmers' distress too.

Foot Notes:

(a) Kolhapur Sugar Mills Vs. It's Workers, High Court Verdict, LLJ, 1, 1986;
(b) Six Sugar Factories of Ahmadnagar District Vs. Their Workmen, Industrial Court Verdict, Government of Maharashtra, Part-I, L, Sept1971, p. 4703;
(c) Malegaon and Someshwar Sugar Factories of Baramati Taluka Vs. Their workmen, Industrial court verdict;
(d) Govt. of Maharashtra Notification No. 1131/46, BIR 1946, A-10-1952, and
(e) Govt. of Maharashtra's Notification No. BIR 1878/2976/Lab/9, December 3, 1981.

CHAPTER XI
ROAD MAP FOR THE SUGAR INDUSTRY

11.1 CAGR

Brazil's success story precisely guides the Indian policy makers. The crux of deregulating the sugar and sugarcane prices and encouraging the private participation in export dealings were the direct imitative undertaken in Brazil during 1999-2001. Simultaneously, proactive programmes like, reducing the oil import dependency and leveraging the sugar sector by developing alternative sugarcane based fuel were supportively implemented. The cane acreage has grown to 70 per cent CAGR from 1996 to 2005. The conversion cost has been reduced at the milling and farm levels. The transport costs also reduced by way of modernizing the ports, roads and their co-ordination with rail conveyances. The product mix and product flexibility techniques were adopted at the managerial levels. Consequently, Brazil became the largest sugar producer and has registered the largest growth in production among the leading sugar production countries.

India, being the second largest producer is consistently competing and strengthening for better in the world. In fact, its potentials are not properly managed and supported by a policy mix. The Government policy in India is oriented towards the package bound documentary efforts rather than strategic and commodity intelligence. China and India are the largest consumer of sugar in the world. Asia, experience highest sugar consumption in the world (ISMA, 2006) with 3.05 per cent CAGR during 1997-2006; Africa followed with 3.01 per cent CAGR in sugar consumption, Central America and South America accounts for 2.33 per cent and 8.04 per cent CAGR respectively. Oceania, North America and North Europe have a very less CAGR comprising 1.48 per cent, 0.76 per cent and 0.62 per cent respectively.

11.2 Consumption

India could not harness the fullest capacity of consumption; export remained at only 4 per cent of production (3.4% of world's share) of sugar. The percentage of exports in total production of Australian stands at 72 per cent, Brazil 56 per cent, South Africa 39 per cent, Thailand 35 per cent and EU 20 per cent. India with a given large domestic market obviously, is less dependent on exports; hence, the industry is relatively insulated

against global price variations. Going ahead, India and China would play a critical and crucial role in the global sugar scenario. India is unique due to its large domestic market. India, Australia and Thailand are the low cost sugar and sugarcane producing countries in the world. The cost structure is not compatible and congenial to the sugar and sugarcane growers, which is because of the lower crushing capacities and small and marginal land holdings respectively. Viability norms, both for sugar and sugarcane production remained controversial in India. However, they can be set on the basis of sugar recovery, which differs from regions and seasons.

Global sugar consumption has continued to increase despite the continuing economic difficulties in many developed countries, compounded by the period of high sugar prices and increased volatility. Global consumption is projected to grow at 2.2% p.a. to 2020-21, and down from 2.6 per cent per annum in the previous ten years. The developing countries will continue to experience the strongest growth in sugar consumption, fueled by rising incomes and populations, although with considerable variation between countries. Total consumption in developing countries is expected to increase from 48Mt to nearly 52 Mt over 2020.

11.3 Cane Price

The cane price remained at the largest component of the sugar value chain accounting to nearly 70 per cent of the ex-mill price of the sugar. (KPMG Analysis) The standard sugar produced in India containing 70ppm (or 70mg.) of Sulphur (Sulphuric acid) in 1 kg of sugar, which is normally observed in U.P. state. The sugar produced in Maharashtra has only 30ppm. The Codex Commission (under FAO) on sugar has reduced the Sulphur ratio to 20ppm, which is not possible to Indian sugar factories. However, WHO has prescribed the minimum hygienic conditions for the human being, wherein it has been quoted that, the minimum consumption of 44mg Sulphur is being consumed per day; hence, the Sulphur content in sugar is not harmful. Besides, on an average a person in most developed countries has a habit of drinking at least a glass of wine per day; which contains at least 250mg of Sulphur. So, the Codex norms applied to sugar were later withdrawn. (Quoted in M. S. Marathe, 2007)

Similar kind of observations were made and proved in LDCs indicating that ‘A’ Vitamin can be added in sugar. Sugar as a sweetening agent is liked by the children. Every year crores of children in LDCs are affected by night blindness; which can be cured

through this method. The WHO has approved this for India through Canadian Nutrients Institution. This offer has been accepted by Co-operative Sugar Factories' Federation in India. Central American Country like Guatemala has conditioned and compelled on the sugar industry for adding vitamin 'A' in sugar. This has been tasted with a case study and likely to be accepted as a policy in India. (Quoted in M. S. Marathe, 2007)

11.4 Dynamic and cyclicality management

The sector's future agenda looks very bright. At the current state of market, the sugar industry stands 2nd largest producer country in the globe. The largest consumers are one of the opportunities, which can also enhance the domestic demand in near future. India, of late, is becoming very serious in international trade participation. The import of sugar, a few years back, has decelerated the growth of sugar industry in India. We should take it as an opportunity and develop a strategy along with an improvement in the productivity.

Dynamic and cyclicality management aligning between cane price and sugar price followed by product mix and production flexibility be introduced. Indian sugar co-operatives are not a keen in sugar price risk management and product innovations, now-a-day it is becoming essential to balance the price risk.

The future state of the industry after 10 years as indicated by KPMG Advisory Services Pvt. Ltd. (2007) shows a favourable picture because;

1. India is self-sufficient in sugar.
2. India has a largest partner for Indian Ocean Countries.
3. We will be having most competitive sugar units in India.
4. Significant opportunity in CDM and power production
5. E 10 and beyond ethanol programmes are useful.
6. Less cyclical and sustained revenue abundances are expected.

