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Sugarcane Transportation and Harvesting Cost in Uttar Pradesh

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Preface

Sugarcane crop as an enterprise is not only benefitting Indian farmers as entrepreneurs in terms of a prime Cash Crop; but also national economy as well as domestic consumption(s) through its final processed form namely SUGAR; a product earning considerable foreign exchange to the tune of Rs. 6869 crores during the year 2016-17 through its export. Also according to Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India; INDIA has been the second largest producer of Sugarcane in the World and stood only next to Brazil, by contributing 18.72 percent of total sugarcane production in the World against 41.29 percent by Brazil in the year 2016.

As such, sustainable cultivation of a crop like sugarcane is most inevitable for a developing country like India. In this regard the three main contributing factors to sustain sugarcane cultivation are (i) Timely payment of all the dues by the sugar mills to the sugarcane growers for their sugarcane supplies (ii) Remunerative prices to farmers by the government for their sugarcane produces and (iii) Sugarcane harvesting and transportation facilities; which need suitable schemes by the policy makers and the adequate facilities by the Central/State Governments, accordingly.

While, in respect of timely payments by sugar mills to the cane growers, directions are being issued by the concerned Central and State Governments accordingly from time to time; our central government has also been taking care in respect of reasonable prices to the cane growers through fixation of Minimum Support Prices (MSPs) on the recommendations of the Commission for Agricultural Costs and Prices (CACP), on the basis of nation wise cost of cultivation studies for various field crops including sugarcane. On account of another important aspect of sugarcane cultivation, i.e., its transportation and harvesting; the present study has been initiated by the central government, to ease the problems faced by cane growers, especially marginal & small farmers and in earning and generating more and more incomes by medium and large farmers, towards upgrading the agricultural sector in prospering the Nation. This study revealed that of the total sugarcane sale by the entire sample respondents maximum was sold to Sugar Mills.

The study was undertaken under my overall supervision. The field survey, tabulation and analysis of data were conducted by Sri. Hasib Ahmad, Research Associate, Dr. H.C. Malviya, Research Associate, Sri. S.N. Shukla, Research Associate (Contractual), Sri R.S. Maurya, Research Associate (Contractual) and Ms. Twinkle Thapa, Research Fellow of the Centre and Sri Ovesh Ahmad typed nicely the report while the supervision as well as drafting of report was accomplished by Dr. Ashok Kumar, Research Officer (contractual) of the Centre. I acknowledge, with thanks, the valuable contributions of all the concerned officials of the State, district, block, village levels and the sample farmers who assisted and cooperated in this study selflessly at various stages, and many atimes, at personal inconveniences. .

Any comments and suggestions for improvement in the report are solicited and will be acknowledged thankfully.

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Dated: 15/07/2020

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Executive Summary

Introduction

India has achieved a marked record in respect of crop sugarcane with 4.73 million hectare area, 376.90 million tonnes production and 796.50 ql/ha yield in the year 2017-18 against that of 1.71 million hectare area, 57.05 million tonnes production and 334.22 ql/ha yield in 1950-51. Global wise as well, India is the second largest producer of sugarcane in the world and comes only next to Brazil. As per statistics for the yesr 2016, India contributed 18.72 percent of total sugarcane production in the world against that of 41.29 percent of Brazil. As such sustaining cultivation of sugarcane; is not only essential but also most inevitable in India. Among three main factors for sustainability of Sugarcane Cultivation in the interest of farming community in particular and the entire agricultural cum national economy in general; viz. (i) Timely payment of dues to Sugarcane growers by Sugar Mills (ii) Remunerative prices to Cane growers for their sugarcane produces and (iii) Harvesting and Transportation aspects of Sugarcane; the third one has still to be taken careof. The estimation of "Transportation and Harvesting Costs" of sugarcane is to be explored with, on the basis of Strong Data Base and Scientific Research Methodology. It is with this prime motto, that the present Study was initiated by our national government towards finding out sugarcane transportation and harvesting costs, in eight states of the country, including Uttar Pradesh.

Objectives of the Study

The present study, as a step forward in this direction, aims to estimate and analyse the Transportation and Harvesting Costs of Sugarcane, incurred by the Cultivators (Cane Growers) of different size of farms and /or Sugar Mills, in the state of Uttar Pradesh as per following set forth objectives:

(i) To estimate the harvesting cost of sugarcane using different modes of harvesting.

(ii) To estimate the transportation cost of sugarcane, from the farmers' field to the sugar mill and other selling points using different modes of transportation.

(iii) To estimate the various factor/input costs in the overall harvesting and transportation costs.

Methodology of Study:

(The detailed methodology has been given in the report).

Sampling Framework

A field survey has been conducted, using a Multi (three) Stage Stratified Random Sampling Plan, as per CACP (Commission for Agricultural Costs and Prices) Sampling Design Frame; with district as the first stage, village as the second stage and the farmer (cane grower) as the third stage or the ultimate unit of sampling and conducting the survey for the sugarcane season 2018-19.

As per sampling method of the present study, in each state, two districts are selected using CACP sampling frame; adopting the following criteria for selecting the districts and the selected districts have been Lakhimpur Khiri and Bijnor on the following criteria.

(i) The districts should have large proportion of area under sugarcane to the total area under sugarcane in the state.

(ii) In each district two sugarcane growing villages were selected, making a total of four villages per state.

(iii) From each selected village, a total of 50 farmers were selected for primary survey, giving representation to each size-group, i.e., marginal (<1ha), small (1-2ha), medium (2-4ha) and large (>4ha) farmers, using stratified random sampling and PPS (Probability Proportional to Size) methodology.

(iv) The aggregate sample size of study in the state of Uttar Pradesh, thus works out to be of 200 farmers under study and thereby collecting the primary data by personal interview of the sample respondents by the AERC Prayagraj Research Team as also the related data from the associated Sugar Mills viz. Balrampur Chini Mill and DCM Shriram Mill in district Lakhimpur Khiri and Kisan Sahkari Chini Mill in district Bijnor for the sugarcane season 2018-19.

Major Findings of the Study:

The major findings of the present study are as follows:

- The state of Uttar Pradesh is the largest producer of sugarcane in the country. During the year 2017-18, it (U.P.) contributed to the tune of 46.98 percent of total sugarcane

production in the country against that of 22.00 percent of Maharashtra. But, it lagged behind Maharashtra in respect of yield, with yield level of 792.55 ql/ha against that of 921.66 ql/ha in Maharashtra.

- Also as per time-series (1990-91 to 2016-17) data, of the state of Uttar Pradesh, there has not been much variations in the three basic crop parameters, i.e., area, production and yield of sugarcane, during the entire period of 1990-91 to 2016-17.
- In state of Uttar Pradesh, Harvesting Operations of Sugarcane are totally borne by cane growers themselves and Sugar Mills are not party to it at all.
- As per records for the year 2019-20, out of 119 Sugar Mills in the state, majority of them (77.31 percent) belonged to Private Sector, followed by the Cooperative (20.17 percent) and the Corporate i.e. Nigam (2.52 percent) respectively.
- During the period 2014-15 to 2018-19, in the state of Uttar Pradesh (a) There has been a continuous rise in quantum of sugarcane crushed, sugar production as also in sugar recovery rate, (b) As compared to 744.54 lakh tonnes sugarcane crushed, 71.01 lakh tonnes sugar production and 9.54 percent sugar recovery rate in 2014-15; the corresponding figures in 2018-19 are 1031.67 lakh tonnes sugarcane crushed, 118.22 lakh tonnes sugar produced and 11.46 percent sugar recovery rate.
- The recorded data in respect of main features of "three sugar mills under the study" revealed that (a) Installed capacity of the sugar mill varied from 3000 TCD (Tonne Capacity Day) to 10500 TCD, (b) Capacity utilization ranged from 85.72 percent to 100 percent, (c) Total cane crushed by factory during sugar season 2018-19 has been in the range of 475393.86 Tonnes to 1770891.40 Tonnes, (d) Total sugar production in a factory had been to the tune of 59510.00 Tonnes to 217690.00 Tonnes, (e) Sugar recovery rate ranged from 12.29 percent to 12.52 percent; which have been higher than the state average (11.46 percent) and that (f) The average cost of sugarcane transportation incurred by the sugar mill for transporting sugarcane from mill purchase centre to mill gate ranged from Rs. 16.54 per quintal to Rs. 20.48 per quintal.
- On overall sample basis, the sale percentage of sugarcane from its total produce has been 87.95 percent; while category wise the sale percentage has been highest (89.59 percent) in case of marginal farmers and lowest (85.42 percent) in case of medium category farmers and that of the total quantity of sugarcane sold; maximum has been sold to Sugar Mill (55.82 percent); followed by Gur Manufacturer (27.48 percent), Sugar Mill Purchase Centre (15.20 Percent) and to Khandasari Unit (1.50 percent).

- Among various modes of transportation like Manual Carts, Trucks, Tractor Trollies; the only mode of transport used by all the 200 sample respondents has been Tractor Trolley, on cent percent, i.e., 100 percent basis for transporting sugarcane from their fields to ultimate destination(s).
- Destination wise; average distance covered by a cane grower, has been (i) 12.96 kilometers to reach Sugar Mill gate, (ii) 2.08 kilometers to reach Sugar Mill Purchase Centre, (iii) 4.06 kilometers to reach Gur Manufacturer and (iv) 4.87 kilometers to reach Khandasari Unit.
- It may be mentioned that manual transportation mode has not at all been reported in case of any of the sample respondent; while in case of Mechanized Transportation, as in the present study, it has been exclusively tractor trolley.
- While, machine mode of loading/unloading is not preventing in case of any of the sample respondent, the details of manual mode has been (a) wage rate (males) Rs. 278.00 per day for loading and Rs. 244.00 per day for unloading.
- In case of Sugarcane Harvesting (i) machine mode of harvesting is not at all in practice in the study area (ii) under manual mode of harvesting, the prevailing "Contract rate" of harvesting in the region of study, is in general Rs. 30.00 per quintal including cleaning charges. It may also be mentioned that of the prevailing contract rate of Rs. 30.00 per quintal of sugarcane harvesting; Rs. 25.00 is towards harvesting and loading; and Rs. 5.00 towards cleaning.

Policy Suggestions

Based on major findings of this study, the following suggestions are recommended towards policy implications:-

- Provision of mechanized harvesting as well as mechanized loading/unloading facilities to all sugarcane growers of the study area in general and marginal and small farmers in particular (who both when combined form majority of cane growers and also cane suppliers to Sugar Mills) by the concerned sugar mills towards timely, quick and efficient harvesting as well as loading / unloading operations. This facility of cource will be on repayment basis by cane growers in terms of deduction of amount so incurred

by mills, from the payments they will receive from sugar mills for their respective cane supplies.

- More efficient management of flow of trucks/tractor trollies and unloading operations by Sugar Mills towards lowering down cost of production of sugar; which in turn in one way or the other will certainly be benefiting the mill owners as also the cane growers. This is so since at the beginning of the season, the sugar mills face problem of inadequate supply of cane while during peak season they get cane supply even more than their crushing capacity and on account of this, the cane suppliers also have to wait and wait for much longer time, due to unending queues of vehicles in terms of tractor trollies and trucks.
- The following factors, which influence the damage to sugarcane as a transit loss and also result to increased fuel consumption to a great extent during its transportation, irrespective of mode of transport like tractor trolly/truck; must be checked to all possible extent to minimize such losses – (i) Over Loading in the vehicle, (ii) Speed of the vehicle, (iii) Condition of the road used for transportation.
- Provision of Transport facility by Sugar Mills for transporting Sugarcane, right form the Farmers Fields to Sugar Mill Gate, to Marginal and Small farmers in particular and all such farmers (cane growers) who are desirous of such facility on Repayment basis.
- The HnT (Harvesting and Transportation) charges for the services, whenever so provided by the Sugar Mills to the farmers (cane growers) for entire harvesting operations (including cleaning and loading) and transportation of sugarcane from their (cane growers) fields to Mill Gate on Repayment basis, be crystal clear and made Public, so that farmers may decide accordingly; which mill to sell their cane produce.
- Good quality and early variety sugarcane (seed) be provided for sowing to sugarcane growers by Govt. towards better sugarcane cultivation to result (i) enhanced sugarcane aggregate production through higher crop productivity as well as (ii) higher sugar recovery rate. .

Chapter-I

Introduction

1.1. Background

SUGARCANE crop has got its own importance and significance, not only on account of a single factor, but for its multi-faceted values in terms of (i) Being the main Cash Crop for Indian farmers (ii) Intrinsic value of its final processed product, i.e., SUGAR, which apart from its use for domestic consumption of countrymen, is also a main source of earning foreign exchange to national exchequer through its export. As per statistics released by DGCIS (Directorate General of Commercial Intelligence and Statistics); India has earned foreign exchange to tune of Rs. 6,869 crores through export of 2146 thousand tonnes of Sugar during the year 2016-17, (iii) Its importance in terms of Gur Making, Khandsari units; alongwith those of Sugar Mill associated distillery units, electric production and by products like molasses, bagasse, biofertilizers.

Among a number of factors, the three most important ones in respect of cultivation and production of this most dominating cash crop Sugarcane; for its regional as well as national upliftment are respectively (1) Remunerative Prices to Sugarcane growers for their sugarcane produce, (2) Timely payment of all the dues to the cane growers by Sugar Mills and (3) The transportation and harvesting cost of sugarcane. As such for promotion of sugarcane, all the three factors as above need to be taken due care of, by the policy makers and National and State Governments, respectively.

Also among these, apart from timely payment by sugar mills and transportation and harvesting aspects of sugarcane; the price fixation of the crop has always been the most delicate issue right from the inception of planning era in 1951, not only for sugarcane but in fact for all the field crops. This has been so, since there had been empirical findings based instances, of price of agricultural commodities ruling very high during lean agricultural productions and in turn seriously affecting adversely the ultimate buyers, i.e., consumers and the prices slumping down very low during bumper production, to such an extent that farmers in frustration even burnt their standing crops. This caused a great concern to our national

government, which in turn to take care of this ebb and flow or boom and depression; established a permanent commission, popularly known as the Agricultural Prices Commission (APC) in 1965; which was renamed later as Agricultural Costs and Prices Commission (ACPC) and finally redesigned as the Commission for Agricultural Costs and Prices (CACP) in 1985. This commission, since its inception in 1965, has been advising the Government on appropriate price policies through recommending Minimum Support Prices (MSPs) for agricultural produces of not only sugarcane, but almost all the major field crops to take due care of crop producers, i.e., farmers, in particular and the overall consumers in general.

