Chapter - VII

SUMMARY, FINDINGS, SUGGESTIONS AND POLICY IMPLICATIONS
7.1. INTRODUCTION

The Indian economy is basically an agrarian economy and development of this country largely depends on development of agriculture and agro-based industries. In an agricultural country like India the dual object of economic progress and general prosperity can be achieved by improving agricultural productivity. Since time immemorial, agriculture has been the main stay of the Indian economy in general and rural economy in particular. Agriculture in India has emerged as an indispensable part of rural economy, around which socio-economic privileges and deprivation revolve.

Agro industries, being a vital instrument to bridge the gap between agriculture and industries, can accelerate integrated growth of the two and thereby contribute to the development of rural economy. This sector is an engine to India’s economic development as it establishes a vital linkage between agriculture and industry.

Development of agro-industries can encourage the farmers to adopt modern techniques, to produce more of high-yielding crops and diversity cropping pattern so as to get higher income. On the other hand, they create the demand for farm products and thereby induce the farmers to develop new outlook towards agriculture and changing economic environment.
SUGARCANE

India has been known as the original home of sugarcane and sugar. There is ample evidence to show that India is the original home of sugarcane and also of sugar manufacture and sugar has been known to India for about 2000 years. India is one of the world’s largest producers of sugarcane and sugar. Sugarcane and sugar beet are two main sources of white crystal sugar in the world. At present, about 100 countries in the world are producing sugar from sugarcane and 35 countries from sugar beet. About 12 countries produce sugar both from sugarcane and sugar beet. India, Brazil, Thailand, Cuba, Mexico, China, Australia, Indonesia, US and Philippines are the leading sugarcane producing countries of the world. Therefore, sugarcane and sugar industry are the two sides of the same coin. Thus the present study focusses on both sugarcane and sugar industry

In agriculture sector, sugarcane is an important commercial crop in the country which shares 7.5 per cent of the total value of agricultural output, occupied about 46.8 lakh hectares of land with an annual sugarcane production of 2896 lakh tonnes (2002-03).

GLOBAL SUGAR PRODUCTION

The art of making sugar from sugarcane originated in India from where it spread to Cuba, Mexico, Jamaica, Malaysia and China. India is among the ten largest producers of sugar in the world and ranks as the largest sugar producing country in the world. India has a share of over 15 per cent and 45 per cent (40 to 47%) of the world’s and Asia’s sugar production, respectively. The
largest producer in Asia is India with an estimated production of 216 lakh tonnes during 2002-03.

India has maintained its position as the largest (largest sugar producer in 7 out of 10 years.) and the second largest (next to Brazil) sugar producing country in the world, having a share of about 15 per cent of the world’s sugar production.

GLOBAL SUGAR CONSUMPTION

India is also the largest consumer of sugar in the world even though per capita consumption of sugar in India is still 18 Kg. per annum. If the consumption of non-centrifugal sugar (Jaggery and Khandsari) is taken into account, the per capita consumption would reach the level of about 24 Kg. per annum. The overall consumption of the country of centrifugal and non-centrifugal sugar comes to more than 250 lakh tones. The growth in population and income in India is accompanied by the shift in the consumption of sugar from non-centrifugal sugar to centrifugal sugar, particularly after 1985-86.

India’s consumption of sugar has been 160 to 180 lakh tonnes per annum and having a share of over 13 per cent of the world’s sugar consumption. Among the ten largest sugar consumers in the world during 2000, India was the largest consumer of sugar in the world, with an estimated consumption of 165 lakh tonnes during 1999-2000, accounting for nearly 35 per cent of the estimated regional sugar consumption.

The analysis revealed that the world production of sugar exceeded global demand for sugar. The production of sugar in India for the sugar season
2006-07 is expected to reach 230-250 lakh tonnes, consumption of 196 lakh tonnes, the fulfillment of re-export obligation to the extent of 20 lakh tonnes and ending with a closing stock (inventory) of 56-76 lakh tonnes. As per the researcher analysis, the stock to consumption ratio would start increasing which would restrict the upward movement of sugar prices. There is immense scope for the sugar industry in Asia and general preference for sugar in the preparation of soft drinks.

In the new season (2007-08) the market will be shaped by developments in two sugar giants- Brazil the world’s largest sugar producer and exporter and India the world’s largest sugar consumer.