11.5Sugar Crop

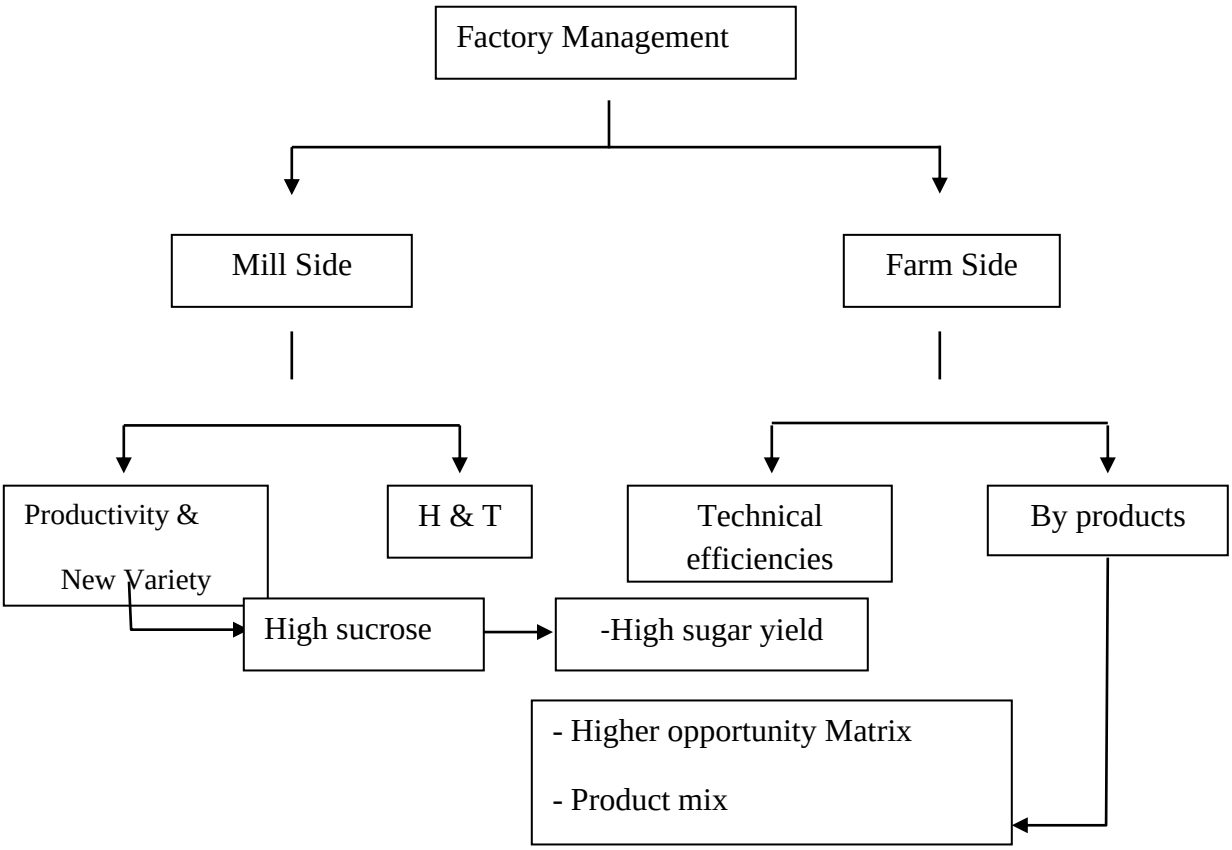
Sugar crops in many parts of the world are projected to expand in response to rising demand for sugar and other uses at relatively high market prices. World sugar production is expected to increase by 50 Mt to reach over 209 Mt in 2020-21. (OECD FAO, 2011) The recent surge in sugar prices has improved profitability and should trigger additional investment to come on stream within the decade, with output rising by around 11 Mt to nearly 50 Mt by 2020-21. India, the second largest global producer and the

world's leading consumer, is expected to boost production substantially to 32 Mt of sugar per year, on average, in the coming decade, or some 50% higher than in 2008-10, when production fell sharply. Some other countries of Asia, such as China and Pakistan, are also expected to continue to experience milder forms of production cycles, which contribute to fluctuations in production and their import volumes. Outside this group, an expansion drive underway in Thailand is expected to continue as investment projects currently in the pipeline come on stream, lifting production to around 8.7 Mt by 2020-21, and maintaining its position as the world's third largest producer.

11.6 Sugar Recovery and Comparative Advantage of Indian Sugar

Sugar recovery in India is a least considered managerial aspect of the sugar factories. Crushing of fresh and matured high yielding (sugar) cane variety is the essential pre-requisite of the sugar factories. A suitable cane variety is the outcome of continuous research in the fields and farms. Of late, GMO is being used in investigating such varieties. The managerial activities traditionally concentrate only on the mill side. The farm side is left to the farmers. The cane development office in most of the sugar units maintains the harvesting and transporting activities rather than R & D. The sugar factories with small crushing capacities are very efficient in managing the sugar recovery at highest level. With increase in the crushing capacity the sugar recovery declines. The technical efficiency committees have not considered recovery aspect. Sugar is produced in the farm. Consequently, it needs a suitable cane variety which will improve the sugar recovery and high yielding capacities. Factory management has to establish a backward link with farm economy.

The farm practices should be guided and administered by the Cane Development Office of the sugar factories. Infrastructural facilities are the composite efforts of both sugar factories and the Government policies. Infrastructure includes farm section basics and mill section basics. The use of by-products and the additional remuneration earned out of it is totally careless aspects in the co-operatives. In fact, their share should go to the farmers as an additional premium to the cane growers. The present struggle between farmers and the millers (2006-08; two seasons) can end with an effective symbiosis between the both. Besides, the farmers-miller relationship will improve, which is essential both socially and economically.



The sugar recovery in India is less as compared to the world's major sugar producing countries (see Table No 11.1). It always remained around 12% in western Maharashtra particularly in Sangli, Kolhapur and South Satara district of the State. It is lower in Bihar (9%) and higher in Maharashtra (average 11%).