CACP

The Commission for Agricultural Costs and Prices (CACP) provides data on various input costs such as land rent, irrigation, fertilizers, labour, seeds etc. for sugarcane along with other crops. The detailed data on various costs is collected under the scheme "Comprehensive Scheme for studying the Cost of Cultivation of Principal Crops in India". However, the data on Transportation and Harvesting costs is not collected under this scheme. The transportation and harvesting costs are important components of overall cost structure of any crop, including sugarcane. At present there is no reliable data on these costs for sugarcane crop in the country. Inputs provided by state governments, which are not based on a scientific survey, are the only source for the CACP. Thus, a Reliable Data Base and Scientific Methodology need to be developed to estimate the harvesting and transportation costs of SUGARCANE. The present study is a Step Forward in this direction.

1.2.Research Questions

Q.1. What are various modes of Harvesting of Sugarcane ? Which one is most commonly used and what is its operational cost ?

Q.2. Which mode of transportation for transporting sugarcane is most commonly used and what amount (cost) is to be paid for it ?

Q.3. To which destination (sugar mill / Gur manufacturer / Khandsari unit), the farmers (sugarcane growers) are supplying their sugarcane produce, to the highest extent?

1.3.Objectives

The purpose of the present study[1] is to estimate the transportation and harvesting costs of sugarcane marketed by the farmers in the state of Uttar Pradesh. The specific objectives of the present study are as follows:

(i) To estimate the harvesting cost of sugarcane using different modes of harvesting.

(ii) To estimate the transportation cost of sugarcane, from the farmers' field to the sugar mill and other selling points using different modes of transportation.

(iii) To estimate the various factor/input costs in the overall harvesting and transportation costs.

1.4. Plan of the Report

The present report consists of nine chapters in all. The Chapter-I Introduction, deals with Background of the study followed by Research questions, Objectives and the Plan of the report; Chapter-II entitled Review of Literature and Methodology covers Review of Literature, Methodology, Sampling Method, Data and Data Base and the Trend Analysis. Chapter-III, deals with Sugarcane Transportation and Harvesting Cost, (Secondary Data Analysis), Chapter-IV, The Demographic Profile of State, Districts under study and the Sample Respondents, Chapter-V describes Production and Marketing Cost, Chapter-VI comprises Transporting Cost of Sugarcane, Chapter-VII Harvesting Cost of Sugarcane, Chapter-VIII deals with Results and Interpretation and lastly Chapter-IX presents Summary, Conclusions and Policy Implications, followed by References and Appendix Tables.

[1]The study has been proposed by the CACP and is being undertaken on the recommendation of the Research Advisory Committee of the AERC/Us. (Agro-Economic Research Centre/Units)

Chapter-II

Review of Literature and Methodology

Prior to start an empirical work, it is statutory and desirable to go through some relevant facts already investigated. It is the Review of Literature only, which serves as a guideline in developing Methodology, apart from the set objectives of the planned study and as such it is of prime importance in conducting any study.

2.1. Review of Literature

As the topic of the present study, i.e., Sugarcane Harvesting and Transportation costs, is coming up as a recent initiation; not much of literature is available on this; but among the main ones which are available a few of them are cited as under:

- G. Dines, S. M^{c}rae, C. Hendersm (2013): Sugarcane Harvest and Transport Management: A proven whole-of-systems approach that delivers least cost and maximum productivity.
- A study conducted to estimate cost of waiting time on Harvest cost and to develop a transport for coordinating harvest and transport of sugarcane to minimize waiting time; reports as (i) NSW Sugar Milling; A Cooperative Sugarcane Processing Group in Northen NSW, Australia, harvests and transports upto 2.5 million tonnes of sugarcane each year to its three factories, using only 21 harvesters and 28 trucks in total, (ii) Cane is delivered to each factory every six minutes to maintain processing capacity and that there is no or little queuing of trucks at the mill and few interruptions from the field side operations and that (iii) Traditionally a significant proportion of sugarcane processing costs are invested in harvesting and transportation. By contrast, the current systems operational costs are very low; and that this innovative system represents a significant change to traditional approaches in harvest and transport management and illustrates a proven path using a whole-of-system approach for other processers to follow.

- ToI (2012): Unique System for Sugarcane Transporters:

- Bhandara: With a view to empower persons engaged in agriculture, allied activities in the district, Vainganga Sugar and Power Ltd.: Devada has taken an initiative to help land farmers engaged in cutting and transportation of sugarcane for procuring an additional four-wheel trolly for their tractor trailors and also a pair of bullocks. The sugar factory will stand guarantor for the loan of Rs. 1.5 lakh from Bank of India taken for purchasing the trolly. In six months, the beneficiary will be the owner of the trolly on repayment of loan amount that will be deducted from the transportation bill. Factory management decided this to help people engaged in transporting sugarcane from the field to the factory. This will benefit the tractor-trolly owners to transport sugarcane in two trollies attached to the same tractor.

- Milan, Estaban Lopez…. Plo Aragones Llusis Miguel (2006): Sugarcane Transportation in Cuba,a case study:

- In this study the authors present a mixed integer linear programming model to solve the problem of cost minimization of sugarcane removal and its transport from the fields to the sugar mill at operational level. The complexity of the problem is basically determined by the system approach which results in the generation of a great number of variables and constraints that refer to the following operational dimensions: (a) need for continuous supply to the sugar mill; (b) cutting means used in cane harvesting; (c) transportation vehicles and (d) providing routes, which are characterized by the existence of storage facilities at the beginning of the rail roads; and that the results demonstrate that the model is not useful only to minimize transportation cost, but also for scheduling daily cane road transport and harvesting quotas of cutting means. (https:''doi,org/10.1016/j.ejor. 2005.01.028).

- Shodhaganga Transportation of Sugarcane

- Sugarcane is the main economic crop to the farmers and the society. After harvesting the sugarcane, it shall be transported to the factory nearer to the fields…… However, both small and marginal farmers face a common problem of transportation as the delivery of sugarcane per transaction requires a bullock carrier. Apart bullock carrier; a small/marginal farmer has to rent a truck; since normally he does not passes truck and has only a traditional multipurpose vehicle.

- If the sugar mills could manage the flow of trucks and unloading operations more efficiently during peak hours, the cost of sugar production would be certainly lowered down. This is so since at the beginning and end of the season, the sugar mills face an inadequate supply of raw materials, i.e., sugarcane, whereas during the peak season, supply is much more and even higher than crushing capacity of the mills and at such times, unending queues of trucks/tractor-trollies and also bullock carts are seen.
- The following factors which influence thedamage to the sugarcane during Transportation, irrespective of mode (Truck/Tractor Trollies/ Bullock Carts) are to be taken care of, to avoid sugarcane losses: (i) Over Loading in the Vehicle (ii) Speed of the vehicle (iii) Condition of the road for the transportation.
- Statistics shows that number of bullock carts has not reduced during last 30 years; belying the popular concept that bullock carts will disappear with development of society. Now-a-days apart bullock carts; due to technological revolutions, different types of transportation modes like tractor-trolley, lorries and heavy load carrying trucks are being used more commonly for transportation of Sugarcane, as these are more faster as well as heavy load carriers.

➢ Rogerio de Avila, Riberro Junqueira, Reinalde Marabita (2017): Opinization approaches for Sugarcane harvest front programming and scheduling:

- The production of sugar, ethanol and electricity from sugarcane necessarily involves harvesting and transportation of raw materials, which are expensive and complex operations that affect industrial efficiency. This study proposes optimization approaches to support programming and scheduling harvest front decisions, based on considering the representation of the lot sizing and scheduling problem on parallel machines with sequence-dependent set up time and costs, a modeling technique widely reported in the literature. The researchers (authors) carried out realdata experiments in order to verify the adequacy and consistency of this representation. The results show that the proposed approaches adequately represent the conceptual model studied and have great potential to reduce cost in real-life situations.

➢ Raj Udai, Dubey P.P and Kumar Ashok (1996): "Key Determinants of Area under Sugarcane: A case study of Faizabad District (U.P)":

- The paper, in its attempt to identify key determinants of area under SUGARCANE in Faizabad district of Uttar Pradesh, a state which ranks FIRST among all cane producing states of the country in respect of area and production of sugarcane; to suggest policy measures to enhance sugarcane hectareage and aggregate production thereof; on the basis of sample survey, conducted during the agricultural year 1990-91 by personal interview of 90 farmers (cane growers) using a multi stage stratified random sampling; reported that (i) increase in price of cane and irrigated area, are necessary but their impact as a determinant factor towards hectareage allocation under sugarcane has not been very high (ii) larger is the size of farm, greater is the area under sugarcane but not the proportion (iii) farmers living nearer to sugar mill allocate greater proportion of their cultivable land to the sugarcane crop.

Summarizing the above reviews, the following points emerge as "sumup" in relation to present study.

(i) "Transportation and Harvesting operations" of sugarcane form the most important component of sugarcane cultivation and need innovative methods as compared to traditional methods.

(ii) Special consideration is needed towards these two aspects.

(iii) Sugar Mills have to evolve still better techniques and management; and to POSSIBLE extent provide services towards Harvesting of Sugarcane and its transportation, right from cane growers fields to Mill Gate on REPAYMENT basis by farmers.

(iv) Farmers nearer to Sugar Mill area allocate more area to sugarcane crop and as such more PURCHASE CENTRES be established to ease cane growers problems and increase sugarcane hectareage.

2.2. Methodology[1] and Data Base

As per, the present CACP records, the sugarcane is covered in ten states – Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh and Uttarakhand.

[1]The present study is conducted under the guideline, study plan and the detailed Methodology, provided to us by the Coordinator Centre of the study, viz. Agricultural Economics Research Centre (AERC) Delhi University, Delhi-110 007

As in the case of Maharashtra, Karnataka and Gujarat, Sugar Mills arrange for HT (Harvesting and Transport) operations and deduct the amount from the payment to be made to farmers; these three states have been excluded and the newly formed state of Telangana has been added to be covered. Hence, the present study is being conducted in the following eight states – Andhra Pradesh, Bihar, Haryana, Punjab, Tamil Nadu, Telangana, Uttar Pradesh and Uttarakhand. These states are covered by the respective Agro-Economic Research Centre/Unit (AERC/AERU) and that the "Sampling Frame" is drawn from the "List of Selected states and crops" of the state-wise crop complex selection, published by the CACP.

The use of CACP Sampling Frame in the present study makes it possible (i) to generate estimates of harvesting and transportation costs, comparable with other costs published by CACP and that (ii) the scientifically designed CACP Cost Estimation Methodology was directly adopted for study.

The time period of the present study is the sugar season 2018-19.

2.3. Sampling Method

As per sampling method of the present study, in each state, two districts are selected using CACP sampling frame; adopting the following criteria for selecting the districts:

(i) The districts should have large proportion of area under sugarcane to the total area under sugarcane in the state.

(ii) Within the sugarcane growing districts, distinct geographic regions of the state to the extent possible.

(iii) In each district two sugarcane growing villages are selected, making a total of four villages per state.

(iv) From each selected village, a total of 50 farmers were selected for primary survey, giving representation to each size-group, i.e., marginal (<1ha), small (1-2ha),

medium (2-4ha) and large (>4ha) farmers, using stratified random sampling and PPS (Probability Proportional to Size) methodology.

(v) The aggregate sample size of study in the state of Uttar Pradesh, thus works out to be of 200 farmers.

The details of selection of districts, villages within the district and the farmers, the ultimate units of sampling within villages, for the present study, corresponding to state of Uttar Pradesh, are described in the following paragraphs:

2.3(i) Selection of Districts

As per set criteria, the two districts selected for study in the State (Uttar Pradesh) are shown in Table-II-1

Table-II-1

Selection of Districts

Sl. No.	Name of Selected District	Division	Geographical Region	Area under Sugarcane in ha. (2018-19)	Proportion of District Sugarcane Area to State Sugarcane Area
1.	Lakhimpur Khiri	Lucknow	Central	239675	10.78%
2.	Bijnor	Moradabad	Middle Western	204482	9.20%
Total	-	-	-	2223805	-

The selected districts are Lakhimpur Khiri and Bijnor; with respective proportion of district sugarcane area to state sugarcane areaas 10.78 percent and 9.20 percent area respectively

2.3(ii) Selection of villages and farmers

The Table-II-2 illustrates the details of selected villages and the sugarcane farmers, along with the coverage of Sugar Mill

Table-II-2
Details of Selected Districts, Villages and Category (Farm Class) wise Sugarcane farmers

State	District	Name of Sub-district (S.D.)/Tehsil (T.)	Name of Villages (V.)/village cluster (V.C.)	Farm Class	Total number of Sugarcane farmers	Number of Sample Farmers	Name of the sugar mills covered (Tehsil/S.D. level)
Uttar Pradesh	Lakhimpur Khiri	Gola Gokaran Nath	Muda Pasi	Marginal	94	34	Balrampur chini mills ltd. Unit-Kumbhi,Gola Gokarannath, Lakhimpur khiri
				Small	28	10	
				Medium	12	4	
				Large	4	2	
				Total	138	50	
		Mohamadi	Bagrethi	Marginal	133	21	DCM shriram ltd Sugar & Distellery unit, Azabpur, Lakhimpur khiri
				Small	47	19	
				Medium	31	8	
				Large	9	2	
				Total	220	50	
	Bijnor	Najiababad	Lukadadi	Marginal	238	37	Kisan Sahakari Chini mills ltd. Nazibabad bijnor
				Small	57	7	
				Medium	20	5	
				Large	5	1	
				Total	320	50	
			Mandavali	Marginal	149	29	Kisan Sahakari Chini mills ltd. Nazibabad bijnor
				Small	58	15	
				Medium	14	5	
				Large	1	1	
				Total	222	50	

[Marginal <1ha; Small (1-2ha); Medium (2-4ha), Large>4ha]

The Table-II-2 shows that (i) As per CACP frame the selected villages are respectively Muda Pasi and Bagrethi in district Lakhimpur Khiri and Lukadadi and Mandavali in Bijnor district, (ii) 50 sugarcane growing farmers have been selected in each of the four selected villages, forming a cluster of 2 villages in each district, (iii) Category wise distribution of total farmers selected in each village (50 in number) has been as 34,10,4,2 in village Muda Pasi; 21,19,8,2 in village Bagrethi; 37,7,5,1 in village Lukadadi and 29,15,5,1 in village Mandavali respectively; corresponding to marginal, small, medium and large category, (iv) In district Lakhimpur Khiri, village Muda Pasi is covered by Balrampur Chini Mill Ltd., Kumbhi, Gola Gokhran Nath while village Bagrathi by DCM Shriram ltd. Sugar & Distillery unit, Azabpur (v) In district Bijnor both the selected villages, i.e., Lukadadi and Mandavali are covered by the same Sugar Mill, viz. Kisan Sahakari Chini Mill Ltd. Nazibabad.

2.4. Data and Data Base

The data incorporated in the present study consisted of both, i.e., the primary data as well as the secondary data.

