CHAPTER - VIII

SUMMARY AND CONCLUSIONS
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Sugarcane is an important cash crop grown in India. Sugarcane cultivation and development of sugar industry runs parallel to the growth of human civilization and is as old as agriculture. The importance and use of sugarcane and sugar in the country’s socio-economic milieu is deep rooted and immense in the current day rural economy set up sugarcane cultivation and sugar industry has been focal point for socio-economic development in rural areas by mobilizing rural resources generating employment and higher income, transportation and communication facilities.

India is one of the largest sugarcane producers in the world. The sugarcane growing may be broadly classified into two agro climatic regions-tropical and sub tropical. The sub-tropical zone includes four States, i.e. 1) Uttar Pradesh (2) Bihar (3) Punjab (4) Haryana. The tropical zone includes five States, i.e. (1) Maharashtra (2) Andhra Pradesh (3) Tamilnadu (4) Gujarat and (5) Karnataka. In India there are two important marketing channels for sugarcane. They are

Channel 1: Producer → Sugar factory → Wholesaler → Retailer → Consumer
Channel 2: Producer → Processor (Gur) → Wholesaler → Retailer → Consumer

Government policies affect sugarcane cultivation in a number of ways. Various policies framed by government and micro level factors are influence sugar cultivation, cost and income of sugarcane farmers. The cost of production has significantly increased over a period of time and minimum support Price has not adjusted in accordance with increased cost. Thus, sugarcane farmers in India find themselves in a complex web of problems leading to declining profits. To understand and evaluate of the economy of sugarcane farmers micro level studies from time to time are necessary. In fact, case studies have been mostly used method of research on farm economics. The important objective of case studies is to compare the results characteristic of different classes or conditions eg: cost of production of farm in different size group. This research study is attempted with the following objectives.
8.1. Objectives

1. To examine the growth of Sugarcane cultivation in India
2. To examine the Socio Economic background of sample sugarcane farmers
3. To examine the Input – Output relationship in sugarcane cultivation
4. To examine the Cost and returns of sugarcane growers – who are selling sugarcane directly to sugar mills and
5. To examine cost and returns of sugarcane cultivation of Jaggery farmers.
6. To highlight the important problems of sugarcane cultivation at micro level.

8.2. Methodology

(a) Sample Selection

The discussion on methodology includes selection of the study area, sample households, tools of analysis. Multistage sampling technique is use in the sample selection process. The level (i) Selection of district (ii) Selection of sample villages and (iii) Selection of sample farmers.

The State of Andhra Pradesh is one of the major sugarcane growing States in India. In this State there are farmers whose sells the harvested sugarcane to the sugar factories and at the same time there are farmers who process the sugarcane manufacture Gur and sell to wholesalers.

(iv) Selection of District

In Andhra Pradesh State, Visakhapatnam district is one of the major sugarcane growing district in Andhra Pradesh. Further, in Visakhapatnam district there are three sugar factories and one huge famous Gur marketing yard at Anakapalli. In view of these two facts the Visakhapatnam district is selected for the study.

(v) Selection of Villages

For the purpose of selection of villages the command area of each sugar factory is the base. From the command area of each sugar factory two villages are selected. A total of six villages are selected. Further, for Gur farmers selection, the command area of the major Gur wholesale market is considered.
A total of six villages under Gur cultivation are selected. The details of selected villages are given below.

**Sugarcane Sugar Villages**
7. Pisinikada
8. Dibbapalem
9. Munagapaka
10. Chuchukonda
11. Kasimkota
12. Veduruparthi

**Sugarcane Gur Villages**
7. Kapsa Jagannadhapuram
8. Veeravalli Agraharam
9. Kothapally
10. Etikoppaka
11. Kodavatipudi
12. China Boddupalli

(vi) **Selection of Farmers**

For the purpose of selection of farmers the total sugarcane cultivators list is ascertained from village records possessed by the village secretary-a government official. This data is the base for the selection of farmers.

The population of sugarcane cultivators is stratified based on the size of the holding and from this sample farmer’s are selected. There are few sugarcane cultivators who have large operational holding. Therefore they are purposively eliminated. For purpose of selection of the sample farmer’s marginal farmers, small farmers and medium farmers are considered.

To know the difference in cost and returns of owner cultivator and tenant cultivator, proper care is taken to have representation of tenant farmers in the sample. In Visakhapatnam district sugarcane cultivation is of two types viz., plant and ratoon. Therefore while selecting the sample proper care is taken to have representation of both these groups in the sample.
(b) Data Base

This study is based on both secondary data and primary data. To analyse trends in growth of area, output and yield published data is collected from (a) Statistical abstract of Andhra Pradesh and (b) Center for Monitoring Indian Economy. Data relating Visakhapatnam district is collected from district Handbook of statistics.