In comparison with the earlier data the Indian sugar recovery has been improved a lot. The comparison of some indicators with other sugar producing countries is given in Table 11.1:

Table 11.1

Comparisons of some Sucrose Indicators

Country	Recovered sucrose production per hectare (MT)	Av. Cane sucrose content (%)	Av. Sucrose recovery rate (%)
Australia	10.5	15	90
Brazil	5.5	13.5	76
Cuba	5	12.5	82.5

India	6.5	12	82.5
Mexico	6.5	12	78
South Africa	7.5	13	85
Thailand	5	12.5	80
U.S.	8	12.5	82.5

Source: Kansal Satish (2019),*Factors Determining Indian Sugar Production and its Comparative Advantage for the Sugar*, Beverages Group, Commodities and Trade Division, FAO, 2019

An improvement in cane field and sugar yield will further overhaul the farmer-miller relationship. India is in an advantage in the international market, in comparison to other sugar producing countries. However, there are some issues which place India in a disadvantageous situation. Broadly, advantages and disadvantages are summarized as under:

Attribute		Advantage	Disadvantage
Product	Plantation white sugar		Less flexibility for exports as cannot offer raw sugar
Quality	45 to 200 / ICUMSA	Over Brazil	Over EEC and can't compete with refined sugar.
Sugar policy			High regulated and controlled and politicized.
Sugar cane price	63% of average sugar price		With assured price farmer does not bother about quality and delivery
Sugar production.	70 Mt Ha	Compares well with major producers	
Sucrose content	12.00%		Low against 12.5% in Thailand. US-but far behind Australia, Brazil
Sugar recovery	82.50%	Next only to Australia 90.0%	
Economy of scale	2000 TCD		Low compared to other countries.
Factory production			

costs			Less competitive compared to Thailand, Australia
Cane Farming/ Harvesting	Manual average farm holding 1.57 hectare		No control on cane quality, cane procurement due to low land holdings.
Cane utilization			Traditional sweetener segment. Free from controls.
Fobbing costs	6.5% of Ex. Mill Cost	Compares well with major sugar exporters even with Port berthing delays	
Export market	Natural markets	Natural markets of Shrilanka Pakistan, Bangladesh, Nepal, Indonesia, Gulf	Exports are opportunity based due to dual pricing policy.
Price hedging mechanism	Trading on futures		All imports and exports open to market risks.

Source: Kansal Satish (2019),*Factors Determining Indian Sugar Production and its Comparative Advantage for the Sugar*, Beverages Group, Commodities and Trade Division, FAO, 2019.

- India produces only plantation white sugar while most countries produce refined or raw sugar or both.
- Traditionally India has not produced raw sugar as it does not have a market locally and it would cost 30$/MT to convert into white sugar making it uneconomical.
- This puts India in somewhat disadvantageous position. If opportunity arises, cannot offer
    - Raw sugar
    - Also Indian sugar has to compete with world's refined sugar.
- At the same time, produces granular sugar which has a market in Pakistan, Bangladesh, and Indonesia (FAO, 2019).

11.7 Cane Yield

The maximum cane yield in India is much higher as compared to the major cane producing countries in the world. (See Table No.10) But there is high degree of variations within the country. Tamilnadu producing high, whereas, Bihar is producing world's lowest. There is high degree of variability in farm practices and the climatic conditions.

Table 11.2 gives the top ten sugarcane producing countries in the world during 2009.

Table 11.2

Top 10 Sugarcane Producing Countries in the World

Countries	Production
Brazil	672,157,000
India	285,029,000
China	116,251, 272
Thailand	66,816,400
Pakistan	50,045,400
Mexico	49,492,700
Colombia	38,500,000
Philippines	32,500,000
Australia	30,284,000
Argentina	29,000,000
World	1,743,068,525

Source: Food And Agricultural Organization of United Nations: Economic And Social Department: The Statistical Division

The tropical area however, experience higher cane yield as compared to sub-tropical areas. The cane yield during 1980s has declined slightly. But now, it is improving. It is expected to reach 72.2 per hectare during near 10 years (KPMG, 2007).

Every effort should be made to reduce the cost of cultivation and increase the yield along with better sugar recovery. Use of hi-tech both in farm factory areas will improve the quality and quantity of the sugarcane vis a vis the factory will be benefited by high sugar recovery. At present there are various opportunities of minimizing the burden of the workforce by using the hi-tech applications. The PLENE (a company) has innovated a revolutionary technology in sugarcane planting. This technology has been combining

chemistry, plant genetics and application technology for providing a truly integrated solution to the shortage of workforce. The industry can get commercial cane varieties in small cuttings coated with proprietary seed treatment. A shift from manual to mechanical planting will further improve safety. Growers can be able to re-plant cane frequently, with younger plants producing higher yields. Soil health and use of water with broader benefits can also become more resourceful.

Possibility of GM application to the sugar beets and sugarcane is now possible and feasible. This was under experimentation for more than a decade. The first commercial GM sugar beet variety was genetically modified by Monsanto in 2008. The German seed breeder KWS for resistance to glyphosate (i.e. Roundup Ready), were introduced in the US, and later in Canada. The major sugar beet seed companies in North America are selling Roundup Ready sugar beet varieties since then. The EU is the biggest market for sugar beet seed. But the GM sugar beets are not approved for commercial introduction, even though the Roundup Ready beets have been approved for use as food and feed. Monsanto expects to have a Roundup Ready/Bt GM sugarcane variety on the market by 2015.

The mechanized harvesting has been started in the State since last two years. This needs to have a mechanized sugarcane farms. There is not much progress in terms of actual implementation in the field. The other farm and factory economies should be considered for fair and remunerative cane prices irrespective of sugar prices. A shock absorbing capacities have to be developed through proper agencies and educating the cane farmers in various farming techniques.

Certain policy initiatives are essentially be introduced for furtherance of the industry in general and cane growers in particular. The State's stake at the time of emergency, no doubt brings an effective disaster management, but it is not enough all the time. Self-sustained growth of the industry with shock absorption capabilities are essentially be developed in near future. Some of the areas of change are identically stated below:-

1. The supply side regulatory should consist of defining the operational area based on geo-climatic and infrastructural conditions in the localities. This helps to maintain the desirable level of sugar recovery by harvesting, transporting and crushing the cane in time. In Pakistan the removal of command area has failed. Brazil and Australia have used the

captive farms and large size of land holding for cane cultivation which has weakened the urge of dereservation of cane area. Sugar recovery, in fact remains high, if a sugar factory crushes its cane for the nearby farms. The flexibility in its operation with cane or short of cane supply should be executed as and when necessary. The economics of the sugarcane farm management is totally neglected area. The sugar is normally created in the farm; hence, its quality and the supply mechanism be developed by the sugar factories. The role of sugar federation increases in this respect. The farm economics has a direct link with the property of sugarcane and the sugar recovery at the production centre. Sugarcane, in fact, is a *Kalpvruksha,* knobbed very poorly.

The KPMG ISEC study reiterates the Mahajan Committee recommendation in the command area concern. The cane requirement vis-à-vis yield rate of the cane in certain regions should be taken into account for defining the command area. The restriction of distance should be flexibly applied. The cane concentration index can be measured for determining the cane supply for a long term rather than making it permanently. There should be flexibility in confining the distance of the factories. An economic analysis of the cane supply mechanism should be developed with the help of electronic devises.