While primary data was collected by personal interviews (i) of the selected respondents (cane growers belonging to different category of holding (viz. marginal, small, medium and large) by AERC, Prayagraj Research Team by visiting the farmers in the respective villages, through prescribed schedules and questionnaires (ii) those of from Sugar Mills were also collected by personal interview with the concern factory officials and that (iii) Both of these primary data, i.e., those selected from respondents and from factory authorities corresponded to the sugar season 2018-19.

The secondary data in respect of Sugar Transportation and Harvesting costs, as also various statistics of Regional profile and the Uttar Pradesh state, have been collected from various publications of the state government at different levels, i.e., Headquarters, Districts, Tahsils; like Directorate of Agriculture Statistics, Directorate of Economics & Statistics, Cane Commissioner Uttar Pradesh; Districts Sugarcane Officers and like that andthose of Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Govt. of India from time to time and as per need of the survey; and all duly mentioned and acknowledged thereof accordingly.

2.5. Trend Analysis

The trend analysis has always been a useful tool in future planning in respect of any characteristic(s). As such, the following paragraphs, (i) firstly present the trend analysis in brief, of the three basic crop parameters of sugarcane, i.e., Area, Production and Yield for Uttar Pradesh as a whole and then for the selected districts viz. Lakhimpur Khiri and Bijnor, i.e., the region of study and (ii) secondly the current status of sugarcane in respect of above mentioned parameters for the state and the selected districts.

But, before presenting trend analysis it is most appropriate and worth mentioning at this stage to take account of following points in respect of the whole country (India) as well as the state of Uttar Pradesh.

(1) As per statistics released by Directorate of Economics and Statistics (4th Advance Estimates for the year **2017-18**), Ministry of Agriculture and Farmers Welfare, Govt. of India; INDIA has achieved a marked record with 4.73 Million hectares Area, 376.90 million tonnes production and 796.50 ql/ha yield in the year 2017-18 against those of 1.71 million hectares area, 57.05 million tonnes production and 334.22 ql/ha yield in 1950-51 for crop sugarcane.

(2) Global wise as well, India is the second largest producer of sugarcane in the world and comes only next to Brazil. As per crop statistics for the year **2016**, issued by the Directorate of Economics and Statistics, Ministry of Agri. & F.W., G.O.I; India with sugarcane area, production and yield as 4.95 million hectares, 348 million tonnesand 703.94 ql/ha respectively, contributes to the extent of 18.72 percent of total sugarcane production in world; against Brazil's corresponding sugarcane production contribution to that of world as 41.29 percent.

(3) Coming over to state level, as per year **2017-18** statistics (4th Advance Estimate) by DES, Ministry of Agriculture and Farmers Welfare, GOI; Uttar Pradesh with sugarcane hectareage of 2.23 million hectares and production of 177.06 million tonnes;is the largest producer of sugarcane in the country; through it lags behind the state of Maharashtra in respect of yield, the state with highest sugarcane productivity in the country. Uttar Pradesh's contribution to total sugarcane production in India is 46.98 percent against that of Maharashtra's 22.00 percent; while its yield is 792.55 ql/ha against that of 921.66 ql/ha of Maharashtra.

2.5(i). Trend Analysis of Sugarcane Key Parameters in Uttar Pradesh and selected Districts:

Uttar Pradesh

The Table-II-3, below presents the details of Area, Production and Yield of Sugarcane in Uttar Pradesh during the period 1990-91 to **2016-17**, along with the Indices worked out with Triennium (Average) ending 1992-93 as the respective Base Value.

Table-II-3
Area, Production and Yield of Sugarcane in Uttar Pradesh (1990-91 to 2015-16)

Sl. No.	Year	Area ('000'ha)	Indices T.E. 1992-93 as base	Production ('000' tonnes)	Indices T.E. 1992-93 as base	Yield (tonnes/ha)	Indices T.E. 1992-93 as base
1.	1990-91	1856	98.62	103562	97.83	55.8	99.29
2.	1991-92	1933	102.71	111098	104.95	57.5	102.31
3.	1992-93	1857	98.67	102929	97.23	55.4	98.58
4.	1993-94	1761	93.57	104082	98.32	59.1	105.16
5.	1994-95	1839	97.72	110239	104.13	59.9	106.58
6.	1995-96	1974	104.89	119830	113.19	60.7	108.01
7.	1996-97	2110	112.11	125349	118.41	59.4	105.69
8.	1997-98	1985	105.47	129267	122.11	65.1	115.84
9.	1998-99	1975	104.94	116483	110.03	59	104.98
10.	1999-2000	2011	106.85	115419	109.03	57.4	102.14
11.	2000-01	1938	102.98	106068	100.19	54.7	97.33
12.	2001-02	2035	108.13	117982	111.45	58	103.20
13.	2002-03	1852	98.41	116324	109.88	62.8	111.74
14.	2003-04	2030	107.86	112754	106.51	55.5	98.75
15.	2004-05	1955	103.88	118715	112.14	60.7	108.01
16.	2005-06	2156	114.56	125470	118.52	58.2	103.56
17.	2006-07	2247	119.39	133949	126.53	59.6	106.05
18.	2007-08	2179	115.78	124665	117.76	57.2	101.78
19.	2008-09	2084	110.73	109048	103.01	52.3	93.06
20.	2009-10	1977	105.05	117140	110.65	59.3	105.52
21.	2010-11	2125	112.91	120545	113.87	56.7	100.89
22.	2011-12	2162	114.88	128819	121.68	59.6	106.05
23.	2012-13	2212	117.53	132427	125.09	59.9	106.58
24.	2013-14	2228	118.38	134689	127.23	60.6	107.83
25.	2014-15	2161	114.82	133061	125.69	62.1	110.50
26.	2015-16	2169	115.25	145385	137.33	67.0	119.22
27.	2016-17	2034	109.14	148657	140.42	72.4	128.77

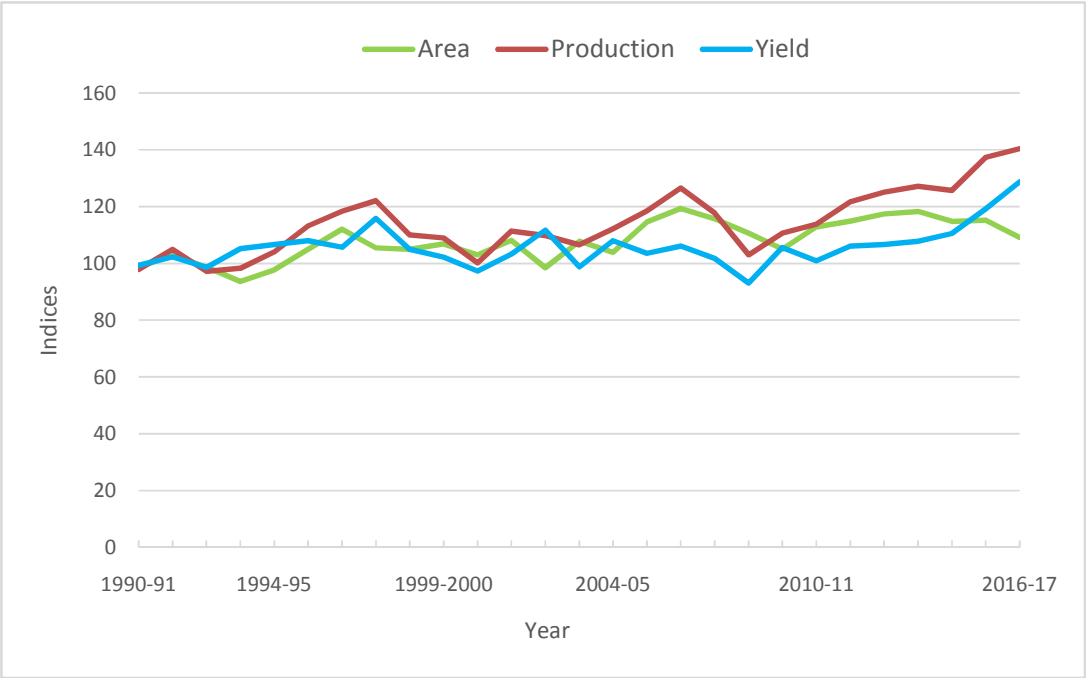
Note: Triennium Average Value Ending 1992-93 as base:

*Area: 1882; *Production:105863; *Yield:56.2
'000'ha '000' tonnes tonnes/ht

Source: Cooperative Sugar, Vol 44 (II) July 2017 and Office of the Sugarcane Commissioner, Uttar Pradesh

Fig- II.1:

Indices of Area, Production and Yield of Sugarcane in Uttar Pradesh (1990-91 to 2016-17)



The Table-II-3, shows that

(i) There has not been much variation in the Indices of all the three crop parameters, i.e., area, production and yield of sugarcane, during the entire period of 1990-91 to 2016-17.

(ii) With TE 1992-93 as base value; the respective 'Indices' of Area, Production and Yield in the year 2016-17 being respectively 109.14, 140.42 and 128.77 as compared to those of 98.62, 97.83 and 99.29 in the year 1990-91.

(iii) The lowest index of (a) area being 93.57 (1993-94) and highest 119-39 (2006-07), (b) production being lowest 97.23 (1992-93) and highest 140.42 (2016-17), (c) yield lowest being 93.06 (2008-09) and highest 128.77 (2016-17) respectively.

(iv) It is also observed that apart from area, it is the yield which is enhancing aggregate sugarcane production; since rise in yield index is also followed by increase in production index and vice-versa.

Selected Districts:

The Table-II-4 below gives details of area, production and yield of sugarcane for selected districts, i.e., Lakhimpur Khiri and Bijnor along with respective indices with TE 2014-15 average as Base Value; during the period 2011-12 to 2016-17.

Table-II-4

Sugarcane area, production and yield in Districts Lakhimpur Khiri and Bijnor (During last five years)

Year	Area (in ha)		Production (in M.T.)		Yield (Ql/ha)	
	Lakhimpur Khiri	Bijnor	Lakhimpur Khiri	Bijnor	Lakhimpur Khiri	Bijnor
2011-12	233988 (95.46)	210954 (101.10)	14488537 (95.89)	12169514 (99.35)	619.20 (100.49)	576.88 (98.28)
2012-13	239781 (97.83)	201967 (96.79)	14453040 (95.66)	11809414 (96.41)	602.76 (97.82)	584.72 (99.62)
2013-14	261521 (106.70)	213053 (102.11)	16386906 (108.45)	12768692 (104.24)	626.60 (101.69)	599.32 (102.10)
2014-15	270157 (110.22)	202070 (96.843)	17857378 (118.19)	13284890 (108.46)	661.00 (107.27)	657.44 (112.01)
2015-16	277299 (113.14)	203202 (97.39)	18418200 (121.99)	13951037 (113.89)	664.20 (107.79)	686.56 (116.97)
2016-17	245844 (100.30)	205353 (98.42)	17697818 (117.13)	16100497 (131.44)	719.88 (116.83)	784.04 (133.57)

Note: Figures in parenthesis show respective indices with TE 2013-14 average, as base:
Source: Statistical Abstracts (2012-2017)

Base Value	Lakhimpur Khiri	Bijnor
TE average Area: in ha	245096.67	208658
TE average Production: in M.T.	15109494.33	12249206.67
TE average Yield: in Ql/ha.	616.19	586.97

Fig- II.2:
Indices of Area, Production and Yield of sugarcane in district Lakhimpur (2010-11 to 2015-2016)

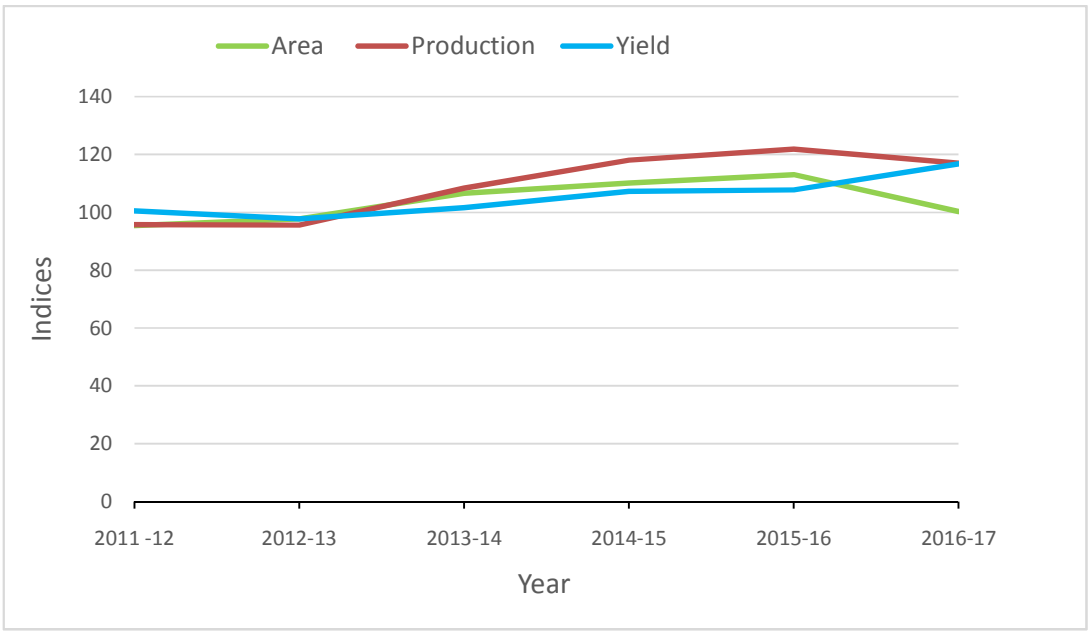
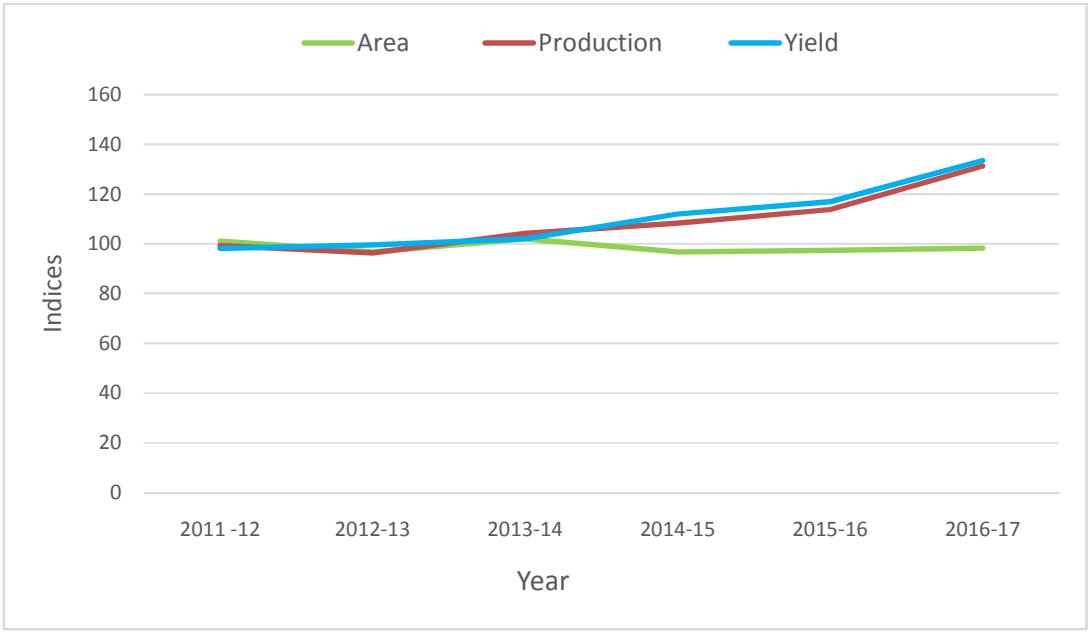


Fig-II.3:
Indices of Area, Production and Yield of sugarcane in district Bijnor (2010-11 to 2015-16)



The observations of the Table-II-4 shows that

- While sugarcane area in Lakhimpur Khiri has an increasing trend upto 2015-16, that of Bijnor district remained almost stagnant, during the period 2011-12 to 2016-17. Production also followed the same trend, i.e., when sugarcane area expanded then sugarcane production also rose; while even with area stagnate the yield factor made the production to rise, i.e., inspite of area remaining stagnate, the rise in yield contributed positively to increase the overall production. In general; on overall basis sugarcane production in both the districts recorded an increasing trend, though slightly.
- Yield, in both the districts is showing slightly rising trend, during the entire period of 2011-12 to 2016-17.
- It is also observed that apart area, yield is the main contributing factor in increasing total production; as at some point of time in spite of slight decrease in area, the rise in yield factor enhanced the aggregate production.
- In district Lakhimpur Khiri, the rising indices of yield enhanced the production indicates to rise more fastly as compared to area; while in district Bijnor also same observation is recorded, i.e., yield factor contributing to increase production more rapidly in spite of area remaining the same or rising very slightly.