(c) Period of Enquiry

The secondary data relates to the years from 1970-71 to 2010-11. The primary data collected relates to the 2010-11. Primary data is collected with the help of the pre designed and pre tested questionnaire.

(d) Tools of Analysis

The collected data is analyzed using different statistical techniques. Apart from averages and percentages appropriate statistical techniques are used wherever necessary. Compound Growth Rate is used to analyze temporal changes in area, production and yield of sugarcane, the formula is as follows. For purpose of analysis the total 40 years period is divided into two sub-periods, i.e. 1970-71 to 1989-90 and 1990-91 to 2010-11. The opening of the economy with different economic reforms is expected to have an impact on internationally traded agriculture goods which include sugarcane. To capture the impact reforms on sugarcane cultivation.

8.3. Profile of Visakhapatnam district

Visakhapatnam district is one of the North Eastern Coastal district of Andhra Pradesh lying between $17^0-15^1$ and $18^0-32^1$ Northern latitude and $18^0-54^1$ and $83^0-30^1$ Eastern longitude. It is bounded on the North partly by the Orissa State and partly by Vizianagaram District, on the South by East Godavari District, on the West by Orissa State and on the East by Bay of Bengal.
(a). Physical features

The distinct geographic divisions. The District presents two Geographic divisions. The strip of the land along the coast and the interior called the plain division and hilly area of the Ghats flanking it on the North and West called the Agency Division. The agency Division consists of the hilly regions covered by the Eastern Ghats with an altitude of about 900 meters dotted by several peaks exceeding 1200 meters.

(b). Soil and climatic conditions

Red loamy predominates in the district. About 70 percent of the land in the district is of Red Loamy soils. Black cotton soils are next important type of soil with a considerable area. 45 percent of the soils in the district are low in organic content and 55 percent in phosphorous.

The district receives and annual normal rainfall of 1191.5 mms of which South West monsoon accounts for 48 percent, North East contributes about 18 percent, summer showers and winter rains share the rest, agency and the plain area receive larger rainfall from the South West monsoon, while regions close to costal belt receive larger rainfall in the North East rainfall.

(c). Demographic conditions

As per 2011 census the total population of the district is 42.88 lakhs which constitute about 5 percent of the population of the state. Male population is 21.41 lakhs and 21.47 lakhs are females. The district sex ratio is 1003:1000 males. The density population is 384 persons per sq.km. The district has 16.03 lakhs workers which constitute about 42 percent of population. Among workers 36.31 percent are cultivators, 23.60 percent are agriculture labour and 40 percent are engaged in other works.

8.3.1. Agriculture

(a). Land utilization

The land use pattern in Visakhapatnam district shows that the Total Geographical Area (TGA) is 1134284 hectares in the year 2010-11. The forest
area is about 40 percent. The temporal trend in area under forest shows a decline; however, still a significant extent of TGA is under forest.

The Net Sown Area (NSA) which is used for cultivation purpose shows a distressing trend. 23 percent of the TGA is under NSA Barren land is about 12 percent. There is increasing in area under current follows both in absolute figures and also as percentage to TGA.

(b). Irrigation

The irrigation details of the district show that the Gross Irrigated Area (GIA) is 102986 hectares and NIA is 73299 hectares. The irrigation intensity as considerable increased from 110 to 141 during the last fifty years. In the beginning period tanks on predominance source on irrigation, however by the end period 2010-11, canals are emerged have predominance source of irrigation; check dams and hill streams are also irrigating a considerable extent of NIA.

(c). Crop pattern

Visakhapatnam district grows food crops, pulses, and commercial crops like sugarcane, oilseeds, groundnut and seasmum, among food crops area under paddy is very large constituting around 25 percent of the GCA. The cropping pattern the food crops constitute major extent of the major cropped area in the district. Area under paddy and other food crops show a consistent declining trend during the period under reference while area under sugarcane has increased substantially in absolute terms from 12662 hectares to 69190 hectares.

There is significant increase the output of food crops among the food crops the performance of paddy is impressive and that of pulses is very dismal, increase of sugarcane the output change show a mixed pattern or fluctuated.