2. A contract (farming) between the industrialists and cane growers should be emphasized and agreed upon for the favourable dealings with the agencies linked in industrial contacts. In case of deficits caused by fall in the sugar prices, as compared to a deserved economic level of sugar prices be compensated by the state initiatives and simultaneously, by creating a compensatory fund earned out of various sources like; state contribution, surpluses earned out of paying the cane prices, and budgetary provisions in the Central budgets. The surplus earned should be credited on the individual cane suppliers.

3. The SMP/FRP should continue. It should be declared prior to the commencement of the sugar season. While making any contracts in concern to the sugarcane prices, it should be referred by the offering prices. Cane pricing have to be linked to sugar and its by-products; unlike the fixed formula in Thailand. Australia has a free market access with variable pricing formula. Pricing in Brazil is linked to sugar and ethanol prices. Pricing in provincial China is mandated. In India, there is a need to work into the pricing in regional perspectives. The multifactor pricing methodology may be adopted in determining the SMP/FRP. The cane price beyond the SMP/FRP may be

agreed through tri-partite agreements i.e. cane growers, millers and the Government. There is no point in making any agreements below the SMP/FRP rates, since SMP/FRP is mandatory on the part of the sugar producers. SMP/FRP for cane supplied to a factory is a statutory binding on the millers.

4. The final cane prices should be paid prior to the beginning of the next sugar season. The advance cane prices can be determined by a tripartite contract farming methodologies. The second/third cane price installment/s can be paid immediately after the currents crushing season is over.

5. The state level buffer stock be defined and maintained by the Centre. Government own buffer stock in China. Sugar is the only commodity which process monetary mechanism in India. In other commodities like Wheat, Rice; FCI operates the buffer stock. The release mechanism should be replaced with frequently changing needs of the industry.

6. The tariff and taxation policies should be definite and independently set. While doing so, there is no need to follow direct *quid-pro-quo*.

7. Export of sugar shall be separately delt with as at the current state with certain modifications for quick decisions and deliveries. International trade strategy should intelligently be cope with. Import and exports of sugar be flexibly and quickly adjusted with the need of the industry. The import duties and countervailing duties should have compliance to the WTO requirements. There should be regulatory import and export of sugar with commodity intelligence, freight adjustments and advantages be looked in with SAARC group of countries. The opportunity-matrix of import of raw sugar for processing and domestic use, in the case of shortage, incentives for export and buffer stock vis-à-vis domestic needs be confined.

Brazil is expected to consolidate its position as the leading global exporter and will account for over 55 per cent of global trade and over 63 per cent of all additional sugar exports. Bulk of Brazil’s exports will continue to comprise high quality raw sugar (VHP), which increases to 21 Mt in 2020-21, the composition of trade will also start to favour white sugar shipments which grow by 50 per cent and amount to over 12 Mt by 2020.

8. Set up an independent regulator and arbitrator for maintaining the buffer stock and sugar price band effectively.

9. Modify and amend the regulatory pre-requisite caused by 5 bench majorly judgments (3:2) of Supreme Court in 2004.

- Upheld the validity of the section 16 of the UP Sugarcane Regulation of Supply and Purchase Act 1953, which enables the UP State Government to declare State Administered Price.

- Section 3 and 4 of the same Act earlier contained a provision for set up of a Sugarcane Board for determining the cane price.

- Clause 3 and Clause 5(a) of sugarcane control order (1966) enable Central Government for fixing the cane price.

The other State legislations like Haryana needs modifications.

10. All states should follow uniform modalities of determining the sugarcane prices. The basis of ownership (Co-operative, Joint Stock Companies and Private) may be taken up as a key concern in this matter.

12. Self-regulatory cane pricing formula should be developed both for private and co-operative sector units. The share of sugarcane cost in the conversion cost should be equal to the revenue earned out of the sale of sugarcane. Cost = revenue is the rational approach to avoid the conflicts between millers and the farmers. This percentage differs from factory to factory. Rangarajan Committee has made a suggestion of 70 per cent sharing in both cost and revenue. But this ratio cannot be observed in all sugar factories.

13. The economies of scale of by-products be worked out with sugar price vis-à-vis cane price and reduce the price risk involved in both through product mix and product flexibility.

14. Tariff policy has to be based on price band system.

15. Sugarcane pricing vis-à-vis the economics of costing of sugar factories now-a-days is totally governed by the export of sugar and the sugar prices both in domestic and foreign countries. So, the rationality of the unit depends on;

(a) Minimizing the conversion cost

(b) Sugar price in home country

(c) Export sugar prices

(d) By-products and their markets both in home country and abroad.

The share of sugarcane prices in the conversion cost stands around 70 per cent. Its share in total cost is fixed, so, the factory management must focus on reducing the

conversion cost. Important conversion costs being the cost incurred on harvest and transport of sugarcane seeks to be rationalized. The nearby farms are useful for maintaining the better sugar recovery. Hence, determination of operational area has to be correlated to the factory's crushing capacity, which has to be maintained properly. There is negligence on the part of this by the factories' management.

Sugar prices in the home country become crucial. The cost of production cannot get reflected in the open market sugar prices. So many distorting factors/agents play a significant role to keep the prices low, so as to harm the industry. Cost of production is not recoverable sometimes. On such occasions, the factory should play other tricks to sustain and maintain the viabilities.

Remunerative export prices are in fact, a reward to the sugar factories. Occasionally, it renders reward to the sugar factories. But, whenever available, it should be harnessed efficiently.

Major Indian ocean importers of sugar will help to rescue the industry, when the world prices are viable; because India could get freight cost advantage at this situation. Indian exports become more useful and viable since India's competitiveness for raw sugar exports is lower due to the freight rates of the raw sugar.

India's annual export potentials are around 34 million tons to meet the international demand for sugar. India has to produce 13.2 million MT of sugar by the end of 2017 (KPMG analysis).

The managerial tricks become very sticky and intelligent, when economy of sugar production remains non-remunerative and it should reflect through Government policies. The role of State Sugar Federations is important on such occasions. Another area of complex management is that the surplus production or under-production should also be properly managed. Dr. C. Rangarajan Committee has suggested pursuing a multi-pronged approach for remunerative cane prices to the farmers. The CRISIL confesses that the profit of sugar companies may rise by Rs 6 billion if the recommendations of Rangarajan committee to decontrol the sugar sector get implemented. CRISIL further said that, if the Rangarajan Committee's suggestion related to full decontrol of sugar prices is implemented, profitability of sugar companies will increase by 50 per cent. Rationalization of cane pricing and liberalization of the sugar trade needs to be introduced over two to three years, in a calibrated manner.