2.5(ii) Current Status of Sugarcane in Selected Districts and Uttar Pradesh

The details of Area, Production and Yield of Sugarcane in selected districts of the study viz. Lakhimpur Khiri and Bijnor and the Uttar Pradesh state are given in the Table-II-5.

Table-II-5
Area, Production and Yield of Sugarcane in selected Districts of study and Uttar Pradesh (2018-19)

Sl. No.	District	Sugarcane		
		Area (in ha)	Production (in M.T.)	Yield (in Ql./ha)
1.	Lakhimpur Khiri	239675 (10.78)	20693540 (11.51)	863.40
2.	Bijnor	204482 (9.20)	17575637 (9.78)	859.52
Total	Uttar Pradesh	2223805	179698158	808.07

Source: Uttar Pradesh Ke Krishi Akde
(Figures in parenthesis show percentages to total Uttar Pradesh value)

The Table-II-5, shows that (i) the selected districts, i.e., Lakhimpur Khiri and Bijnor cover 10.78 percent and 9.20 percent of total sugarcane area in the state; accounting for 11.51 percent and 9.78 percent of total sugarcane production in the state (ii) In respect of sugarcane crop productivity, both the districts Bijnorand Lakhimpur Khiri are ahead of state average yield, (iii) the average per hectare yield of sugarcane has been recorded as 863.40 ql./ha. in Lakhimpur Khiri and 859.52 ql./ha in Bijnor against the state average yield of 808.07 ql./ha. (iv) it may also be mentioned that these two districts are ahead of all the remaining districts of the state in respect of total sugarcane crop hectarage as well as the total sugarcane production.

Chapter-III

Sugarcane Transporting and Harvesting Cost (Secondary Data Analysis)

The present chapter is mainly designed as a secondary data based approach; towards procuring desired information with regard to Sugar Mills and their main characteristic features like crushing capacity (TCD-Tonne Capacity Day), utilization extent, transportation cost etc., in the state of Uttar Pradesh, to all possible extent, subject to data availability constraints. To have clarity it may be well stated at this point itself that in the state of Uttar Pradesh, Sugarcane Harvesting operation and costs are to totally borne by the cane growers themselves and that Sugar Mills are not party to it at all; where as in some states of India like Maharashtra, Karnataka and Gujarat, Sugar Mills arrange for Harvesting operations and thereafter deduct the amount from the payments to be made to the cane growing farmers.

A brief description regarding sugar mills and their main features along with transportation cost(s) in the state of Uttar Pradesh is highlighted in the coming paragraphs.

3.1. Sector wise Sugar Mills in Uttar Pradesh

The details of sector wise sugar mills in the state of Uttar Pradesh are shown in Table-III-1

Table-III-1

Sector wise Sugar Mills in Uttar Pradesh Year (2019-20)

Sl. No.	Name of sector	Number of Sugar Mills	Percentage (%)
1.	Private	92	77.31
2.	Cooperative	24	20.17
3.	Corporate (Nigam)	03	02.52
Total	--	119	100.00

Note: For the entire list of 119 Sugar Mills in U.P., see Appendix-IV

The Table-III-1 depicts that out of total 119 sugar mills in the state of Uttar Pradesh as recorded in the year 2019-20; majority (77.31%) belong to private sector, followed by Cooperative sector mills (20.17%) and the Corporate (i.e., Nigam) Mills (2.52%) respectively.

It is also to be mentioned here that, out of three Sugar Mills operating in the area of present study, (where, the sample respondents, i.e., selected cane growers are supplying their sugarcane) two mills viz. DCM Shriram Ltd. Sugar and Distillery Unit Ajabpur and Balrampur Chini Mills Ltd. Kumbhi in district Lakhimpur Khiri belong to Private Sector while Kisan Sahkari Chini Mills Ltd. Sneh Road in district Bijnor, being a Cooperative Sector Mill.

3.2. Sugar Mills details in Uttar Pradesh during last five years.

The Table-III-2 below displays details regarding number of Sugar Mills in operation, Quantum of Sugarcane crushed along with sugar production and sugar recovery percentage in Uttar Pradesh during last five years i.e. 2014-15 to 2018-19.

Table-III-2
Data in respect of Mills in Operation, Sugarcane Crushing, Sugar Production and Sugar Recovery, during last five years in Uttar Pradesh

Item	Year				
	2014-15	2015-16	2016-17	2017-18	2018-19
Mills in Operation	118	117	116	119	119
Sugarcane Crushing (lakh Tonnes)	744.54	645.66	827.16	1111.90	1031.67
Sugar Production (lakh Tonnes)	71.01	68.55	87.73	120.50	118.22
Sugar Recovery (%)	9.54	10.62	10.61	10.84	11.46

Source: Office of Sugarcane Commissioner, Uttar Pradesh, Lucknow

The data of the Table-III-2 shows that

- The total numbers of Sugar Mills in the state of Uttar Pradesh are recorded as 119 in the year 2018-19, as compared to that of 118 in the year 2014-15.
- The crushing of sugarcane in the state of Uttar Pradesh on overall basis has recorded a continuous rising trend during the entire 5 year period from 2014-15 to 2018-19 except a few decline at some point. The amount of sugarcane crushed in the Uttar Pradesh state has been 1031.67 lakh tonnes in the year 2018-19 as compared to that of 744.54 lakh tonnes in the year 2014-15.
- The sugar production by these mills in the state of Uttar Pradesh, has also recorded an increasing trend, except for slight fall in the year 2015-16 as compared to that in the year 2014-15 and 2018-19 as compared to 2017-18. The total sugar production in the

state (U.P.) is recorded as 118.22 lakh tonnes in the year 2018-19 as compared to that of only 71.01 lakh tonnes in the year 2014-15.

- As a sign of prosperity for the Sugar Industry in particular and the whole of Uttar Pradesh state in general, the sugar recovery percentage is on continuous rise; with corresponding sugar recovery rate as 11.46 percent during the year 2018-19 as against that of only 9.54 percent in the year 2014-15. With this pace of rise; it is expected that the sugar recovery rate in the state of Uttar Pradesh as well; will touch the record high of 13 to 15 percent very shortly, in the coming years.

3.3. Sugar Transportation Cost

The details of Sugarcane Transporting Cost (Rs./Quintal) as provided by the 23 Sugar Mill Federation are given in the Table-III-3.

Table-III-3
Sugar Federation Transportation Cost: Sugar Season 2018-19

Sl. No.	Name of Mill	Cost of Transportation (Rupees per quintal)
1.	Kayamganj	17.18
2.	Ghosi	31.76
3.	Nanauta	10.06
4.	Ramala	14.12
5.	Semikheda	22.32
6.	Satha	34.77
7.	Sathiyun	27.63
8.	Sultanpur	22.21
9.	Mahmudabad	27.72
10.	Puwaya	18.60
11.	Puranpur	13.53
12.	Naanpara	21.93
13.	Anupsener	19.54
14.	Tilhar	20.32
15.	Badayun	13.90
16.	Gajrola	13.68
17.	Baghpat	14.09
18.	Sampurna Nagar	16.11
19.	Belroya	20.38
20.	Sarsawa	16.38
21.	Bisalpur	10.09
22.	Saneh Road	16.81
23.	Bilaspur	N.A.

Source: M.D. Sugar factory Federation, Lucknow
Note: N.A. = Not Available

As per data of Table-III-3 provided by M.D. Sugar Factory Federation, Lucknow; for the sugarcane season 2018-19; (i) The transportation cost of sugarcane as incurred by Federation Mill has been varying from Rs. 10.06 per quintal to Rs. 34.77 per quintal of cane, (ii) The sugar mill incurring the lowest transportation cost has been Nanauta (Rs. 10.06/quintal) while that involved with highest transportation cost has been Satha (Rs. 34.77/quintal).

3.4. Transportation Cost and other main Features of Sugar Mills under study

The following paragraphs through the Table-III-4, describe the main features of the three sugar mills under study.

Table-III-4
Main Features of Selected Sugar Mills
Sugar Season (2018-19)

Items	Sugar Mills		
	Kisan Sahkari Mills Sneh Road	Balrampur Chini Mills Kumbhi	DCM Shriram Ltd. Ajabpur
Installed Capacity	3000 TCD	8000 TCD	10500 TCD
Capacity Utilization	89.53%	100.00%	85.72%
Total cane Crushed (Tonnes)	475393.86	1357600.00	1770891.40
Total Sugar Production (Tonnes)	59510.00	169935.10	217690.00
Sugar Recovery (%)	12.52	12.52	12.29
Average Transportation cost incurred by mills for transporting from purchase cane to factory (Rs./quintal)	16.81	16.54	20.48

Note: for details see Appendix-I, II and III

The data of the Table-III-4 in respect of three Sugar Mills in the study area; shows that

- The installed capacity of the sugar mill has been between 3000 TCD (Tonne Capacity Day) to 10500 TCD.
- The extent of utilization of the installed capacity has been of the order of 85.72% to 100%.
- The maximum sugarcane crushed and also sugar production has been in case of DCM Shriram Mill Ajabpur and minimum in Kisan Sahkari Mill Sneh Road.
- The sugar recovery percentage in each of the three selected sugar mill has been above 12%.; which has been higher than state average of 11.46%.
- The cost of transporting sugarcane from purchase centre to factory gate has been ranging from Rs. 16.54 per quintal to Rs. 20.48 per quintal.

Chapter-IV

Demographic Profile of the State, Districts and the Sample Households

This chapter presents the demographic profile of the state under study, i.e., Uttar Pradesh; districts selected therein viz. Lakhimpur Khiri and Bijnor and the sample households (200 in number) in the study area, corresponding to sugarcane season 2018-19. While the state and districts profile are secondary data based, those of the sample households, i.e., cane growers of the study area, refer to primary data. These are presented through following tables and descriptions thereof.

4.1. Uttar Pradesh

Uttar Pradesh, with a total area of 243,290 square kilometres, is India's fourth-largest state in terms of land area and is roughly of same size as United Kingdom. It is situated on the northern spout of India and shares an international boundary with Nepal.

The Himalayas border the state on the north, but the plains that cover most of the state are distinctly different from those high mountains. The larger Gangetic Plain region is in the north; it includes the Ganges-Yamuna Doab, the Ghaghra plains, the Ganges plains and the Terai.

The smaller Vindhya Range and plateau region is in the south. It is characterised by hard rock strata and a varied topography of hills, plains, valleys and plateaus. The Bhabhar tract gives place to the terai area which is covered with tall elephant grass and thick forests interspersed with marshes and swamps.

The other two regions, the central and the western are comparatively better with a well-developed irrigation system.

The state has more than 32 large and small rivers; of them, the Ganga, Yamuna, Saraswati (Invisible), Sarayu, Betwa, and Ghaghara are larger and of religious importance in Hinduism.

Cultivation was intensive. The valley areas have fertile and rich soil. The transitional belt running along the entire length of the state is called the terai and bhabhar area. It has rich forests, cutting across it are innumerable streams which swell into raging torrents during the monsoon.

Uttar Pradesh is the most populous state in India, with 199,581,477 people on 1 March 2011. The state contributes 16.16% of India's population. The population density is 828 people per square kilometre, making it one of the most densely populated states in the country. While its sex ratio (2011 Census) has been 912 women to 1000 men.

4.2. Districts under Study

The demographics of districts under study, i.e., Lakhimpur Khiri and Bijnor are described as under:

(i) Lakhimpur Khiri

1. Lakhimpur Kheri district is the largest district in Uttar Pradesh, India, on the border with Nepal. Its administrative capital is the city of Lakhimpur.
2. Lakhimpur Kheri district is a part of Lucknow division, with a total area of 7,680 square kilometres. The national government designated Lakhimpur Kheri as a Minority Concentrated District on the basis of 2001 census data, which identifies it as requiring urgent aid to improve living standards and amenities.
3. Dudhwa National Park, is in Lakhimpur Kheri and is the only national park in Uttar Pradesh. It is home to many rare and endangered species including tigers, leopards, swamp deer, hispid hares and Bengal florican
4. The district is within the Terai lowlands at the base of the Himalayas, with several rivers and lush green vegetation. Situated between 27.6° and 28.6° north latitude and 80.34° and 81.30° east longitudes, and about 7,680 square kilometres in area
5. The district is located at about the height of 147 meters above sea level.

6. According to the 2011 census Lakhimpur Kheri District has a population of 4,021,243.This gives it a ranking of 56th in India (out of a total of 640).
7. The district has a population density of 523 inhabitants per square kilometer.
8. It has a sex ratio of 894 females for every 1000 males, and a literacy rate of 60.56%.