The yield of paddy crop, pulses and sugarcane have considerable improve this impressive performance is attributable to different technological and cultural practicable in district agriculture.
(d). Marketing of Gur and Sugarcane

In Visakhapatnam district the sugarcane is generally marketed either by processing it into Gur (Jaggery) or directly sold to sugar factories for the manufacturing of sugarcane, Gur is marketed at Anakapalli regulated Gur market where as sugarcane sold to three sugar factories that are working in district.

8.4. Sugarcane cultivation in India

The sugarcane cultivation and sugar industry in India plays a vital role towards socio-economic development in the rural areas by mobilizing rural resources and generating higher income and employment opportunities. About 7.5 per cent of the rural population, covering about 45 million sugarcane farmers, their dependents and a large number of agriculture labours are involved in sugarcane cultivation, harvesting and ancillary activities.

There are about seven States in India where sugarcane is grown on a large extent of area. There are a number of varieties that are grown in India depending on the suitability of the soil. The area, output and yield, and sugarcane cultivation is subjected to fluctuate in response to policies of the government and also conditions of cultivation.

There are two types of sugarcane cultivation, plant and ratoon crops, as far as marketing of sugarcane is concerned there are distinctively two ways. (1) Sugarcane directly sold to sugar factories which are used for to production of sugar. (2) Sugarcane juice is processed and Gur (Jaggery) is manufactured and sold to wholesale market. In India, two marketing channels for sugarcane have been identified.

Channel: 1 Producer \(\rightarrow\) Sugar factory \(\rightarrow\) Wholesaler \(\rightarrow\) Retailer \(\rightarrow\) Consumer
Channel: 2 Producer \(\rightarrow\) Processor (Gur) \(\rightarrow\) Wholesaler \(\rightarrow\) Retailer \(\rightarrow\) Consumer

Growth in Area, Production and Yield is examined for the nine major sugarcane producing States for the period 1970-71 to 2010-11 by computing Compound Growth Rates. To capture the impact of economic reforms the total

The estimated Compound Annual Rate of Growth (CARG) is 1.87 per cent for the forty years which is not an impressive performance for the State of Andhra Pradesh CARG of area under sugarcane is just 1.12. Among the nine States considered Haryana, Assam and Bihar have negative growth rate.

A comparative picture of the CARG of the two sub periods indicate that only two States namely Haryana and Bihar show a declining trend for the total period and also for the two sub periods.

Comparatively in the post reform period, number of States registering declining trend growth rate are more than pre reform period.

The production of sugarcane in India has increased to 303630 thousand tons from 121600 thousand tons registering CARG of 3.00 per cent during the reference period. The estimated instability indices do not show much fluctuation.

Among different States Assam, Bihar show a declining trend. Barring Assam all States in India have registered an increasing trend growth rate during post reform period. The estimated value of CARG indicate that the post reform period the value is less than the pre reform period in majority of sugarcane growing States in India.

As far as spatial changes in the distribution of output it is noticed that the State of Maharashtra has increased its share. However, the State of Uttar Pradesh is highest in both the periods. In case of Andhra Pradesh there is marginal decline in its share to that of the country.

The yield of sugarcane has increased to 66554.33 tons/hectare in triennium ending 2008-11 from 48920 tons/hectare in triennium 1970-73, registering CARG rate 1.46 percent. Among different States Gujarat has higher
CARG (2.87) followed by Maharashtra (2.08) while it is lowest in Bihar (0.16) and Karnataka (0.21). In Andhra Pradesh, the yield has decreased in absolute terms during the period of reference. However, the estimated CARG show positive trend (1.55 percent) with little instability. A comparative picture of CARG in sugarcane yield show that for the country it is highest in pre reform period Vis-à-vis post reform period further. The performance of Gujarat and Tamil Nadu is impressive in pre reform period as CARG of yield is exceeding that of what is noticed for the country as a whole, the States Uttar Pradesh, Gujarat, Bihar and Maharashtra have declining CARG in post reform period. For the State of Andhra Pradesh the performance is comparative good in pre reform period.

8.4.1. Sugarcane cultivation in Andhra Pradesh

In Andhra Pradesh, there are eight major sugarcane cultivating districts. In Visakhapatnam district, the area under sugarcane has increased to 41880.33 hectares from 19174 hectares during period of reference; registering CARG of 3.00 percent which is highest than all other sugarcane growing districts. The values CARG show that, barring Nizamabad district, all districts have positive CARG values without wide fluctuations in area.

The production of sugarcane in different district though shows positive CARG values during the study period. However, considering the long forty years, the performance is not impressive for the State and for majority of districts. Among the major sugarcane growing districts, CARG of output is highest for Medak. For Visakhapatnam district the CARG is just 1.02. The value CARG for the two sub periods show that in post reform period, the output performance is comparatively good.