16. The domestic national demand for sugar is expected to grow by 28.5 million MT during next decade and the international export demand will reach 4 million MT by the end of the same period (estimated by the MOA, ISMA, KPMG); whereas, the supply of cane is expected to reach by 12.57 million MT under the presumption of the sugarcane productivity of 73 MT per hectare in the State. However, the estimates differ from agency to agency. Predictions are estimated by; 1) State Agricultural Department, GOM, 2) Co-operative Sugar Factories Federation, Mumbai, 3) VSI, Pune, 4) Regional Directorate of Sugar and 5) Directorate of Sugar, Pune.

Sugar production in India is projected prior to the beginning of the season. Assuming a sugar recovery of 12 per cent, the State will produce 15.08 million MT of sugar. Of which only 6 per cent of the production is being used by the State for domestic consumption. Remaining sugar production dispatched to other States or used to export abroad. Simultaneously, there is a possibility of improving the crop yield during the next decade. It is estimated (author's estimate) that, there shall be an improvement of yield at the rate of 0.5 to 0.15 per cent every year. Of course, the history shows volatility in production and yield since it is based on natural calamities. The cyclicality of sugar economy is a varying fact to the industry vis-à-vis agriculture in western Maharashtra.

17. The Government policy related to release mechanism has failed since it could not control over the falling domestic sugar prices, which rendered a loss to the industry. It is difficult to put a ceiling on the sugar price, which ensures the cane growers to pay remunerative price to the cane suppliers. The floor price protects or harms the millers. Rising sugar prices (covering the cane price + conversion costs) would be beneficial to the sugar factories. On the contrary, it would be a loss, in the case of falling sugar prices. Since last couple of years, the industry is experiencing non-remunerative market situations to the industry. The consumers are happy with low sugar price. As said earlier, consumers will purchase sugar even at the sustainable rising prices. The sustainable level can be identified through a survey. Government Policy however, should poise between the interests of the millers, farmers and the consumers in an effective manner. We feel this is not a resilient chore on the part of the Government since everything is controlled by the Government. For the policy effectiveness no one should deny the grass- root realities.

India is set to produce a third sugar surplus country in a row during 2012-13, but the abundance is unlikely to find overseas buyers as millers want a hefty premium over world prices to meet higher production costs. (Times of India 3rd Oct. 2012)

18. India being the second-biggest sugar producer and top consumer swings from net exports to net imports every two to three years depending on weather and harvest quality, adding volatility to the world prices. India has imported sugar because of shortages in 2009-10; consequently, global prices remained to 30-year highs. India exported about 3.3 million tons in the year ending Sept. 30, 2012, up from 2.6 million the previous year, helping to pull down world prices from multi-year highs. India exports mainly white sugar to the Middle East and neighboring countries. The price in the local market is nearly $100 per ton over London sugar futures. India has started its season 2012-13 with 6 million tons of carry forward stocks and has produced 24 million tons of sugar in the year despite an estimated drop in Maharashtra. Local consumption is pegged at 22.5 million tons. Overseas prices are under pressure due to expectations of bumper output in Thailand and Brazil during 2012-13. As a result instead of exporting sugar at lower prices, Indian mills will prefer to sell unsold stocks in 2013/14. Bumper crops and lower imports by major consumers Russia and China will push global sugar prices down further in the 2012-13 marketing year.

19. The price of raw sugar (Intercontinental Exchange No. 11 spot, *fob*, Caribbean ports) in nominal terms is projected at nearly USD 408/t (USD 18.5 c/lb.) in 2020-21 White sugar prices (Euronet, Liffe, Contract No, 407, London) are projected to reach USD 508/t (USD 23cts/lb.) in 2020-21, with the white sugar premium narrowing with higher export volumes to average above USD 90/t over the coming decade(OECD FAO, 2011). This trend needs to be reflected in the Indian sugar policy framework.

20. The Centre and the State always stand supportive to the industry in India. The history of the sugar and sugarcane policy initiatives exhibited by both Centre and State Governments are indicative to support during the crisis; the industry was experiencing. The Central Government has given a new package to the sugar industry in 2007, (local newspaper “Sakal” news, 9-10-2007). The maximum arrears in the sugar cycle - 2003-04, stands to Rs.4770 crores. The Government rehabilitation package has provided relief through various schemes. The Government steps appear to have lost their gloss with the

market only finding some support from festive demand, which is likely to last till *Diwali* apart from a sluggish Brazil outlook.

21. The co-operative enterprising do not have any access of funds in the capital market. They are much dependent on the financial institutions (i.e. Co-operative Apex Banks) even for their working capital. In fact, they are compelled to hold their accounts, as a state advice in the co-operative banks. They could not build up sufficient capital out of their transactions since last 3-4 decades. The Multi-State Co-operative Act gives relief in this regard by providing a relief of 10 per cent of profit as reserves. There is a need to strengthen the capital base of the co-operative sugar factories. Government (State and Centre) can contribute to the share capital under the package on behalf of the cane growers (not their own shares) as a direct subsidy to them. An access to the technology should be supported by the Government so as to lessen the debt burden on behalf of modernization. Co-operatives after their annual accounting do not hold any access of technology fund for modernization. Co-operatives should become self-reliant.

22. The Sugar Industry Efficiency Act at par with the Mauritius can be enacted so as to improve the conditional health of the sugar industry.

CHAPTER XII

FINDINGS AND SUMMING UP

The sugarcane economy in Maharashtra has brought a drastic change in the socio-economic aspects of the rural Maharashtra, particularly in the agglomeration of the sugar factories. The dream of doubling of farmers' income by 2023 can be attained through better price option. The farmers are still exploited in number of occasions. Weight cut is becoming a serious issue, but is being neglected by the stakeholders. The govt should watch on such issues.

The farm to factory management is to be improved. Particularly the farm sector is very important since 70-75% of cost of sugar production is shared by the farm sector; ultimately the efficiency has to improve. Sugarcane processing is environmental friendly if properly adopted by the factory management. Every by-product in the process can utilized for production fresh commodities.

Now a day, the energy cane rather than sugarcane is becoming more profitable business of farming since the change in the ethanol policy. Similarly the bio-energy through co-generation is saving lot of environmental conveniences.