(ii) Bijnor

1. Bijnor district is one of the districts of Uttar Pradeshstate of India. Bijnor city is the district headquarters. The Uttar Pradesh Government wants Bijnor to be included under National Capital Region (NCR) due to its close distance from Delhi.
2. Bijnor, or more correctly Bijnaur, occupies the north-west corner of the Moradabad Division (historically, Rohilkhand or Bareilly region) and is a roughly triangular stretch of country with its apex to the north. The western boundary is formed throughout by the deep stream of the river Ganges, beyond which lie the four districts of Dehradun, Saharanpur, Muzaffarnagar and Meerut.
3. The boundary being conventional and undetermined by natural features. The extreme parallels of north latitude are 29° 2' and 29° 58' and of east longitude 78° 0' and 78° 57' from Lalitpur.
4. According to the 2011 census Bijnor district has a population of 3,682,713. This gives it a ranking of 74th in India (out of a total of 640).
5. The district has a population density of 808 inhabitants per square kilometer. While it has a sex ratio of 913 females for every 1000 males, and a literacy rate of 70.43%.

4.3. Sample Households

The coming paragraphs deal with demographic profile and other key features of the sample households (sugarcane growers) corresponding to sugarcane season 2018-19, all based on primary data.

4.3(i). Sample Farmers

The Table-VI-1, below shows village wise total and selected farmers under study.

Table-IV-1
Details of farmers (sample households) selection

Coverage of study (based on 2018-19 sugarcane season)					
State	District	Name of Blocks in which village located	Name of villages/ village cluster	Total number of sugarcane farmers	Number of sample farmers
Uttar Pradesh	Lakhimpur Khiri	Gola Gokaran Nath	Muda Pasi	138	50
		Mohamadi	Bagrethi	220	50
	Bijnor	Najiabadad	Lukadadi	320	50
		Najiabadad	Mandavali	222	50
1	2	3	4	900	200

The table shows that (i) In district Lakhimpur Khiri the selected cluster of villages comprised of village Muda Pasi and Bagrethi, while those of district Bijnor being Lukadadi and Mandavali (ii) The number of selected farmers in each of the four villages has been 50; while the total farmers (cane grower) were respectively 138, 220, 320 and 222; as per CACP frame; resulting to overall sample of 200 farmers from total 900 farmers in the study area of the state (Uttar Pradesh).

4.3(ii) Category-wise Details

Table-IV-2 presents category-wise details of the sample respondents.

Table-IV-2
Category-wise details

Number of sample households in various land-holding categories (net operated area/owned area based)		
Size of the Landholding	**Sample Households**	**% to Total**
Marginal	121	60.5
Small	52	26
Medium	20	10
Large	7	3.5
Total	200	100

Table shows that out of the total 200 sample households, majority of them (60.50%) belong to marginal farmers; followed by small farmers (26%), medium farmers (10%) and Large farmers (3.5%), respectively.

4.3(iii) Sex-wise Composition

The Table-IV-3 below presents sex wise details of sample households.

Table-IV-3
Sex-wise Demographic Profile of the Sample Households

Sex-wise Demographic Profile of the Sample Households						
Farmer Class	**Total Population**	**Percentage Distribution (%)**				
		Adults			**Children Total**	**Overall**
		Male	**Female**	**Total**		
Marginal	121	53.56	46.44	100.00	0	100
Small	52	51.97	48.03	100.00	0	100
Medium	20	61.39	38.61	100.00	0	100
Large	7	51.28	48.72	100.00	0	100
Total	200	53.92	46.08	100.00	0	100

On overall basis, among total 200 sample households 53.92 percent are males and 46.08 percent female, showing higher proportion of males as compared to females. Category-wise as well, male female percentages being in the same vicinity as of overall respondent basis; while no respondent belonging to child category, either category-wise or on overall basis.

4.3(iv) Education-wise Details

The education wise details of different category's respondents are shown in Table-IV-4

Table-IV-4
Education level of the Head of the sample households

Education level of the Head of the sample households									
Farmer Class	Total no. of Households	Percentage Distribution (%)							
		Illiterate	Primary	Junior	High School	Intermediate	Graduate	Post Graduate	Overall
Marginal	121	6.61	55.37	28.93	2.48	3.48	3.30	0.83	100
Small	52	7.69	23.08	13.46	17.31	21.15	11.54	5.77	100
Medium	20	10.00	15.00	25.00	15.00	20.00	5.00	10.00	100
Large	7	0.00	28.57	0.00	14.29	28.57	28.57	0.00	100
Total	200	7.00	42.00	23.50	8.00	10.00	6.50	3.00	100

The Table-IV-4 depicts that (i) On overall basis majority of respondents (42.00%) have education upto primary level, followed by Junior High School (23.50%), Intermediate level education (10.00%), High School standard (8.00%), Graduates and Post Graduate levels education (9.50%); while 7.00% of the total respondents being illiterates (ii) Highest illiteracy is reported in Medium category farmers and lowest (i.e., 0.00%) in large category

respondents (iii) Among marginal farmers higher proportion of respondents have education upto Junior School level, while small, medium and large category respondents have education level High School and above.

4.3(v) Caste Profile

Caste profile details of sample households are given in Table-IV-5 below

Table-IV-5
Caste profile of the sample households

Caste profile of the sample households					
Farmer class	**Total No. of Households**	**Percentage Distribution (%)**			
		General	**OBC**	**SC & ST**	**Overall**
Marginal	121	43.80	51.24	4.96	100
Small	52	63.46	28.85	7.69	100
Medium	20	60.00	40.00	0.00	100
Large	7	71.43	28.57	0.00	100
Total	200	51.50	43.50	5.00	100

As evident from to Table-IV-5 (i) The highest proportion of respondents belong to General category, followed by OBC and SC&ST; in each category of respondents as well as on overall basis (ii) on the whole, 51.50% of total respondents belong to General category, followed by OBC (43.50%) and SC&ST (5.00%) respectively

4.3(vi) Distance wise Details

The distribution of sample respondents as per distance of village centre from their respective farms is given in Table-IV-6

Table-IV-6
Average Distance of farm from village centre (km.)

Average Distance of farm from village centre (km.)						
Size of Landholding	**Bijnor**			**Lakhimpur Khiri**		
	0 – 2 km	**2 km – 4 km**	**4 km above**	**0 – 2 km**	**2 km – 4 km**	**4 km above**
Marginal	66	-	-	50	5	-
Small	20	-	-	22	7	-
Medium	9	3	-	9	1	-
Large	1	1	-	4	2	-
Total	96	4	-	85	15	-

The Table-IV-6 shows that (i) In district Bijnor for 96 farmers out of total 100 sample households, the distance of Village Centre from their respective farms is between (0-2) km, while four farmers reside at a distance of 2 km to 4 km from the village centre; while (ii) In Lakhimpur Khiri district, out of total 100 sample households, 85 reside (0-2) km apart from village centre and 15 at a distance of (2-4) km and that (iii) there is no sample household in the study area living beyond the distance of 4 km from village centre.

4.3(vii) Land Area and Area under Sugarcane

The details of land area and area under sugarcane, along with respective irrigated areas are given in Table-IV-7

Table-IV-7
Land, Crop and Irrigation details of the sample households (in Acres)

Land, crop and Irrigation details of the sample households (in Acres)						
Size of Landholding	**Total Land Area**			**Area Under Sugarcane**		
	Operated Land	**Irrigated Area**	**Irrigated (%)**	**Operated Land**	**Irrigated Area**	**Irrigated (%)**
Marginal	160.46	160.46	100.00	137.01	137.01	100.00
Small	191.31	191.31	100.00	129.24	129.24	100.00
Medium	144.28	144.28	100.00	109.18	109.18	100.00
Large	81.13	81.13	100.00	77.62	77.62	100.00
Total	577.18	577.18	100.00	453.05	453.05	100.00

The various observations as depicted by the Table-IV-7; shows that (i) Total area of all the 200 sample respondents of the study area is 577.18 acres, out of which 453.05 acres, i.e., 78.49% is under sugarcane (ii) The entire land area as well as sugarcane area is totally (cent percent) irrigated in each category and the overall sample (iii) Out of total land area maximum is occupied by small category respondents followed by marginal, medium and large category farmers (iv) In case of total sugarcane area highest is occupied by marginal category followed by small, medium and large categories respectively.

Chapter-V

Production and Marketing Cost

The details of quantum of total sugarcane production and extent of quantity sold along with marketing costs thereof in relation to sample households (cane growers) in the study area comprising of twin districts of Lakhimpur Khiri and Bijnor, in Uttar Pradesh are dealt in this chapter.

5.1 Area, Production, Yield and Quantity Sold

The details of area, production, yield of sugarcane and the quantity sold thereof by the sample respondents are given in Table-V-1 below

Table-V-1
Area, Production, Yield and Sold Quantity of Sugarcane

Size of Landholding	Area (in Acres)	Production (in Quintals)	Yield (Ql/acre)	Total Sold (in Quintals)
Marginal	137.01	42783.07	312.26	38329.77 (89.59)
Small	129.24	38445.92	297.48	34337.95 (89.31)
Medium	109.18	36659.5	335.77	31313.14 (85.42)
Large	77.62	24055.5	309.91	20866.44 (86.74)
Total	453.05	141943.99	313.31	124847.30 (87.95)

Note: Figures in parenthesis show percentages of total sugarcane production.

The Table-V-1 shows that (i) out of total sugarcane area (453.05 acres) of all the 200 sample respondent of study area ; highest acreage was covered by Marginal farmers , followed in order by small, medium and large category farmer .(ii) the same trend is observed in respect of aggregate production of sugarcane as well (iii) The highest per acre yield (335.77 ql/acre) was recorded in case of medium category farmers and lowest (297.48 Ql/acre) in case of small farmers, against overall average yield of 313.31 Ql/acre for the total sample (iv) On the whole for total sample 87.95% of total sugarcane production was being sold; with category wise this percentage varying from 85.42 % (medium size farmers) to 89.59% (Marginal Farmers).

5.2 Source wise distribution of total sugarcane sold/supplied

The Table-V-2 shows source wise sale of sugarcane by the sample respondents of the study area.

Table-V-2
Quantity sold (in Quintals)

Quantity sold to	Quantity sold (in Quintals)	% Distribution
Sugar mill	69683.11	55.82
Sugar mill purchase centre	18971.05	15.20
Gur manufacturer	34324.67	27.48
Khandsari unit	1868.47	1.50
Village market	0	0
Commission agents	0	0
Any other place(specify)	0	0
Total	124847.30	100

As evident from the Table-V-2; Of the total sugarcane sold by the sample respondents, 55.82% was supplied to Sugar Mill followed by 27.48% to Gur manufacturer, 15.20% to Sugar Mill purchase centre and 1.50% to khandsari unit; while no sugarcane was at all sold to village market, commission agent or any other place. This clearly indicates that maximum of the sugarcane was sold to sugar mills followed by Gur manufacturers and Khandsari unit in the area under study.

5.3 Market fees paid:

The Table-V-3 below presents details of market fees in selling sugarcane to different source;

Table –V-3
Market fee paid (Rs./Quintal)

Quantity sold to	Uttar Pradesh
Sugar mill	0
Sugar mill purchase centre	0
Gur manufacturer	0
Khandsari unit	0
Village market	0
Commission agents	0
Any other place(specify)	0
Total	0

The data of the Table-V-3 displays that no market fees has been paid by any of the sugarcane grower in selling Sugarcane to Sugar mill or Sugar Mill Purchase center or Gur Manufacturer/ Khandsari unit.

Chapter-VI

Transportation Cost of Sugarcane

The present chapter deals with the most important aspect of sugarcane cultivation, i.e., its transportation from the farmers' fields to the ultimate destinations; among which the main is sugar mill along with its purchase centre, followed by gur manufacturer and khandsari units. The details of total sugarcane quantity transported, modes and destinations of transport, average distance covered for reaching ultimate destination, loading/unloading modes are highlighted through following tables and associated narrations thereof.

6.1 Quantity and Mode of Transportation

The Table-VI-1 shows the total quantity of sugarcane transported (in quintals) along with the mode of transport.

Table-VI-1
Total quantity transported by mode (in qtl.) (carried to all destinations)

State	Manual carts	Tractor trolley	Truck	Any other	Overall
Uttar Pradesh	-	124847.30	-	-	124847.30
% distribution					
	Manual carts	Tractor trolley	Truck	Any other	Overall
Uttar Pradesh	-	100.00	-	-	100.00

As evident from the Table-VI-1; the total quantity of sugarcane transported by the sample respondents, i.e., the cane growers (200 in number) of the study area has been 124847.30 quintals and that the mode of transport used for transporting this quantum of sugarcane has been the tractor trolley on cent percent, i.e., 100 percent basis. This shows that all the selected respondents in the study area used only tractor trolley as mode of transportation, for transporting sugarcane from their fields to ultimate destination.

6.2 Average Distance Covered

The average distance covered to reach the ultimate destination along with the mode of transportation is shown in Table-VI-2.

Table-VI-2
Average distance covered by mode (in Kms.) (travelled to all destinations)

State	Manual carts	Tractor trolley	Truck	Any other	Overall
Uttar Pradesh	-	7.15	-	-	7.15
% distribution					
	Manual carts	Tractor trolley	Truck	Any other	Overall
Uttar Pradesh	-	100.00	-	-	100.00

The average distance covered by a cane grower to transport his cane produce from field area to ultimate destination, i.e., sugar mill, sugar mill purchase centre, gur manufacturer and the khandsari unit has been 7.15 kilometers and that the mode of transport for this transportation has been solely, the tractor trolley on 100 percent basis.

6.3 Destination Wise Transportation of Sugarcane

The Tables- VI-3(a) and VI-3(b) respectively show (i) destination wise breakup of total quantity of sugarcane transported and (ii) the corresponding mode of transport.

Table-VI-3(a)
Total quantity transported by mode and by destination (in qtl.)

State	Destination	Manual carts	Tractor trolley	Truck	Any other	Overall	Percent
Uttar Pradesh	All the sugar mill covered	-	69683.11	-	-	69683.11	55.82
	All the sugar mill P.C. covered	-	18971.05	-	-	18971.05	15.20
	All the gur manufacturer	-	34324.67	-	-	34324.67	27.48
	All the khandsari unit	-	1868.47	-	-	1868.47	1.50
	All other places	-	-	-	-	-	-
	Total Quantity transported	-	124847.30	-	-	124847.30	100.00

Table-VI-3(b)
Total quantity transported by mode and by destination (% distribution)

State	Destination	Manual carts	Tractor trolley	Truck	Any other	Overall
Uttar Pradesh	All the sugar mill covered	-	100	-	-	100
	All the sugar mill P.C. covered	-	100	-	-	100
	All the gur manufacturer	-	100	-	-	100
	All the khandsari unit	-	100	-	-	100
	All other places	-	-	-	-	-

The Tables-VI-3(a) and VI-3(b) show that (i) out of total quantity of 124847.30 quintals of sugarcane transported by the selected respondents, i.e., cane growers; maximum (55.82%) was transported to sugarmill gate; followed by gur manufacturer (27.48%); sugar mill purchase centre (15.20%) and khandsari unit (1.50%); respectively and that (ii) the mode of transport for all these transportations to different destinations has been the tractor trolley; on cent percent basis and that no other mode like manual cart, truck was used for transportation of sugarcane by the sample respondents.