INDIAN SUGAR INDUSTRY

Indian sugar industry is the country’s second largest agro-processing industry. On the economic map of India, sugar industry occupies a unique position among various other industries of the country. This industry utilizes agro-based input for processing. The most outstanding feature of the sugar industry is the vital link between the factory (industry) and the cultivators (agriculture), whose interest and well being are interdependent. Obviously, sugar industry is an agro-industry par excellence and consequently serves as an important vehicle for carrying progressive influence into the country-side of India. Since the sugar factories are mainly situated in the rural areas, they are acting as an instrument of change in the socio-economic life of the rural sector.

As on September 30, 2003, there were 553 installed sugar mills in the country with the total capital investment of Rs.50,000 crores and with an
aggregate installed capacity of 180 lakh tonnes of sugar. Of these, 178 were in the private sector, 308 in the co-operative sector and 67 in the public sector. Out of 553 sugar mills, only 453 were in operation in the year 2002-03 and crushed 1944 lakh tonnes of sugarcane to produce 201.45 lakh tonnes of sugar.

About five lakh skilled and semi-skilled workers, including highly qualified and trained technologists, are directly employed in the sugar industry. It has provided indirect livelihood to another ten lakhs or so. Many other industries utilize by-products of sugar industry as raw material. About 50 million sugarcane farmers, their dependents and a large mass of agricultural labour are involved in sugarcane cultivation, harvesting and ancillary activities. Thus, the industry caters about 7.5 per cent of the rural population.

Sugar industry contributes about Rs.1800 crores to the Central Exchequer as excise duty and other taxes annually. In addition the state governments realized about Rs. 600 crores annually through purchase tax and cess on sugarcane. The total sugarcane produced in the country is valued at about Rs.30624 crores per year at the prevailing sugarcane price.

India entered the world market as an exporter of sugar in the year 1957. Under the Sugar Export Promotion Act (SEPA) of 1958, the government facilitated export of sugar as per the quantity allotted by the government. However, exports were undertaken in the years of surplus production and imports during the years of shortages.

The sugar scenario has changed during the last one and a half decade due to rapid changes in technology and science. New technological changes
improved yield, lowered costs which made Brazilian sugar prices the most competitive in the world scenario.

Under the liberalization and globalization, the policies adopted by the government since 1991, there are likely to be new policy initiatives in regard to sugar industry. The focus of the government’s new policy initiatives would render the Indian sugar industry more competitive and more growth oriented. Sugar factories all over the world have successfully persuaded the route of value addition to by-products for improving their financial health. Indian sugar industry is marching towards the same route in the interest of achieving long term sustainability.

The sugar industry is producing, apart from sugar, the molasses, bagasse and filter press mud as waste products. India has been facing a severe power, water and oil crises, most of the sugar factories in India are facing a financial crunch. Hence, it became necessary to think and act that the sugar complex must have not only sugar production but also utilization of the by-products for the profitability.

The sugar factory can become an additional source of producing good quality of water as a by-product; generate power by using bagasse, produce alcohol in the distillery and subsequently alcohol products like ethanol by using molasses and produce bio-compost by using filter press mud. The cost of production of the main product (sugar) decreases if the net profit from the by-products is deducted from the cost of production of the main product. Presently, Indian sugar mills are running in loss and have become unable to
compete in the global market. To increase competitive strength and withstand the competition the sugar mills in India have to invest heavily on diversification into ‘Sugar Ethanol cum cogeneration’ plants.

SUGARCANE AND SUGAR INDUSTRY IN KARNATAKA

The state of Karnataka has occupied an important place among the sugarcane growing states of the country by contributing 8.36 per cent to area and 11.22 per cent of the total production of sugarcane. The state covered an area of 3.85 lakh hectares of cane with the total production of 324.79 lakh tonnes during 2002-03.

As on September 30, 2005 there were 48 installed sugar factories in the state. Of these 23, 22 and three were in the private, co-operative and public sector, respectively. Out of 48 factories, 38 sugar factories were operating in the state with an aggregate installed capacity of 113050 tonnes crushing per day (TCD). The production of sugar in the state reached 17.83 lakh tonnes during 2002-03.