Agro-industries are having potential welfare capabilities. This quality itself has insisted the leaders of the State to go for agro-industrial co-operative commonwealth. Pragmatism paved the way for this. The State has grown only this asset.

The co-operative sector should become rational. It should be held responsible for protecting the interests of the cane grower members. They should increase competitiveness and professional management strategies. The farmers need training in increasing the sugar recovery. The farm level crop management plays a significant role in increasing the yield and sugar recovery.

The technical mill efficiency in Maharashtra is also good. However, Tamilnadu stands at the lowest in total mill losses in India followed by Punjab. There is a possibility

of improvement in sugar recovery by at least 0.75 per cent to 1.50 per cent keeping an average recovery at 12.50 to 13 per cent in the State.

The Central Government needs to coordinate with state government electricity boards for utilization of the surplus power which sugar mills even can generate, when co-generation is encouraged. Commercial aspects of power purchase arrangement and distribution needs study. The investment required is about 60% of what will be required for setting up a conventional thermal power plant. A beginning has been made by few units in Maharashtra other plants will be coming up soon if policy is suitable to them.

For the international sugar market a number of major uncertainties remain. In the light of the relatively tight world market situation however, in the main producing countries of Brazil and India, could radically change the market in the near term, igniting further bouts of high volatility and prolonging the period of high world sugar prices.

The profit sharing and loss compensating mechanisms has to be properly developed by considering various factors compositely. The sugar price over and above the cane minimum support price + conversion cost be taken up as a base for its determination. Hutatma Kisan Ahir Co-operative Sugar Factory's pattern of surplus sharing or the additional income earned by selling the sugar is equally distributed among sugar workers in the factory sector, farm workers (harvest and transport), expenses on area development in the operational areas and the sugarcane suppliers or the cane growers. Cane pricing should basically be linked to the sugar recovery and not to the volumetric weight norms.

The world sugar market has undergone a number of reforms and structural changes over the past decade. Nonetheless, it remains heavily distorted by government policy interventions that contribute to high price volatility. The world market is highly concentrated. At present, it is possible to include as the most important players (77) on the global sugar market the following countries: Brazil, India, China, Thailand, USA, EU, Mexico, Russia, Pakistan and Australia (FAO stat, 2013). In particular, the shares of Brazil, India, China and Thailand, compared to the total world production, amount to amazing 51%.

The FAO has summarized the Indian sugar sector as under (Kansal Satish (2019), Factors Determining Indian Sugar Production and its Comparative Advantage for the Sugar, Beverages Group, Commodities and Trade Division, FAO, 2019);

- India is one of the largest producers of sugar in the world and so also the consumer. Can manage its inventory to its advantage by rotating the same through imports and exports.
- Agriculture growth pegged at 3.5% - sugar cane has to compete and compete on its own.
- There exists a potential in terms of increase in productivity, extraction and production.
- Like in the past planners/policy makers/farmers producers - should get together to form a policy also acceptable to politicians.
- Optimization of sugar mill capacity - vertical growth need of the day.
- Pricing
    - Decontrol may not be the answer - at the same time dual pricing policy has to go to provide level playing field for all sweeteners.
    - Govt. can procure sugar from market and subsidies in case, it is a must for PDS.
    - For the good of consumer, farmer and the mills sugar price should move in a band, meaning monthly inflow to market to be regulated by Government.
    - Balanced export/import policy.
- Mills and farmers to work together to improve yield and extraction through better harvesting.
- To become internationally competitive - i.e. cost effective and quality producer.
- To be ready for free marketing i.e. to hedge on futures.
- With consistent policy and competitiveness India can be a regular player in the international market.

This summary gives a very good insight to the policy makers to think better future. There are lots of corners where an improvement is essential. Particularly carbon agriculture and the use of modern hi-tech agriculture tools will definitely improve the farm sector efficiency required by the sugar industry. The Cane Development offices in sugar factories are managing only cane supply registration and planning the harvesting schedule only. It nowhere stands to improve the cane quality. GM technology has entered in the sugarcane field. Energy cane is possible to be developed. New cane varieties have developed. The outlook of the industry should change. The cooperative sector has

generous scope to convey welfare to the farmers. The leadership should be kept on watch. The family monopoly is to be eliminated for better cane farming.

In general, it is crystal clear that the government policy has given impressive results as for as the sugarcane economy is concerned. The production has gone more than300MnT. The per capita consumption also has gone up from 5 to 13 kg over a period of 3 decades. There is still a potential of growth, but what is needed, is some changes in policy to make it world class player.

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States

Commission for Agricultural Costs and Prices
Ministry of Agriculture and Farmers Welfare
Government of India
New Delhi

Questionnaire for the Price Policy for Sugarcane for the 2017-18 Sugar Season

1. **Capacity Utilization by the Sugar Mills:**

(i) Give an account of the no. of sugar mills, installed capacity and its percentage utilisation by sugar mills in your state in different sectors (State, Cooperative and Private) during 2015-16 or latest available.

(ii) Indicate the steps taken, if any, for capacity expansion or/and modernization of machinery of mills during the last three years.

(iii) No. of sugar mills with distillery and power generation by sector.

2. **Wholesale Prices:**

(i) Indicate Wholesale Prices of sugar in important markets of the state during last two seasons and current season.

Rs./Quintal

Item	Year-end Wholesale Prices (Market average) (approximate)		
	2013-14	2014-15	2015-16
1	2	3	4
Sugar			
Molasses			
Press mud			
Bagasse			
Any other			

(ii) Please give reasons for fluctuations observed in the movement of prices during last 5years.

3. **By-products:**

Name of by-product	%age of by products out of every Tonne of sugar produced			Price (Approx) in 2015-16 (Rs./Tonne)
	2013-14	2014-15	2015-16	
Molasses				
Bagasse				
Press-mud				

4. **Pricing of Molasses**: Give an account of the policy regime governing the pricing and distribution of molasses produced in your state. If there is supply of molasses to potable alcohol industry, Indicate the quantity and price at which sugar mills are required to sell molasses to potable alcohol industry compared to prevailing prices in open market prices.

5. Provide the information for the latest available three years on the level of price realization/imputed value from the sale of these by-products separately as well as combined (imputed value includes unsold value or notional for transfer value of such by-products for further value addition in the sugar factory like, alcohol and ethanol production from molasses, use of press-mud for making bio-fertiliser and/or distillery effluent treatment, generation of power from bagasse or any other product produced through value addition to the by-products but would not include the bagasse used for running the boiler of the main sugar factory for the production of sugar alone).