6.4. Destination wise Distance Covered

The Tables-VI-4(a) and VI-4(b) show destination wise distance covered and the corresponding mode of transportation for transporting sugarcane by the selected cane growers.

Table-VI-4(a)
Average distance covered by mode and by destination (in kms.)

State	Destination	Manual carts	Tractor trolley	Truck	Any other	Overall
Uttar Pradesh	All the sugar mill covered	-	12.96	-	-	12.96
	All the sugar mill P.C. covered	-	2.08	-	-	2.08
	All the gur manufacturer	-	4.06	-	-	4.06
	All the khandsari unit	-	4.87	-	-	4.87
	All other places	-	-	-	-	-

Table-VI-4(b)
Average distance covered by mode and by destination (% distribution)

State	Destination	Manual carts	Tractor trolley	Truck	Any other	Overall
Uttar Pradesh	All the sugarmill covered	-	100	-	-	100
	All the sugar mill P.C. covered	-	100	-	-	100
	All the gur manufacturer	-	100	-	-	100
	All the khandsari unit	-	100	-	-	100
	All other places	-	-	-	-	-

The above Tables depict that (i) the average distance covered for transporting sugarcane to various destination have respectively been as 12.96 kilometers for sugarmill; 2.08 kilometers for sugarmill purchase centre; 4.06 kilometers for reaching gur manufacturer and 4.87 kilometers for khandsari unit; and that (ii) the mode of transport used by the selected respondents for all these destinations has been the tractor trolley. Thus, this indicates that to facilitate the cane growers towards their transportation of sugarcane; more purchase centres should be made available to them by the sugar mills.

6.5. Manual Transportation

Manual Transportation mode has NOT been reported by any of the selected respondents.

6.6. Mechanized Transportation

The details regarding expenses towards mechanized transportation are given in table-VI-6.

Table-VI-5
Mechanized transportation- expenditure on various inputs

Machine	Owned/hired	Fuel consumed (Km./litre)	Labour/driver cost (Rs./Day)	Maintenance cost (Rs./season)	Hiring charges (Rs./Day)	Hiring charges (Rs./Qtl.)	Any other cost (Rs.)
Tractor trolley	Owned	5.88	277	13526	-	-	13770
	hired				967	26	20740
Truck	Owned	-	-	-	-	-	-
	hired	-	-	-	-	-	-
Any other	Owned	-	-	-	-	-	-
	hired	-	-	-	-	-	-

The data of the Table-VI-5; shows tractor trolley as the mode of mechanized transportation for all the sampled farmers in the study area and that (a) on owned tractor trolley (i) consumption of fuel is at the rate of 5.88 kilometer/litre (ii) labour (driver) charges is Rs. 277.00 per day (iii) maintenance cost is Rs. 13526.00 per season and (iv) the other costs come as Rs. 13770.00 per season. (b) On hired tractor trolley basis (i) hiring charges is recorded as (i) Rs. 967.00 per day and/or (ii) Rs. 26 per quintal and (iii) Rs. 20740.00 as other costs of total hired transported sugarcane. Therefore, the expenses towards

transportation costs by cane growers may be shared by government as subsidies; but only to possible extent.

6.7 Loading/Unloading Manual mode

The details of manual mode of loading/ unloading are given in the table-VI-6.

Table-VI-6
Loading/ unloading- manual mode

State	Expenditure		Loading	Unloading
Uttar Pradesh	Wage rate (Rs./day)	Male	278	244
		Female	-	-
	Contract rate (Rs./qtl. or -/trolley)	Trolley size 1	-	-
		Trolley size 2	-	-
	Ratio of labourers	-	-	-
	Number of labourers (total)	-	555	159
	Number of days (total)	-	2220	322

As per Table-VI-6 (i) the wage rates towards loading and unloading are respectively worked out to be Rs 278.00 per day and Rs 244.00 per day. (ii) The total number of labourers engaged for loading and unloading, during entire season have been 555 and 159, respectively (iii) while correspondingly the total numbers of days for loading and unloading, are respectively reported as 2220 days and 322 days. It may also be mentioned that for loading/unloading males are engaged.

6.8. Loading/ Unloading Machine Mode

This is to be noted that machine mode for loading/ unloading of sugarcane is not prevailing in case of any of the respondent of the sample in the study area; and the entire loading/un-loading is done by manual mode.

Chapter-VII

Harvesting Cost of Sugarcane

The details of harvesting cost of sugarcane, paid by sugarcane growers to labours towards manual/machine harvesting are shown in the following pargraphs of this chapter.

7.1. Manual Harvesting

The Table-VII-1 shows wage rates paid to farm servants and casual labour towards harvesting of sugarcane-

Table-VII-1
Manual Harvesting-wage rates paid to the labours

	Wage rate(Rs./Day)						
State	Family Labour			Farm Servants		Casual Labour	
	Men	Women	Children	Men	Women	Men	Women
Uttar Pradesh	X	X	X	200	200	268	250

As per Table-VII-1, farm servants were paid the wage rate @ Rs. 200/-per day; both men and women; while for casual labour wage rate paid on average basis consisted of Rs. 268/- per day for male worker and Rs. 250/- per day for female worker; respectively.

7.2.Contract Rate:

Contract Rate towards manual mode/ machine mode is shown in the Table-VII-2

Table-VII-2
Contract rate paid to labours

	Contract Rate	
State	Manual mode(Rs./Ql)	Machine mode(Rs./Ql./Hr./Hact.)
Uttar Pradesh	30.00	-

- The prevailing contract rate towards manual mode of sugarcane harvesting in the region of study in general, is Rs.30.00 per Quintal, including cleaning and loading; while machine mode of harvesting is not at all prevailing in the study area.

- It may also be mentioned that of the prevailing contract rate of Rs 30.00 per quintal for sugarcane harvesting; Rs. 25 is towards harvesting and loading and Rs 5 towards cleaning.

7.3. Machine Harvesting Expenditure:

In the area under study, i.e., district Lakhimpur Khiri and Bijnor, in Uttar Pradesh; Machine Harvesting is not at all in practice for harvesting of sugarcane as among all the 200 sample households (sugarcane growers).

Chapter-VIII

Results and Interpretation

The results and the interpretation thereof, as derived on the basis of conducting the present study in Lakhimpur Khiri and Bijnor districts of Uttar Pradesh; with regard to Sugarcane Transportation and harvesting Cost in Uttar Pradesh; are presented as under:

- India has achieved a marked record in respect of crop sugarcane with 4.73 million hectares area, 376.90 million tonnes production and 796.50 ql/ha yield in the year 2017-18 against that of 1.71 million hectares area, 57.05 million tonnes production and 334.22 ql/ha yield in 1950-51; as per statistics released by Directorate of Economics and Statistics (4th Advance Estimates for the year 2017-18), Ministry of Agriculture & Farmers Welfare, Government of India.
- Global wise as well, India is the second largest producer of sugarcane in the world and comes only next to Brazil. As per statistics for the yesr 2016, India contributed 18.72 percent of total sugarcane production in the world against that of 41.29 percent of Brazil.
  - As such sustaining cultivation of sugarcane; is not only essential but also most inevitable in India.
- The state of Uttar Pradesh is the largest producer of sugarcane in the country. During the year 2017-18, it (U.P.) contributed to the tune of 46.98 percent of total sugarcane production in the country against that of 22.00 percent of Maharashtra. But, it lagged behind Maharashtra in respect of yield with yield level of 792.55 ql/ha against that of 921.66 ql/ha in Maharashtra.
- Also as per time-series (1990-91 to 2016-17) data, of the state of Uttar Pradesh there has not been much variations in the three basic crop parameters, i.e., area, production and yield of sugarcane during the entire period of 1990-91 to 2016-17.
  - This necessitates to explore the causes responsible for the low yield level of sugarcane in the state; as there has been empirical evidences that inspite of decline in sugarcane area its aggregate production increased on account of enhancement in yield.

- As per secondary data analysis of the state (based on data collected by AERC Prayagraj, Research Team from state level officers like that of Sugarcane Commissioner, Uttar Pradesh, Directorate of Agriculture Statistics, Uttar Pradesh, Lucknow)

  (i) In the state of Uttar Pradesh, Harvesting Operations of Sugarcane are totally borne by cane growers themselves and Sugar Mills are not party to it at all.

  (ii) As per records for the year 2019-20, out of 119 Sugar Mills in the state, majority of them (77.31 percent) belonged to Private Sector, followed by the Cooperative (20.17 percent) and the Corporate, i.e., Nigam (2.52 percent) respectively.

  It may be noted that out of 3 Sugar Mills under present study; 2 belonged to private sector and 1 to Cooperative Sector.

  (iii) During the period 2014-15 to 2018-19, in the state of Uttar Pradesh (a) There has been a continuous rise in quantum of sugarcane crushed, sugar production as also in sugar recovery rate, (b) As compared to 744.54 lakh tonnes sugarcane crushed, 71.01 lakh tonnes sugar production and 9.54 percent sugar recovery rate in 2014-15; the corresponding figures in 2018-19 are 1031.67 lakh tonnes sugarcane crushed, 118.22 lakh tonnes sugar produced and 11.46 percent sugar recovery rate.

  - The above data in respect of sugarcane crushing, sugar production and the sugar recovery rate, in the state of Uttar Pradesh depict quite encouraging results towards Sugar Industry in Uttar Pradesh.

- As per data provided by 23 Sugar Mills Federation for the sugar season 2018-19; the Sugarcane Transportation cost has been varying between Rs. 10.06 per quintal (lowest) to Rs. 34.77 per quintal (highest) as among these 23 federation sugar mills.
- The recorded data in respect of main features of "three sugar mills under the study" revealed that (a) Installed capacity of the sugar mill varied from 3000 TCD (Tonne Capacity Day) to 10500 TCD, (b) Capacity utilization ranged from 85.72 percent to 100 percent, (c) Total cane crushed by factory during sugar season 2018-19 has been in the range of 475393.86 Tonnes to 1770891.40 Tonnes, (d) Total sugar production in a factory had been to the tune of 59510.00 Tonnes to 217690.00 Tonnes, (e) Sugar recovery rate ranged from 12.29 percent to 12.52 percent; which have been higher than the state average (11.46 percent) and that (f) The average cost of sugarcane transportation incurred by the sugar mill for transporting sugarcane from mill purchase centre to mill gate ranged from Rs. 16.54 per quintal to Rs. 20.48 per quintal.

- The capacity utilization of above 85 percent and even upto 100 percent, as also sugar recovery rate of more than 12 percent indicate "upto mark" working of concerned sugar mills in the study area; though sugar recovery rate has still to be enhanced further more, to come at par with that of a sugar mill in state like Maharashtra.

- Demographic Profile wise

  (a) Uttar Pradesh, the most populous state in the country; as per 2011 census had population of 199,581,477 with sex ratio as 912 women per 1000 men and Literacy Rate of 67.7 percent; while district Lakhimpur Khiri, the largest district of Uttar Pradesh with a population of 40,21,243 ranked 56th in India and Bijnor with a population of 36,82,713 stood 74th in India with respective sex ratio as 894 & 913 and Literacy Rates as 60.56 percent and 70.34 percent, (b) of the "total 200 sample respondents" (i) the majority of them has been marginal (60.5 percent) followed by small (26 percent), medium (10 percent) and large (3.5 percent), (ii) Sex wise 53.92 percent were males and 46.08 percent females, (iii) education wise majority (65.50 percent) had education only upto Junior School, with 7.00 percent still being illiterate (iv) caste wise 51.50 percent belonged to General Caste, 43.50 percent to OBC and 5.00 percent to SC&ST, (v) overall for 90.50 percent respondents the distance of their farm from village centre was between (0 to 2) kilometers and for remaining 9.50 percent it was between (2 – 4) kms (vi) out of total land area of all respondents 78.49 percent was under sugarcane; while the entire land area and also sugarcane area were fully irrigated and that (vii) amongst sugarcane area as well as total sugarcane production majority was shared by marginal farmers followed by small, medium and large farmers.

  - There is atill need to enhance literacy rate as also to take special care of marginal and small farmers in respect of sugarcane cultivation in the region of study, to enhance over all sugarcane production still more.

- On overall sample basis, the sale percentage of sugarcane from its total produce has been 87.95 percent; while category wise the sale percentage is highest (89.59 percent) in case of marginal farmers and lowest (85.42 percent) in case of medium category farmers and that of the total quantity of sugarcane sold; maximum has been sold to Sugar Mill (55.82 percent); followed by Gur Manufacturing (27.48 percent), Sugar Mill Purchase Centre (15.20 Percent) and to Khandasari Unit (1.50 percent).

  - The data, that out of total sugarcane production of the respondents, more than 87 percent has been sold and that, the highest percentage is supplied to sugar mills;

recommend special care to be taken by mill owners towards their cane supplier in general and marginal and small farmers in particular.

- The data displayed that no market fees has been paid by any of the sugarcane grower under study in selling sugarcane to Sugar Mill Gate "or" Sugar Mill Purchase Centre "or" Gur Manufacturing/Khandasari Unit.
- Among various modes of transportation like Manual Carts, Trucks, Tractor Trollies; the only mode of transport used by all the 200 sample respondents has been Tractor Trolley, on cent percent, i.e., 100 percent basis for transporting sugarcane from their fields to ultimate destination(s); while the average distance covered by a cane grower to transport his sugarcane produce from field to ultimate destination (i.e., sugar mill, sugar mill purchase centre, Gur Manufacturing, khandasari units) has been 7.15 kilometers.
- Destination wise; average distance covered by a cane grower, has been (i) 12.96 kilometers to reach Sugar Mill gate, (ii) 2.08 kilometers to reach Sugar Mill Purchase Centre, (iii) 4.06 kilometers to reach Gur Manufacturing and (iv) 4.87 kilometers to reach Khandasari Unit.
  - It is recommended that special facility be provided to cane growers of the study area in respect of Tractor Trolley as a mode of transport and if possible, providing two trollies attached tractors in future to save time and also money to some extent. This has been suggested earlier as well under unique scheme for Sugarcane transporters (Times of India, August 28, 2012).
- It may be mentioned that manual transportation mode has not at all been reported in case of any of the sample respondent; while in case of Mechanized Transportation, as in the present study, it has been exclusively tractor trolley; while the expenses for (a) Owned tractor trolley has been (i) fuel consumption at the rate of Rs. 5.88 km per litre, (ii) driver charges @ Rs. 277.80 per day, (iii) maintenance cost as Rs. 13526.00 per season, (iv) other costs as Rs. 13770.00 per season (b) Hired tractor trolley (i) Hiring charges as Rs. 976.00 per day "or" Rs. 26.00 per quintal of sugarcane transported and (ii) Rs. 20740.00 as "other costs" for the entire sugar season.
- While, machine mode of loading/unloading is not preventing in case of any of the sample respondent, the details of manual mode has been (a) wage rate (males) Rs. 278.00 per day for loading and Rs. 244.00 per day for unloading and that (b) for the entire sugar season (i) number of labourers used for loading 555 and for unloading 159

while (ii) number of labour days used for loading 2220 days and for unloading 322 days.