The yield of sugarcane in Andhra Pradesh has decreased from 79639 kg/hectare to 78200 kg/hectare during the reference period, registering CARG of 0.67 percent with marginal fluctuations.
In East Godavari District, the CARG is highest than other districts for the total period and sub periods. Further, from the values of CARG, the yield of sugarcane in major sugarcane growing districts in the State are more or less stagnant, with marginal fluctuations.

8.4.2. Response of sugarcane cultivation to price

In agriculture, for commercial crops, the output which is totally marketed, price plays an important role, in the decision of farmers to grow or to increase the extent under of particular crop. The hypothesis is the area and output of sugarcane will be positively respond to price. The analysis revealed that area response to MSP is more positive than response of output to price. This is noticed for the country, State and district level.

8.5. Socio Economic profile of the sample Households

The discussion on the socio economic profile of the sample household includes it was size wise classification of the sample, distribution of Head of the household, age, size wise distribution of household, levels of literacy, structure and value of assets etc., Altogether 240 sugarcane farmers (120 Gur farmers and 120 Sugar farmers) are selected.

(a). Distribution of sample households

The Farm size wise distribution of households revealed that marginal farmers are predominant, which is inconformity with the background of the study area.

(b). Distribution of household based on size of the family

The average size of the family about five members which is consistent with the general estimate of rural India, about 64 percent of the sample households have either five or less than five members. The distribution of head of the household based on their age shows that 56 percent are in the age group 35-60 years. This concentration of head of the household gives an advantage to the households on economic and general aspects.
(c). **Age wise and sex wise distribution**

Age wise composition of family members shows that 32 percent are in the age group 16-30 years followed by the age group 31-45 years. In other words there is concentration of family members in the productive age group, which is expected to influence on the supply of labour and enhance the earning capacity of the household.

Age and sex wise distribution of family members shows that there are 518 females and 627 males and sex ratio is estimated at 830 females for 1000 males. The pattern of distribution of age wise population does not show much variation between two types of cultivation and among different size groups. However, sex ratio estimates show much difference for Gur farmer there are 880 females for 1000 males, while in case of sugar farmers it is 780.

(d). **Literacy levels**

The levels of the literacy of the head of the household show that 17 percent had schooling up to primary education. 45 percent had secondary education and about 15 percent had education up to 10th class (High school). There is no much difference between two types of cultivation. As far as literacy levels of the head of the household is concerned.

Literacy levels of family members show that the incidence of illiteracy is high among females in all size groups them that of males. The number of females attending beyond high school is very less. In case of Gur farmers about 12 percent in case of males and 29 percent in case of females are illiterates. Among literate males a considerable proportion has figure 7th to 10th class level followed by primary school. In case of females also the same pattern of distribution is noticed. It is interesting to notice that there are members of sample farmers who have completed degree and post graduation course.

In case of sugar farmers, there is significant difference in the pattern of distribution of family members based on the levels of literacy as is observed.
Gur farmers. There is no striking difference in the sex wise literacy levels among different category of farmers in both type of cultivation.

(e). Distribution of workers

Distribution of the Head of the household and workers in the family based on main occupation is attempted. About 50 percent of the Heads of the sample household are depending on cultivation alone. 5 percent are agriculture labour and the rest are pursuing Non-Agriculture occupation or self employment. As far as occupation distribution of workers of the sample household show the similar pattern as is observed for Head of the household. Majority of the workers in both sexes are depending on agriculture either as cultivators or as Agriculture labourers. There is no considerable difference in the occupation wise distribution of workers between Gur and Sugar cultivation.

(f). Structure and value of Assets

All the assets reported to be possessed by the household are grouped into seven categories viz., (a) House value (b) Furniture value (c) Agriculture land value (d) Non Agriculture land value (e) Agriculture equipment value (f) Live stock value (g) others etc., The major asset value is agriculture land which constitute about 80 percent of the total value of the assets of the household. This is noticed in case of all size groups of farmers in both type of cultivation. The next important item is residential house followed by agriculture equipment.

Data on possession of agriculture equipment by farmers is also ascertained irrigation sets an ploughing equipment are the important agriculture equipment possessed by farmers. There are few households who possessed tractors and crushers.

(g). Details of land holdings

The average size operational holding of all sample farmers is estimated at 3.60 acres. the minimum holding size is 0.79 and the maximum holding is 11.47 acres. Leased in land by the sample farmers exceeds that of leased out
land. Data relating to operational holding of the sample farmers is given in tables 5.14-5.16. The average size of holding of marginal farmers is estimated at 2.39 acres (< 1 hectare). The total own land of all marginal farmers is about 275 acres. About 74 acres of land is taken under lease cultivation. The range of own land of this category of farmers is 0.79 acres to 11.47 acres.