6. **Diversification**: Indicate the progress made towards diversification of sugar industry through value additions to by-products:

i. the number of sugar factories (sector-wise/total) producing alcohol & ethanol, their production and per litre realization; the difficulties faced by sugar factories in production and sale of ethanol;

ii. the number of sugar factories (sector-wise) which have installed/are in the process of installing the **cogeneration** facilities and their realization from per unit sale of electricity; their difficulties and the steps taken/proposed to be taken to remove such difficulties;

Note: In case information in respect of i), and ii) is not readily available, the exercise may please be initiated to collect the same urgently and furnish requisite information as early as possible.

7. **Ethanol Blending**:

(i) Has the ethanol blending programme been implemented in your state? Yes/No
(ii) If yes, give rate of blending, price of ethanol and total production and consumption.
(iii) If yes, how far it has been successful and give shortcomings with reasons.
(iv) If not, reasons thereof?
(v) Give your suggestions for ethanol blending as well as the proper methodology for fixing ethanol price.

8. **Details of arrears**: Please furnish cane price arrears as on 31st March for the last five seasons and for the current season.

Season	Amount payable	Amount paid	Percentage	Date on which arrears were fully cleared	Reasons for arrears
1	2	3	4	5	6

9. **Sickness**: Please indicate the number of sick sugar factories, if any, reasons for their sickness and steps taken to revive these factories.

10. **Cane Area Reservation:**

i. What are your views on cane area reservation-abolition/continuation/modification? Also state the time period of cane area reservation.

ii. In your opinion what should be the minimum distance between an existing sugar factory and another new sugar factory to be set up, and reasons thereof?

11. **Methodology adopted for cost estimates**: Does the State Government generate estimates of cost of cultivation/ production? If so, provide the details of the methodology used and the estimates generated for sugarcane crop for the last three years including the definitions and concepts adopted.

12. What is the running cost of farm machinery such as (a) tractor/harvesters and pump sets used for irrigation and (b) other purposes along with the relative share of important inputs like diesel, lubricants, repairs/ maintenance charges etc. required for their operations?

Year	Running cost (per ha)				
	Irrigation		Other purposes		
	Tractor	Pump set	tractor	Harvester	Others (Please specify)*
2012-13					
2013-14					
2014-15					

13. **Prices & consumption of insecticides/pesticides/weedicides:**

(a) The retail prices (Rs. per kg.) and consumption (per hectare) of five important insecticides/pesticides/weedicides may please be furnished in the following table:

Name of the Pest	Percent Area affected	Average Yield loss	Name of pesticide	2013-14		2014-15		2015-16 (likely)	
				Retail Prices*	Usage quantity#	Retail Prices*	Usage#	Retail Prices*	Usage #

*(Rs. per Kg.) # per hectare

(b) Please furnish information in respect of major constraints in respect of availability, quality, price etc.

14. **Cost of Fertilizer & its availability**: Please furnish following details:

i. Provide the retail prices of phosphate, potash fertilizers and their use in sugarcane:

Name of the fertilizer	2014-15		2015-16		2016-17 (likely)	
	Retail price (Rs.)	Usage per ha	Retail prices (Rs.)	Usage per ha	Retail prices (Rs.)	Usage per ha
1						
2						
3						

ii. Was the fertilizer availability and off-take during the last season up to expectations? If otherwise, factors responsible for this shortfall.

iii. Average quantity of farm manure used per hectare and its prices.

15. **Rates of renting of land** :

Is renting out of land prevalent in your state? If so, Please provide information for current land rent rates for different categories of cultivable land?

(a) Proportion of area under leased in cultivation cost with share of marginal and small farmers in leased area

(b) Nature of contract product or cash share

(c) Tenure- seasonal and annual

16. **Cost of other components**: Please furnish information in respect of marketing charges paid, expenses towards payment of premium and Transport cost in the following table:

Particulars	**Unit**	**Rs.**
Marketing charges paid by the farmers	(per quintal)	
Expenses on premium on insurance	(per hectare)	
Average Transport Cost mill gate/purchase centre	(per quintal)	

17. **Insurance related information for sugarcane:**

i. Percentage of farmers who have availed crop insurance scheme and amount of premium paid by them.

ii. Percentage of loanee and non-loanee farmers availing crop insurance in the State? Give the average area cultivated by the loanee and non-loanee farmers separately.

iii. Percentage of farmers who have availed the claim for the crop insurance and amount disbursed to them against their claim.

iv. Whether the scheme of crop insurance is extended to farmers who are not owner-cultivators but lease in land for cultivation purposes?

v. Please specify the hindrances faced in implementation of the crop insurance scheme, if any? The suggestions of the State Government in overcoming such hindrances may be specified.

18. (a) No. of purchase Centres catering to a particular mill and percentage average area covered
(b) Proportion of produce purchased through purchase centres

19. **Transport related information:**

(i) Information on Transportation modes: 2015-16 or latest available

S. No.	Modes of Transport	Average Distance			Average transportation cost (Rs. per quintal)
		Farm to purchase centre	Farm to mill gate	Purchase centre to mill gate	
(1)	(2)	(3)	(4)	(5)	(6)
1	Rail				
2	Road				
3	Tractor/ Trolley				

(ii) Details of transportation cost borne by mills and cane growers upto mill gate:

Item	Proportion of transport cost of sugarcane borne by (%)
Sugar Mills/ Mill owners	
Cane growers	

(iii) Whether amount is deducted by sugar mills on account of transportation of sugarcane when delivery is received by the mills at the purchase centre? If yes, whether it is deducted lump-sum or per quintal basis? Please provide details.

(iv) Details of harvesting cost:

Sugarcane season	Proportion of Harvesting of sugarcane from field by		Cost of harvesting borne by		Amount deducted by mills from cane growers for harvesting (Rs. per quintal)
	Sugarcane mills (%)	Cane growers (%)	Sugar mill	Cane growers	
2013-14					
2014-15					
2015-16					

(v) Any other information relevant in this context of recommending Fair and Remunerative Price for 2016-17 sugar season.

20. **Demand and supply situation:** The Demand and supply of sugar may please be indicated for the following years:

Year	Total Demand (MT)	Total supply (MT)	Remarks
2014-15			
2015-16			
2016-17 (likely)			

21. **Details of district-wise Area, Production & Yield**

Name of the Crop **Sugarcane**

S. No.	Name of the District	2013-14			2014-15			2015-16		
		Area (Ha.)	Production (Tonnes)	Yield (Kg/ Ha.)	Area (Ha.)	Production (Tonnes)	Yield (Kg/ Ha.)	Area (Ha.)	Production (Tonnes)	Yield (Kg/Ha.)
	State Total									

Note: (i) If the information is not available for the required years please furnish the above information for the latest available three years.