- In case of Sugarcane Harvesting (i) machine mode of harvesting is not at all in practice in the study area (ii) under manual mode of harvesting, the prevailing "Contract rate" of harvesting in the region of study, is in general Rs. 30.00 per quintal including cleaning charges. It may also be mentioned that of the prevailing contract rate of Rs. 30.00 per quintal of sugarcane harvesting; Rs. 25.00 is towards harvesting and loading; and Rs. 5.00 towards cleaning.

Chapter-IX

Summary, Conclusions and Policy Implications

9.1. Summary

Among three main factors for sustainability of Sugarcane Cultivation in the interest of farming community in particular and the entire agricultural cum national economy in general; viz. (i) Timely payment of dues to Sugarcane growers by Sugar Mills (ii) Remunerative prices to Cane growers for their sugarcane produces and (iii) Harvesting and Transportation aspects of Sugarcane; the third one has still to be taken careof. This is so; since regarding first one, directions are already being issued from time to time by the State/Central Government authorities to take care of timely clearance of all the dues to the cane growers (the Suppliers of Sugarcane to Sugar Mills) by Mill Owners; while in respect of appropriate prices to the cane growers for their sugarcane produces, our Central Government has already being issueing Minimum Support Prices (MSPs) on the recommendations of the Commission for Agricultural Costs and Prices (CACP); to take care that the Farmers are not put to losses on producing sugarcane by adopting its cultivation. The estimation of "Transportation and Harvesting Costs" of sugarcane is still to be explored with, on the basis of Strong Data Base and Scientific Research Methodology. It is with this prime motto, that the present Study was initiated by our national government towards finding out sugarcane transportation and harvesting costs in eight states of the country, including Uttar Pradesh.

The present study, as a step forward in this direction, aims to estimate and analyse the Transportation and Harvesting Costs of Sugarcane, incurred by the Cultivators (Cane Growers) of different size of farms and /or Sugar Mills, in the state of Uttar Pradesh as per following set forth objectives:

(iv) To estimate the harvesting cost of sugarcane using different modes of harvesting.

(v) To estimate the transportation cost of sugarcane, from the farmers' field to the sugar mill and other selling points using different modes of transportation.

(vi) To estimate the various factor/input costs in the overall harvesting and transportation costs.

A field survey has been conducted, using a Multi (three) Stage Stratified Random Sampling Plan, as per CACP Sampling Design Frame; with district as the first stage, village as the second stage and the farmer (cane grower) as the third stage or the ultimate unit of sampling and conducting the survey for the sugarcane season 2018-19.

As per sampling method of the present study, in each state, two districts are selected using CACP sampling frame; adopting the following criteria for selecting the districts and the selected districts have been Lakhimpur Khiri and Bijnor on the following criteria.

(v) The districts should have large proportion of area under sugarcane to the total area under sugarcane in the state.

(vi) Within the sugarcane growing districts, distinct geographic regions of the state to the extent possible.

(vii) In each district two sugarcane growing villages were selected, making a total of four villages per state.

(viii) From each selected village, a total of 50 farmers were selected for primary survey, giving representation to each size-group, i.e., marginal (<1ha), small (1-2ha), medium (2-4ha) and large (>4ha) farmers, using stratified random sampling and PPS (Probability Proportional to Size) methodology.

(ix) The aggregate sample size of study in the state of Uttar Pradesh, thus works out to be of 200 farmers under study and thereby collecting the primary data by personal interview of the sample respondents by the AERC Prayagraj Research Team as also the related data from the associated Sugar Mills viz. Balrampur Chini Mill and DCM Shriram Mill in district Lakhimpur Khiri and Kisan Sahkari Chini Mill in district Bijnor corresponding to the sugarcane season 2018-19.

9.2. Conclusions

The various findings and conclusions thereof, of the present study in finding sugarcane transportation and harvesting costs in the state of Uttar Pradesh are presented as under:

- The state of Uttar Pradesh is the largest producer of sugarcane in the country, but still it is lagging behind the state like Maharashtra in respect of sugarcane yield (productivity).
- During last qusiquennial period (2014-15 to 2018-19), apart from continuous rise in sugarcane crushing and sugar production in the state of Uttar Pradesh; the sugar recovery rate has also enhanced from 9.54 percent to 11.46 percent; but inspite of it the state of Uttar Pradesh has yet to come up to be at par with state like Maharashtra in respect of sugar recovery rate.
- There is need to explore motivational factors, towards increasing crop productivity of sugarcane and also its sugar recovery percentage, further more.
- Harvesting operations in the state of Uttar Pradesh are totally borne by cane growers themselves and sugar mills are not involved in this at all. In this regard to support their sugarcane suppliers, the sugar mills should also come up to help and support them; mainly marginal and small farmers, who can not bear heavy expenses towards mechanized harvesting and/or mechanized loading/unloading of sugarcane.
- Sharing or even full bearing the sugarcane harvesting operations by sugar mills at farmers fields, are two fold advantageous; firstly it will ensure sugar factories to get rid of short supplies of cane during start of season and secondly it will give relief to farmers as well in terms of solving problem of unavailability of labourer during peak crop seasons like sowing and harvesting.

  This is so and is also fully justified for the simple reason, that out of total sugarcane sales by the cane growers, the highest proportion is supplied to sugar mills only, either directly to mill gate or through its purchase centre and then to others like Khandasari units or Gur manufacturer.
- In respect of transportation of sugarcane to sugar mill from farmers fields; the mills have already given cane growers significant relief through establishing sugar mill purchase centre for the convenience of cane growers, to narrow down their sugarcane transport distance.

  But it will be still better, particularly to marginal and small farmers and all “such farmers” who are desirous of such a facility of transportation of sugarcane right from farmer (cane grower) fields to Mill Gate, by the sugar mills and thereafter, in turn deducting the amount so incurred by the sugar mills from the payments to be made by

mills to cane growers for their respective cane supplies. However, this should never be made mandatory for all farmers.

- There has been reporting that (i) "one of the main reasons for Maharashtra's higher sugar recovery percentage, is because of Sugar Mills arranging for Harvesting and Transportation of Sugarcane" and also (ii) that such system is in the interest of both, i.e., the millers and the cane growing farmers in the sense that farmers do not have to bother about transporting the cane, while mills are ensured quality harvested materials for their operations.
- This is to be thus noted that, ultimately both the harvesting and transportation costs are to be regarded as key determinant factors of sugarcane adoption by the farmers; as also sugar's domestic consumer price and its international export value. Further, in the interest of farmers (cane growers) as well as for the country as a whole, it may also be well quoted at this junction that "In Thailand the high cost of harvesting and transportation has been one of the reasons for the reduction in total amount of Thailand's sugarcane production and that the farmers who had small fields and /or whose fields were located for away from the sugar factory tended to abandon sugarcane cultivation".
- Summarizing, the development of India's largest Rural Information Technology (IT) network; the Sugarcane Information System (SIS) by the Sugarcane Commissioner of Uttar Pradesh; to overcome the problems associated with the existing cane supply arrangements to the Sugar Mills in the state of Uttar Pradesh (the largest cane growing state of India) is definitely a step forward and welcome move, by the state (Uttar Pradesh) government, in the desired and erstwhile direction, towards Sugarcane related problems.

9.3. Policy Implications

The main points as emerging out on the basis of present study, towards policy implications in respect of sugarcane transportation and harvesting costs in the state of Uttar Pradesh are highlighted as under:

- Provision of mechanized harvesting as well as mechanized loading/unloading facilities to all sugarcane growers of the study area in general and marginal and small

farmers in particular (who both when combined form majority of cane growers and also cane suppliers to Sugar Mills) by the concerned sugar mills towards timely, quick and efficient harvesting as well as loading / unloading operations. This facility of cource will be on repayment basis by cane growers in terms of deduction of amount so incurred by mills, from the payments they will receive from sugar mills for their respective cane supplies.

- More efficient management of flow of trucks/tractor trollies and unloading operations by Sugar Mills towards lowering down; the cost of production of sugar; which in turn in one way or the other will certainly be benefiting the mill owners as also the cane growers. This is so since at the beginning of the season, the sugar mills face problem of inadequate supply of cane while during peak season they get cane supply even more than their crushing capacity and on account of this the cane suppliers also have to wait and wait for much longer time, due to unending queues of vehicles in terms of tractor trollies and trucks.
- The following factors, which influence the damage to sugarcane as a transit loss and also result to increased fuel consumption to a great extent during its transportation, irrespective of mode of transport like tractor trolly/truck; must be checked to all possible extent to minimize such losses – (i) Over Loading in the vehicle, (ii) Speed of the vehicle, (iii) Condition of the road used for transportation.
- Provision of Transport facility by Sugar Mills for transporting Sugarcane, right from the Farmers Fields to Sugar Mill Gate, to Marginal and Small farmers in particular and all such farmers (cane growers) who are desirous of such facility on Repayment basis by deducting the amounts thus spent by the sugar mills from the payments to the cane growers for their respective Cane Supplies; by Mill Owners.

  This will certainly contribute positively towards both, i.e., increasing sugarcane crop productivity and also higher Sugar Recovery Rate.

  But this facility should not at all be made Mandatory.
- The HnT (Harvesting and Transportation) charges for the services, "whenever so provided by the Sugar Mills to the farmers (cane growers)" for entire harvesting operations (including cleaning and loading) and transportation of Sugarcane from

their (cane growers) fields to Mill Gate on Repayment basis, be crystal clear and made Public, so that farmers may decide accordingly; 'which mill" to sell their cane produce.

- Good quality and early variety sugarcane (seed) be provided for sowing to sugarcane growers by Govt. towards better sugarcane cultivation to result (i) enhanced aggregate sugarcane production through higher crop productivity as well as (ii) higher sugar recovery rate.

REFERENCES:

G. Dines, S. M^{c}rae, C. Henderson (2013): Sugar Harvest Transport Management: A proven whole-of-systems approach that delivers least cost and maximum productivity: Article (PDF available) in International Sugar Journal; 115 (1376), 550-554: August 2013, https://www.researchgate.net>2832… [PDF]

Cooperative Sugar, Vol – 44(II) July 2017.

Office of (i) Sugarcane Commissioner, Uttar Pradesh and (ii) M.D. Sugar factory Federation; Lucknow.

Office of Directorate General of Commercial Intelligence and Statistics, D/o Commerce, Kolkata, India.

Office of Directorate of Agriculture Statistics and Crop Insurance, Uttar Pradesh, Lucknow.

Harvesting and Transportation (HnT) charges on Sugarcane – Civils daily: 02 October 2019 https://www.civilsdaily.com>h...

Kriengkri KAEW TRAKULPONG (2008): Multi-objective Optimization for Cost Reduction of Mechanical Sugarcane Harvesting and Transportation in Thailand. January 2008 pp 35-36.

Milan, Estabab Lopez ….. Plo Aragores Llusis Miguel (2006): Sugarcane Transportation in Cuba; a case study European Journal of Operational Research. Vol 174 Issue I, October 2005 pages 374-386. https://doi.org\10.1016\j.ejor.2005.01_028

Raj Udai, Dubey PP and Kumar Ashok (1996): Key Determinants of Area under Sugarcane: A case study of Faizabad district (Uttar Pradesh): Paper Presented at the Golden Jubilee Conference of Indian Society of Agricultural Statistics, IASRI New Delhi: December 19-21, 1996.

Regerio de Avila, Riberro Junqueria, Reinalde Marahita (2017): Optimization approaches for sugarcane harvest front programming and scheduling: Gestro and Producao Print Version, ISSN 0104-530 on Gest. Prod. Vol 24 No. 2 Sao careless. April-June 2017: E Pub. June 01, 2017.

Shodhganga: Transportation of Sugarcane –
Shodhganga.inflibnet.ac.in>… [PDF]
Chapter-3 transportation of sugarcane: Shodhganga
08_Chapter-3.pdf: pp. 2-3, 8-9, 24.

Statistical; Abstracts (Uttar Pradesh): (2012-17)

Sugarcane Information System (SIS): Developed by Uttar Pradesh State Sugarcane Commissioner upcane.gov.in>media gallery (PDF)

4th Advance Estimates for the Year 2017-18: Statistics released by Directorate of Economics and Statistics (for the year 2017-18) Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi

TOI (2012): Unique System for Sugarcane Transporters: Nagpur News - Times of India: August 28, 2012.https://m.timesofindia.com>nagpur

Appendix-I

Questionnaire for Sugar Mill

1. Name and Address of Mill (alongwith name and contact number of main official)	**Kisan Sahkari Chini Mills Ltd., Sneh Road Najibabad** **District Bijnor (U.P.) Pin Code-246763** **Phone: 01341-255410**			
2. Type of Mill (Codes)	Installed Capacity (2018-19)	Capacity Utilization (%)	Total Cane Crushed in tons (2018-19)	Total Sugar Production in tons (2018-19)
2	3000 T.C.D.	89.53	475393.86	59510.00

Code for 'type of mill': Sugar-1; Sugar + Distillation-2; Sugar + Cogen – 3; Sugar+ Distillation + Cogen - 4

3. **Information on Transport Costs paid by the Sugar Mill (2018-19)**

Total Cane Received at	**Quantity (lakh tonnes)**	**Total Number of farmers who availed this**	**Transport Costs <u>Paid by Mill / incurred</u>** *(Rs/qtl/km)*	**Transport Costs <u>if Paid by Farmers</u>** *(Rs/qtl/km)*
A) Farm to Factory Gate				
1) Tractor Trolley	1.275	-	-	-
2) Truck	-	-	-	-
3) Bullock cart	0.028	-	-	-
4) Any other (specify) _____	1.444	-	-	-
B) Farm to Purchase Centre				
1) Tractor Trolley	-	-	-	-
2) Truck	-	-	-	-
3) Bullock cart	2.009	14503	-	-
4) Any other (specify)	-	-	-	-

4. Cost incurred by the mill for transporting from Purchase Centre to Factory Gate (Rs/qtl/km) **16.81**

5. Mode of Transport (Tractor Trolley -1; Truck- 2) ___**2**_____

6. **Information of Harvesting Costs, if Incurred by the Mill**

Mode of Harvesting		**Average Cost (Rs/qtl)**		**Extent (%) of Trash**	
Manual (tons)	Machine (tons)	Manual	Machine	Manual	Machine
√	0	50	0	1%	0