The average operational holding of small farmers is estimated at 4.39 acres. The range of the own land of farmers belonging to this category is 2.57 acres to 5 acres. While the operational holding of the medium size of farmers is 8.38 acres, the range is 5.93 acres to 11.47 acres.

One important point that emerged from this analysis is that the marginal farmers comparatively taking land under lease which is more than the other two categories of farmers.

(h). Irrigation particulars of land holdings

The distribution of operational holding into irrigated and un-irrigated area revealed that 90 percent of the operational holding is irrigated and the major source of irrigation is Bore wells. Further, one interesting observation is conjunctive irrigation (C +W) in the study area. Among the three categories of farmers the conjunctive irrigation is comparatively high for medium farmers then the other two categories.

8.6. Resource use and Production Function Analysis

The basic challenge every farmer in agriculture faces is to increase output and minimum the cost. For this, one must know how efficiently the farmers are using currently the inputs, identify the inputs that are inefficiently used, and then measures can be suggested to efficiently use such inputs to increase production and also to minimize cost. In order to identify the efficient use of inputs, production function analysis is the relevant technique. This study used Cobb-Douglas Production Function for estimating elasticity of inputs used in production of sugarcane. Two equations of Cobb-Douglas function has been estimated by Ordinary Least Square (OLS) method. One equation for plant farming and another for ratoon farming.
8.6.1. Resource uses Gur Plant Crop

The production function analysis for the total farmers reveals that 82 percent of variation of farm output is explained by the explanatory variable used. The elasticity coefficient of expenditure, on seed ($x_2$) manure and fertilizer ($x_3$) ploughing charges ($x_4$) fixed capital ($x_6$) and land ($x_7$) are significant at probability level.

The sum of elasticity coefficient is close to 1 indicating constant returns. Further, the production elasticity of inputs for the three size groups indicates that explanatory variable capture about 80 percent variations and the sum of coefficient also reveal constant returns.

(a). Gur ratoon crop

The explanatory variables used are able to capture about 80 percent variation in output for the total sample. The sum of elasticity is estimated at 0.98 and hence supports constant returns in Gur ratoon crop. The coefficient values of labour, manure and fertilizer and fixed capital have high values significant at some probability level. This in a way suggests that production may be increased by increasing the level of use of these inputs.

(b). Sugar plant crop

The production elasticities of sugarcane farmer sugar plant crop reveal that the explanatory variable are explaining 70 percent of variation in farm output. The sum of production elasticity is estimated at 0.992 indicating constant returns to scale. Among different inputs, labour ($x_1$) ploughing charges ($x_4$) expenditure on manure and fertilizer ($x_3$) are important input contributing significantly to output.

(c). Sugar ratoon crop

For this type of cultivation, the estimated $R^2$ is 0.762, thus capture 76 percent variation. All the explanatory variable have the expected relationship with the dependent variable. Constant returns are suggested by the value of sum of elasticities of all explanatory variable land rent, ploughing charges,
irrigation charges and labour charges have high magnitude of elasticity coefficient.

A comparison of Marginal, Physical Productivity (MPP) and Marginal Value of Product (MVP) is attempted to know.

From the results of the analysis it is derived that in case gur plant crop further investment on fixed capital in not worthwhile. The investment on human labour should reduced to the extent where MVP becomes equal to price. For gur ratoon, expenditure on ploughing, manure and fertilizer and irrigation charges add more to output than other inputs.

For sugar plant and ratoon crop, the values of MPP and MVP suggest that expenditure on labour input, ploughing and irrigation charges need to be reduced.

The MVP of various inputs calculated at their geometric mean are compared to respective factor prices, with a view to know the efficiency of use of inputs. If the estimated ratio is greater than one indicates efficient use and Vice-a-Versa. The hypothesis is

a) The factors of production are efficiently used
b) There exists farm size differences in the efficiently use

For Gur plant crop, barring tractor, all other inputs are efficiently use. In fact there is no striking difference in between different size groups. In case Gur ratoon crop all inputs are efficiently used, and there is no much difference among different size groups. In case of Sugar plant and ratoon type all inputs are efficiently used.