(ii) Reasons for significant fluctuations in Area, Production and productivity in particular years may please be given.

(iii) State-wise average yield and yield under Field Level Demonstration (FLDs).

22. **Water Consumption**

Variety/ Season of Sugarcane	% Share of Area (approx.)	Total Production (lakh MT)	Yield (Qtl/Ha)	Recovery Rate of Sugar from Sugarcane (%) (approx.)	Duration of crop (Gestation period of Crop) (In months)	Irrigation Details		
						Source	No. of standard irrigations applied	Average height of irrigation Column (cm)

23. **Cost of creation of Irrigation potential:** As irrigation is an important input for cane cultivation, please indicate **approximate** cost of creation of irrigation potential:

Sl. No.	Source of irrigation	% irrigated area in 2015-16	Addl. Irrigation potential created (ha) during 2015-16	Cost of creation of addl. Irrigation potential (Rs. per ha)
1	Canal Irrigation			
2	Lift Irrigation			
3	Tube wells/boring wells			
4	Drip			
5	Others (Please specify)			

24. **Water usage:** Out of total water used for irrigation for cultivation of sugarcane, please indicate **approximate** percentage of water utilized by the following components:

Out of Total water used	Percentage
(i) Water normally absorbed for sugarcane (%) (approx.)	
(ii) Water going for ground water recharging (%) (approx.)	
(iii) Water evaporated (%) (approx.)	

25. Programme for diversification of area away from sugarcane:

Target crop	Target area	Details of programmes being implemented

Questionnaire for 2017-18

1. **Capacity Utilization by the Sugar Mills**:

(i) Give an account of the installed capacity and its percentage utilisation by sugar mills in your state in different sectors (State, Cooperative and Private).

(ii) Indicate the steps taken, if any, for capacity expansion or/and modernization of machinery of mills during the last three years.

(iii) Indicate cost of sugar production per tonne under different capacities (both in cooperative and private sugar mills).

2. **Wholesale Prices:**

(i) Indicate Prices of sugar in state during last two seasons and current season.

Rs./Quintal

Item	Year-end		
	2013-14	2014-15	2015-16
1	2	3	4
Factory gate prices			
Whole sale prices			
Retail prices			

(ii) Indicate the reasons for any abnormal increase/decrease in prices in any year/years.

(iii) How these compare with the prices in the preceding three seasons. Please give reasons for fluctuations observed in the movement of prices.

3. **By-products**:

Name of by-product	%age of by products out of every Tonne of sugar produced			Price (Approx) in 2015-16 (Rs./Tonne)
	2013-14	2014-15	2015-16	
Molasses				
Bagasse				
Press-mud				

4. **Pricing of Molasses**: Give an account of the policy regime governing the pricing and distribution of molasses produced in your state. If there is supply of molasses to potable alcohol industry, Indicate the quantity and price at which sugar mills are required to sell molasses to potable alcohol industry compared to prevailing prices in open market prices.

5. Provide the information on the level of price realization/imputed value from the sale of these by-products separately as well as combined (imputed value includes unsold value or notional for transfer value of such by-products for further value addition in the sugar factory like, alcohol and ethanol production from molasses, use of press-mud for making bio-fertiliser and/or distillery effluent treatment, generation of power from bagasse or any other product produced through value addition to the by-products but would not include the bagasse used for running the boiler of the main sugar factory for the production of sugar alone) for the latest available three years.

6. **Diversification**: Indicate the progress made towards diversification of sugar industry through value additions to by-products:

i. the number of sugar factories (sector-wise/total) producing alcohol & ethanol, their production and per litre realization; the difficulties faced by sugar factories in production and sale of ethanol;

ii. the number of sugar factories (sector-wise) which have installed/are in the process of installing the **cogeneration** facilities and their realization from per unit sale of electricity; their difficulties and the steps taken/proposed to be taken to remove such difficulties;
Note: In case information in respect of i), and ii) is not readily available, the exercise may please be initiated to collect the same urgently and furnish requisite information as early as possible.

7. **Ethanol Blending**: Has the ethanol blending programme been implemented in your state? If not, reasons thereof? If yes, how far it has been successful and give shortcomings with reasons. Give your suggestions for ethanol blending as well as the proper methodology for fixing ethanol price. Whether the price of ethanol be fixed as per (ii) above or left free to market.

8. **Details of arrears**: Please furnish cane price arrears as on 31st March for the last five seasons and for the current season.

Season	Amount payable	Amount paid	Percentage	Date on which arrears were fully cleared	Reasons for arrears
1	2	3	4	5	6

9. **Sickness**: Please indicate the number of sick sugar factories, if any, reasons for their sickness and steps taken to revive these factories.

10. **Cane Area Reservation:**
i. What are your views on cane area reservation-abolition/continuation/modification? Also state the time period of cane area reservation.
ii. In your opinion what should be the minimum distance between an existing sugar factory and another new sugar factory to be set up, and reasons thereof?

11. **Views to link FRP with 9.5% recovery rate**: Please indicate your suggestions on the level of Fair and Remunerative Price (FRP) of sugarcane for **2017-18** season linked to 9.5 percent recovery rate.

12. **Transport related information:**
(i) Information on Transportation modes:

S. No.	Modes of transport to mill gate/purchase centre	Proportion of each transport mode	Average transportation cost (Rs. per quintal)
1	**Rail**		
2	**Road**		
3.	**Tractor etc**		

(ii) Details of transportation cost borne by mills and cane growers upto mill gate or purchase centre:

Item	Proportion of sugarcane transported (%)	Share of transportation cost (%)
Sugar Mills/ Mill owners		
Cane growers		

(iv) whether amount is deducted by sugar mills on account of transportation of sugarcane when delivery is received by the mills at the purchase centre? If yes, whether it is deducted lump-sum or per quintal

basis? Please provide details.

(v) Details of harvesting cost:

Sugarcane season	Proportion of Harvesting of sugarcane from field by		Proportion of Cost of harvesting borne by		Amount deducted by mills from cane growers for harvesting (Rs. per quintal)
	Sugarcane mills (%)	Cane growers (%)	Sugar mill (%)	Cane growers (%)	
2013-14					
2014-15					
2015-16					

13.Mill farmers linkage:

Technology support	Product purchase	Pest management	Corporate social responsibility	Share holding of farmers