Appendix-II

Questionnaire for Sugar Mill

1. Name and Address of Mill (alongwith name and contact number of main official)	BALRAMPUR CHINI MILLS LTD UNIT KUMBHI VILL.P.O. KHUMBHI TEHSEEL GOLA GOKARRANNATH DIST. LAKHIMPUR, UTTAR PRADESH			
2. Type of Mill (Codes)	Installed Capacity (2018-19)	Capacity Utilization (%)	Total Cane Crushed in tons (2018-19)	Total Sugar Production in tons (2018-19)
1	8000 TCD	100	1357600	169935.10

Code for 'type of mill': Sugar-1; Sugar + Distillation-2; Sugar + Cogen – 3; Sugar+ Distillation + Cogen - 4

3. Information on Transport Costs paid by the Sugar Mill (2018-19)

Total Cane Received at	**Quantity (lakh tonnes)**	**Total Number of farmers who availed this**	**Transport Costs Paid by Mill / incurred** *(Rs/qtl/km)*	**Transport Costs if Paid by Farmers** *(Rs/qtl/km)*
A) Farm to Factory Gate				
1) Tractor Trolley	62.8	21418	0	NA
2) Truck	0	0	0	0
3) Bullock cart	1.52	9899	0	NA
4) Any other (specify)	0	0	0	0
B) Farm to Purchase Centre				
1) Tractor Trolley	1.73	4831	0	NA
2) Truck	0	0	0	0
3) Bullock cart	3.49	20516	0	0
4) Any other (specify)	0	0	0	0

4. Cost incurred by the mill for transporting from Purchase Centre to Factory Gate (Rs/qtl/km)
16.54 Per Qtls 2018-19

5. Mode of Transport (Tractor Trolley -1; Truck- 2) ___**Trolley/Cart**____

6. Information of Harvesting Costs, if Incurred by the Mill

Mode of Harvesting		**Average Cost (Rs/qtl)**		**Extent (%) of Trash**	
Manual (tons)	Machine (tons)	Manual	Machine	Manual	Machine
√	NA	40	NA	1%	NA

Appendix-III

Questionnaire for Sugar Mill

1. Name and Address of Mill (alongwith name and contact number of main official)	**DCM SHRIRAM LTD SUGAR &DISTELLERY UNIT AJBAPUR,** **LAKHIMPUR KHERI – 8756991822** **R C CHAUDHRY JT. MANAGER**			
2. Type of Mill (Codes)	Installed Capacity (2018-19)	Capacity Utilization (%)	Total Cane Crushed in tons (2018-19)	Total Sugar Production in tons (2018-19)
2	10500 T.C.D.	85.72	1770891.4	217690

Code for 'type of mill': Sugar-1; Sugar + Distillation-2; Sugar + Cogen – 3; Sugar+ Distillation + Cogen - 4

3. Information on Transport Costs paid by the Sugar Mill (2018-19)

Total Cane Received at	**Quantity (lakh tonnes)**	**Total Number of farmers who availed this**	**Transport Costs Paid by Mill / incurred** *(Rs/qtl/km)*	**Transport Costs if Paid by Farmers** *(Rs/qtl/km)*
A) Farm to Factory Gate				
1) Tractor Trolley	13.21	49911	0	0
2) Truck	0	0	0	0
3) Bullock cart	0	0	0	0
4) Any other (specify) _____	0	0	0	0
B) Farm to Purchase Centre				
1) Tractor Trolley	4.5	17145	20.48	8.25
2) Truck	0	0	0	0
3) Bullock cart	0	0	0	0
4) Any other (specify)	0	0	0	0

4. Cost incurred by the mill for transporting from Purchase Centre to Factory Gate (Rs/qtl/km) **20.48**

5. Mode of Transport (Tractor Trolley -1; Truck- 2) ___**2**_____

6. Information of Harvesting Costs, if Incurred by the Mill

Mode of Harvesting		**Average Cost (Rs/qtl)**		**Extent (%) of Trash**	
Manual (tons)	Machine (tons)	Manual	Machine	Manual	Machine
√	0	50	0	1%	0

Appendix-IV

District wise List of Sugar Mills in Uttar Pradesh

Sl. No.	Name of Sugar Mills	Name of District
1	Deoband	Saharanpur
2	Gangnauli	Saharanpur
3	Shermau	Saharanpur
4	Gagalheri	Saharanpur
5	Nanauta (Cooperative)	Saharanpur
6	Sarsawa (Cooperative)	Saharanpur
7	Khatauli	Muzaffarnagar
8	Titavi	Muzaffarnagar
9	Budhana	Muzaffarnagar
10	Mansurpur	Muzaffarnagar
11	Tikaula	Muzaffarnagar
12	Khaikhen	Muzaffarnagar
13	Rohana	Muzaffarnagar
14	Morna (Cooperative)	Muzaffarnagar
15	Thanabhawan	Shamli
16	Shamli	Shamli
17	Unn	Shamli
18	Mawana	Meerut
19	Daurala	Meerut
20	Kinaum	Meerut
21	Nanglamal	Meerut
22	Sakhoti	Meerut
23	Mohiuddinpur (Corporation)	Meerut
24	Modinagar	Gaziabad
25	Simbhaoli	Hapur
26	Brijnathpur	Hapur
27	Malakpur	Bagpat
28	Bagpat (Cooperative)	Bagpat
29	Ramala (Cooperative)	Bagpat
30	Sabitgarh	Bulandshahr
31	Agauta	Bulandshahr
32	Bulandshahr	Bulandshahr
33	Anoopshahr (Cooperative)	Bulandshahr
34	Dhampur	Bijnor
35	Seohara	Bijnor
36	Belai	Bijnor
37	Bahadurpur	Bijnor
38	Barkatpur	Bijnor
39	Bundki	Bijnor
40	Chandpur	Bijnor
41	Bijnor	Bijnor

42	Sneh Road (Cooperative)	Bijnor
43	Dhanaura	Amroha
44	Chandanpur	Amroha
45	Gajraula (Cooperative)	Amroha
46	Belwara	Moradabad
47	Raninagal	Moradabad
48	Belan	Moradabad
49	Agwanpur	Moradabad
50	Asmoli	Sambhal
51	Rajpura	Sambhal
52	Majhawali	Sambhal
53	Milak Narayanpur	Rampur
54	Karimganj	Rampur
55	Bilaspur (Cooperative)	Rampur
56	Faridpur	Bareilly
57	Baheri	Bareilly
58	Meerganj	Bareilly
59	Nawabganj	Bareilly
60	Semikhera (Cooperative)	Bareilly
61	Pilibhit	Pilibhit
62	Barkhera	Pilibhit
63	Bilaspur (Cooperative)	Pilibhit
64	Puranpur (Cooperative)	Pilibhit
65	Nigohi	Shahjahanpur
66	Maqsoodapur	Shahjahanpur
67	Roza	Shahjahanpur
68	Tilhar (Cooperative)	Shahjahanpur
69	Powayan (Cooperative)	Shahjahanpur
70	Bisauli	Budaun
71	Budaun (Cooperative)	Budaun
72	Neoli	Kasganj
73	Satha (Cooperative)	Aligarh
74	Gola	Lakhimpur
75	Palia Kalan	Lakhimpur
76	Khambharkhera	Lakhimpur
77	Aira	Lakhimpur
78	Ajabpur	Lakhimpur
79	Kumbhi	Lakhimpur
80	Gularia	Lakhimpur
81	Belrayan (Cooperative)	Lakhimpur
82	Sampurnanagar (Cooperative)	Lakhimpur
83	Hargaon	Sitapur
84	Biswan	Sitapur
85	Ramgarh	Sitapur
86	Jawaharpur	Sitapur
87	Mahmudabad (Cooperative)	Sitapur
88	Loni	Hardoi
89	hariyawan	Hardoi

90	Rupapur	Hardoi
91	Kaimganj (Cooperative)	Farrukhabad
92	Motinagar	Ayodhya
93	Rauzagaon	Ayodhya
94	Haidergarh	Barabanki
95	Mijhaura	Ambedkarnagar
96	Sultanpur (Cooperative)	Sultanpur
97	Balrampur	Balrampur
98	Itai Maida	Balrampur
99	Tulsipur	Balrampur
100	Kundarki	Gonda
101	Datauli (Mankapur)	Gonda
102	Maizapur	Gonda
103	Chilwaria	Behraich
104	Parsendi	Behraich
105	Jarwairoad	Behraich
106	Nanpara (Cooperative)	Behraich
107	Siswabazar	Maharajganj
108	Babhnan	Basti
109	Rudauli	Basti
110	Munderwa (Corporation)	Basti
111	Pipraich (Corporation)	Gorakhpur
112	Hata	Kushinagar
113	Ramkola (P)	Kushinagar
114	Captainganj	Kushinagar
115	Seorani	Kushinagar
116	Khadda	Kushinagar
117	Pratappur	Deoria
118	Ghosi (Cooperative)	Mau
119	Sathion (Cooperative)	Azamgarh

Note: In the list, Cooperative and Corporation (Nigam) Mills are indicated accordingly; while all the remaining ones are of Private Sector.

Annexure-I

Comments on the "Sugarcane Transportation and Harvesting Cost in Uttar Pradesh" report

Comments prepared by Agricultural Economics Research Centre,
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1. General comments:

S. No.	Chapter	Page no.	Section	Para no., line no.	Observation	Suggestions
1	Chapter I	8, 9, 10	1.2	Complete section, except actual research questions	Section may not require - 'theory on research question'	directly and clearly report the research questions
2	Chapter I	10	1.2	Research Questions (Q1 to Q 5)	Research questions are too many and similar type	Try to report few, distinct research questions. They should focus on topic, may include some transportation and harvesting cost related questions
3	Chapter II	12	2.1	Review of literature	Way of mentioning, length of review, focus on objectives	The name and year (name, xxxx) is enough to mention, not the complete citation. It is there in references. Length may be restricted to max 5-8 lines on one review just focusing on how the work is relevant to this study, how their experience is useful for this study, what suggestions are provided. At the end one paragraph in summarising all the reviews and its relevance to present work.
4	Chapter II	16	2.3	Compete sections - 2.3, 2.4 and 2.5	The section on methodology may be followed by Sampling methodology and 'data and database uses'	Bring section 2.4 and 2.5 before 2.3 (Trend analysis). This will make flow - methodology, sample selection approach, data and data sources used (all as a theory section), followed by the Section on trend analysis of the selected districts and state as a whole.
5	Chapter IV	31+	4.1 and 4.2	Section 4.1 and 4.3	The census data profiling of selected districts and state is not related to the present work.	Most of the parts of section 4.1 and 4.2 may be excluded, i.e. Table IV-1 and related text, the secondary data based demographic descriptions of selected districts may be reduced to a small paragraph. This is not directly link with the study. The primary data based tables are important and should be retained.
6	Chapter VI	44	6.5	Table-VI-5	Table is blank	Table may be removed
7	Chapter VI	44	6.6	Table-VI-6	Fuel consumed (5.55 unit), and other cost (65075.00)	Is this litre/km or km/litre, please match with text in page 45, and also with results at page 52. The 'other' cost also looks too high. Please check this too.
8	Chapter VII	48	7.3	Table VII-3	Table is blank	Table may be removed
9	--	19	Figures and Tables	All figures and tables	variation in graph lines is not visible	length of vertical axis may be adjusted to make the variation visible in graphs. Similarly, in tables, the decimal figures may be reduced or removed, font size may also be reduced
10	References	60	--	all references	Uniformity, information	Uniform format may be applied to all the references (i.e. font type etc.), relevant information may be provided in all the references (i.e. author's name, journal/source name, year etc. without '….')
11	--	--	--	--	grammatical errors, sentences modification	Correct the grammatical errors in general. Sentence modification is needed at few palaces. Some observations are reported in next table.

Annexure-II

Comments wise Action Taken on the Draft Report entitled "Sugarcane Transportation and Harvesting Cost in Uttar Pradesh" report

s.no.	Observation	Suggestion	Action Taken
1.	Section may not require - 'theory on research question'	directly and clearly report the research questions	As per suggestion, research questions have been directly and clearly reported.
2.	Research questions are too many and similar type	Try to report few, distinct research questions. They should focus on topic, may include some transportation and harvesting cost related questions	As per suggestion, few district research questions focusing on topic, i.e., transportation and harvesting cost, have been reported.
3.	Way of mentioning, length of review, focus on objectives	The name and year (name, xxxx) is enough to mention, not the complete citation. It is there in references. Length may be restricted to max 5-8 lines on one review just focusing on how the work is relevant to this study, how their experience is useful for this study, what suggestions are provided. At the end one paragraph in summarising all the reviews and its relevance to present work.	As per suggestion, name and year has been mentioned with topic and not complete citation. The length has been restricted to all possible extent in respect of its relevance and usefulness to present study. At the end, all the reviews have been summarized with relevance to present study.
4.	The section on methodology may be followed by Sampling methodology and 'data and database uses'	Bring section 2.4 and 2.5 before 2.3 (Trend analysis). This will make flow - methodology, sample selection approach, data and data sources used (all as a theory section), followed by the Section on trend analysis of the selected districts and state as a whole.	As per suggestion, section 2.4 and 2.5 have been brought before section 2.3 (trend analysis)
5.	The census data profiling of selected districts and state is not related to the present work.	Most of the parts of section 4.1 and 4.2 may be excluded, i.e. Table IV-1 and related text, the secondary data based demographic descriptions of selected districts may be reduced to a small paragraph. This is not directly link with the study. The primary data based tables are important and should be retained.	As per suggestion, most of the parts of section 4.1 and 4.2 and the related text, the secondary data based demographic descriptions of the selected districts have been excluded; while primary data based tables are retained as such.
6.	Table is blank	Table may be removed	As per suggestion, Table-VI-5 has been removed.
7.	Fuel consumed (5.55 unit), and other cost (65075.00)	Is this litre/km or km/litre, please match with text in page 45, and also with results at page 52. The 'other' cost also looks too high. Please check this too.	The correct word is "Km/litre" and not litre/Km. It has been correctly matched with the corresponding text and also with results. 'Other cost' has been checked.
8.	Table is blank	Table may be removed	As per suggestion, Table-VII-3 has been removed.

9.	variation in graph lines is not visible	length of vertical axis may be adjusted to make the variation visible in graphs. Similarly, in tables, the decimal figures may be reduced or removed, font size may also be reduced	As per suggestion, length of vertical axis has been adjusted accordingly to make variations visible in graph. The decimal figures in Table have already been reduced to 'not more than 2', wherever these are. The font size is also reduced to all possible extent.
10.	Uniformity, information	Uniform format may be applied to all the references (i.e. font type etc.), relevant information may be provided in all the references (i.e. author's name, journal/source name, year etc. without '….')	As per suggestion, uniform format has been followed with relevant information in all the references.
11.	grammatical errors, sentences modification	Correct the grammatical errors in general. Sentence modification is needed at few palaces. Some observations are reported in next table.	As per suggestion, the grammatical errors have been corrected in general, alongwith sentence modification at few places.
12.	Editing related Comments		all editing related comments have been accordingly EDITED