8.7. Cost and Returns

The estimation of income and expenditure of sugarcane cultivation is made from two angles (a) Economic cost analysis and (2) cost concepts used in Farm Management Studies (FMS). The analysis is separately attempted for plant crop and ratoon crop for own land cultivation and tenant cultivation.
The total cost of production comprises total fixed cost and total variable cost. For Gur farmers, the total cost of production per hectare is estimated at Rs.1.33 lakhs of which TVC accounts for 78 per cent. Among different components of TVC, labour charges account for 36 per cent followed by machinery and cost of seed among the three size groups, the cost of production is comparatively high for medium size farms. One important conclusion that is drawn is Total Cost of Production has positive relationship with the size of the farm. Further, the cost on hired human labour in TVC and cost relating to rent on own land in TFC predominant. TC, TVC and TFC are comparatively more for medium farmers than the two categories comparison of cost of production between plant and ratoon crop revealed that cost of production is low for ratoon crop.

The TC of production of farmer’s sells sugarcane to sugar factory is separately analyzed. The total cost of production per hectare is estimated at Rs.1.04 lakhs of TVC accounts for 72 per cent. Among different components of TVC, the cost incurred on human labour accounts for nearly 24 per cent. There is positive relationship the size of the farm and the cost of production. Cost of human labour in TVC and cost relating to rent on own land in TFC is predominant. TC, TVC and TFC are comparatively more for medium size farmers. Comparison between cost of production between ratoon and plant crops revealed tat for ratoon crop it is lowest, which is attributable to TVC.

Cost of cultivation analysis based on FMS cost is also attempted to know the real earnings of the farmers and his family for management of risk, labour, use of land and capital. For purpose of analysis, Cost A₁, Cost A₂ and Cost C are considered, Farm Business Income (FBI) is estimated.

For sugarcane ratoon crop the paid out cost (Cost-A₁) is estimated at Rs.62388 for owner cultivator, and at Rs.70586 for tenant cultivator, among different components of Cost A₁, labour cost is significant. Cost C is estimated at Rs.98, 205 and Rs.106403 for owner and tenant cultivator respectively. Among the three categories of farmers, both Cost-A₂ and Cost-C are relatively
more for medium size farmers. Analysis of cost of production for Gur farmers and sugar farmers show the same pattern as is observed for the total sample.

It is observed that there are variations in the cost of production among the sample farmers. In view of this, it is pertinent to know whether the observed differences are statistically significant or not for which coefficient of variation is estimated. The values of C.V suggest that the variation is not statistically significant. However, from the value of C.V there is conclusive evidence to indicate that whatever the variation is noticed it is comparatively high for small farmers in Gur (plant and ratoon) cultivation. In case of sugar it is high for sugar plant and for medium size farmer in ratoon crop.

8.7.1. Returns of sugar cultivation

To measure profitability of sugarcane cultivation returns against cost of cultivation is estimated for Gur and sugar farmers separately for plant and ratoon crop. Three important measures are considered (a) Gross Income (b) Farm Business Income (c) Farm Income

The Gross Income (G.I) per hectare for Gur farmers is estimated at Rs. 1.42 lakhs for plant and Rs.1.23 lakhs for ratoon crop. However, the estimation of Farm Income (Gross Income – Cost C) shows a different picture. Farm Income for ratoon crop is Rs. 24,726 per hectare as against Rs. 16888 for plant crop. The F.I is more for ratoon crop. This is noticed for all size groups as well as for total farmers. This is due to fact that Cost-C for ratoon crop is relatively less for plant crop. The FBI (Gross Income – Cost-A₁), which is considered as the real measure of earnings of the farmer by Farm Management Studies is also estimated. FBI is estimated at Rs.60,428 and Rs.60543 for plant and ratoon crop respectively.

The analysis of FI and FBI does not indicate any conclusive evidence regarding the pattern of relationship between the size of the farm, FI and FBI.

The FI for tenant Gur cultivation is around Rs. 12,269 for plant crop and Rs.16528 for ratoon crop. While FBI is estimated at Rs.52,230 per hectare for
plant crop and Rs. 52345 per hectare for ratoon crop. In case of four types cultivation small farmers have comparatively high FBI.

In case of sugarcane sugar farmers the estimate of FI shows a distressing picture because for all the three categories of farmers, in both type of cultivation, Cost-C exceeds Gross Income (G.I). FBI for the three categories of farmers also do not show encouraging scenario.

In case of tenant sugarcane sugar farmers the picture is much distressing than that of owner cultivator.

8.8. Cost Returns Ratio (CRR)

The Cost Returns Ratio (CRR) is estimated. Considering the Gross Income (G.I) and Total Cost (T.C). Table 7.28 gives these details. For Gur farmers, the ratio is comparatively high for ratoon crop. It is estimated at 1.19 for owner and 1.10 for tenant. There is much difference in the CRR among the three categories of farmers.

In sugar farmers, the CRR values show very distressing and discouraging picture. The situation is much worse for tenant farmers. The estimated CRR for tenant farmers, for total sample is 0.74 and 0.75 for plant and ratoon crop respectively. The estimated CRR for sugar owner cultivator is marginally better than tenant cultivator.

This situation is a result of steep hike in the prices of various inputs that goes into production and MSP of sugarcane crop is not adjusted proportionately to changes in cost. This low CRR in sugarcane cultivation is to be viewed seriously by policy makers to avoid, further distress among sugarcane growers. If this problem is not addressed with appropriate policy measures, may lead to crop holiday or shifting to other crops.

8.9. Important conclusions

- The estimated Compound Annual Rate of Growth (CARG) of area under sugarcane crop for the country as a whole is just 1.82 percent which is not impressive considering the 40 years period for which the CARG is estimated.
Among different major sugarcane growing states in India, U.P State the area is very large compared to other states.

In State Haryana, Assam, and Bihar the CARG has revealed a deceleration.

The values of CARG and instability indices show that there is no clear pattern of association between trend growth rate and instability indices as States with positive and negatives growth rates show higher values of instability indices.

Among the two periods considered for analysis, comparatively in the post reform period, number of states registering declining rate are more than in pre reform period.

The CARG of sugarcane output is estimated at 3 percent for the country the estimated instability indices do not reveal much variation.

Among different States, the performance of Gujarat, Maharashtra and Tamilnadu is impressive. In fact, in Maharashtra and Gujarat the production of sugarcane has phenomenal increase.

The estimated values of CARG of output suggest that during post reform period, there is less growth.

As far as yield of sugarcane crop, the analysis shows that, all States show positive trend with less fluctuations. Among different State in Tamilnadu the increase in absolute term is high, while Gujarat has highest CARG value.

During pre reform period, the CARG values of yield are more than in post reform period.

The operational holding size wise distribution of sample household revealed predominance of marginal and small farmers.

50 percent of the head of sample household are exhaustive cultivators and 25 percent are agriculture labourers.

The most important agriculture equipment owned by the sample farmers is bore wells followed by sugarcane crushers.
• The source wise distribution of irrigated area shows that wells are predominance source of irrigation among wells the bore wells are predominant.

• The estimated production elasticities of various farm inputs used revealed that the inter farm variation of farm output is explained by the explanatory variables (independent variables) used in the production function.

• The sum of production elasticities indicated constant returns to scale. This is noticed for gur plant crop, ratoon crop and sugar plant crop and ratoon crop.

• The explanatory variables used in the production function of different size groups also shows the same result as pointed above with little variation in co-efficient values.

• Four important inputs are found to have significant influence on output. They are (a) Expenditure on labour (b) Expenditure on fertilizer and manure (c) Expenditure on irrigation charges (d) Fixed capital expenditure. These four variables have significant co-efficient values observed to influence the output for all size groups of farmers.

• The values of MPP and MVP showed that input manure and fertilizer and irrigation charges, machinery important tractor have higher values than other inputs used. Further, these results point out that marginal farmers need to reduce expenditure on labour and investment in fixed capital, small farmers need to reduce expenditure on labour, ploughing charges and no further investment in fixed capital. In case of medium farmers, they have to reduce expenditure on labour and no more further investment on fixed capital.

• The ratio of MVP to factor cost indicated that there is efficiency in use of inputs and there is no much difference in the input use efficiency among different size groups and also between ratoon and plant crop. This is noticed in case of both gur and sugar farmers.
The economic analysis of cost of production showed that the Total Cost (TC) of production for Gur plant farmers is estimated at 1.33 lakhs. 1.14 lakhs for ratoon crop.

The TC of production of sugar plant crop is estimated at Rs.1.04 lakhs. Rs.0.83 lakhs for sugar ratoon crop.

Among different components of Total Variable Cost (TVC) labour charges account for 36 percent followed by cost of machinery and seed.

Cost relating to rent on own land is a predominant cost in Total Fixed Cost (TFC). TC, TVC and TFC are comparatively more for medium farmers.

The Total Cost of production has positive relationship with the size of the farm. This is noticed for sugar and gur farmers in both plant and ratoon crops.

There is no much variation the Total Cost of production among the sample farmers.

However, from the values of Coefficient of Variation (CV) it can be noticed that whatever the variation exists it is comparatively high for marginal farmers than the other categorized.

The gross income per hectare for plant crop is estimated at Rs.1.42 lakhs and for ratoon crop it is Rs.1.23 lakhs for Gur farmers. Among different size groups the gross value of output is for small farmers is highest.

The farm business income is estimated at Rs. 64, 428 for plant crop and Rs.60, 543 for the Gur ratoon crop. The FBI is comparatively more for small farmers.

In case of sugar farmers, the G.I per hectare is Rs. 77,427 for plant crop and Rs.63,323 for ratoon crop. Whereas F.I shows losses to all the three categories of farmers as cost ‘C’ is more than G.I. The FBI also do not reveal encouraging picture.

The FBI for the total sample is Rs. 7,698 and Rs. 13,838 for plant and ratoon crop respectively. The estimated FBI though ositive at it is very less indicating that sugarcane farmers are not able earn enough for all the toil of
their family. Among Gur and Sugar cultivators it is Gur cultivation the incomes are comparatively high. This is attributable to low cost of production and high Gur prices.

- The Cost Returns Ratio (CRR) is estimated. Considering the Gross Income (G.I) and Total Cost (T.C). Table 7.28 gives these details. For Gur farmers, the ratio is comparatively high for ratoon crop. It is estimated at 1.19 for owner and 1.10 for tenant. There is much difference in the CRR among the three categories of farmers.

- In sugar farmers, the CRR values show very distressing and discouraging picture. The situation is much worse for tenant farmers. The estimated CRR for tenant farmers, for total sample is 0.74 and 0.75 for plant and ratoon crop respectively. The estimated CRR for sugar owner cultivator is marginally better than tenant cultivator.

- This situation is a result of steep hike in the prices of various inputs that goes into production and MSP of sugarcane crop is not adjusted proportionately to changes in cost. This low CRR in sugarcane cultivation is to be viewed seriously by policy makers to avoid, further distress among sugarcane growers. If this problem is not addressed with appropriate policy measures, may lead to crop holiday or shifting to other crops.

8.10. Problems of sugarcane in the study area

The technical analysis on the input output relationship, input use efficiency and cost and returns throws light on the technical aspect of the sugarcane cultivation. The researcher during his course of visit to different sample villages for collecting data has noted down the problems being faced by the sugarcane farmers as expressed by them. Some of these the important of these problems are given below which help to suggest appropriate policy measures. These problems are:
Increase in the cost of production due to increase input cost, especially the cost of labour. There is scarcity of labour as stated by farmer is largely due to implementation of Mahatma Gandhi national Rural Employment Guarantee Act during the season of agriculture operation. This scarcity of labour has increased the wages. In fact this scheme is to be implemented during non agriculture but the local implementing authority is not adhering to this norm.

These farmers are not aware of recent techniques of production and farm management which help to increase output and reduce cost.

As bore wells are important source of irrigation for sugarcane cultivation in the study area, electricity power failures, lack of adequate power supply are affecting the irrigation which in turn affect the output, and weight of crop.

The MSP fixed by the government is not remunerative to the farmers in view of steep rise in cost of production, transportation and incidental costs.

Unless these problems faced by sugarcane farmers is solved by appropriate policy measures, sugarcane farmers may declare crop holiday (as happened recently for Paddy crop in Andhra Pradesh) which affect the sugar mills and eventually on the supply of sugar and gur.

8.11. Suggestions

Taking into consideration, the technical analysis of cost and returns, the problems of sugarcane farmers as pointed out sample farmers the following suggestions are given to sustain Sugarcane cultivation and to improve the economic conditions of sugarcane farmers.

✓ The Mahatma Gandhi National Rural Employment Guarantee Act has to be grounded strictly during non-agriculture season i.e. from April –June.
✓ In view of huge labour cost, appropriate capital intensive techniques (machinery to plant sugarcane stems, de-weeding and harvesting machines) are to be supplied by the government on subsidy basis or
made available. Farmers who can afford them will purchase. Once they are available in the village, farmers can hire them as they are doing in case of tractors and crushing machines.

✓ Sugarcane farmers need to be educated on recent techniques of cultivation and Farm Management by government extension department functioning at Mandal level.

✓ The sugarcane mills are to be strictly instructed to purchase cane immediately after harvest without loss of weight.

✓ The most important recommendation is, proper review of government policy of MSP. Present MSP is Rs.2200 per ton of sugarcane. This need to be increased to Rs.3000 per ton.

✓ Uninterrupted power supply need be ensured at least 8 hours in a day so that necessary irrigation from wells will be possible which effect the output