Need for the Study

In Karnataka, Bagalkot district holds the second place (next to Belgaum) in respect of cane area, sugarcane production, number of installed sugar mills, cane crushed, sugar production and so on. The area devoted to sugarcane has increased from 7.57 thousand hectares in 1980-81 to 58.69 thousand hectares (15.24%) in 2002-03 and it is expected to touch 80 thousand hectares for the sugar season 2006-07.
The highest increase of 8.45 per cent per annum in sugarcane area was recorded in Bagalkot district, followed by 3.88 per cent in Karnataka state and 1.78 per cent in India. The growth rates in area under sugarcane were found to be positive and significant during all the three periods (pre-liberalization, post-liberalization and overall periods). The increase in area under sugarcane was also due to the establishment of new sugar factories and attractive sugarcane price paid by the factories in the district. The production of sugarcane reached to 52.41 lakh tonnes (16.14%) during 2002-03. The growth rates in the production and productivity of sugarcane in Bagalkot district were higher compared to India and Karnataka.

As on January 15, 2007 the district has eight working sugar factories, of which seven were in private sector (public Ltd) and one was in co-operative sector. The share of sugar factories in the district to the sugar factories in the state during 2002-03 was 17 per cent, 17 per cent, 20 per cent, 22 per cent and 34 per cent in respect of number of operating factories, installed capacity (TCD), cane crushed, production of sugar and power generation potentiality, respectively.

Sugar recovery percentage of cane and duration of crushing season are the key parameters affecting conversion cost. Average recovery of sugar during 1980-81 to 2004-05 was found to be 10.84 per cent in Bagalkot district as against the average of 10.36 per cent for Karnataka and 10.03 per cent for India during the same period.
Average duration of crushing season was found to be 180 days, 139 days and 137 days in Bagalkot district, Karnataka and India respectively during the same period. Bagalkot district has power generating potential of 170 MW from its eight (as on January 15, 2007) sugar factories. Sugar mill power generation system is considered as economical, saves fossil fuels and has little or no addition to harmful effects on environment.

The sugar factories in Bagalkot district have proved that factories can play an active role in rural development. These factories have undertaken various socio-economic development activities in their area of operation.

Thus, the district has made a good progress in the production of sugarcane and sugar and turned out to be the second largest sugarcane and sugar producing district in the state.

The present study is attempted to analyse various aspects of sugarcane cultivation and performance of sugar industry in Bagalkot district, in the context of new environment taking into account the linkage between the two.

No systematic study has so far been made with a specific objective of investigating thoroughly into the working and performance of sugar factories pertaining to economics of sugarcane cultivation in the context of LPG in Bagalkot district. The main aim of this analysis was to identify the factors influencing the performance of sugar industry with a definite objective of improving its performance.

The review of literature revealed that various studies have been conducted by the researchers on the performance of sugar industry on the one
hand and cultivation of sugarcane on the other. These studies focused either on sugar industry or on sugarcane cultivation, considering few aspects of the problem. But as stated in the beginning of this chapter, there is a strong linkage between sugar industry and sugarcane cultivation signaling the backward and forward linkages between agriculture and industry. Importance of this linkage has become more evident in the context of new economic environment which has widened in the area of operation of sugar industry.

But hardly few studies have been done at macro level taking into account this holistic approach. At micro level, especially in Bagalkot district of Karnataka state, no such study has been done. Bagalkot district is one of important districts in the state in terms of sugarcane cultivation and sugar industries. It holds second place in the state in this respect. The present study therefore aims at filling up this gap. Hence there is importance and the need for this study.

OBJECTIVES OF THE STUDY

The specific objectives of the study were,

1) To study the growth in area, production and productivity of sugarcane crop in India, Karnataka and Bagalkot district during pre and post liberalisation periods.

2) To analyse the cost and returns structure in planted and ratoon crops of sugarcane in Bagalkot district.

3) To assess the resource use efficiency in the cultivation of sugarcane crop in Bagalkot district.

4) To understand the problems faced by the farmers in production and marketing of sugarcane.
5) To analyse the growth and performance of sugar industry in India, Karnataka and Bagalkot district in terms of physical indicators during pre and post liberalization periods.

6) To evaluate the growth and performance of selected sugar factories in the district in terms of physical and financial indicators during liberalization period (2000-01 to 2005-06).

7) To examine the financial position of selected sugar factories in Bagalkot district.

8) To identify the factors influencing the performance of selected sugar factories and to evaluate the direction and magnitude of their influence during liberalization era in Bagalkot district.

9) To analyse the constraints in the production and marketing of sugar

10) To suggest appropriate policy measures.

HYPOTHESIS

1) There is a positive and significant growth in area, production and productivity of sugarcane crop in the study area.

2) The costs are higher in planted sugarcane crop compared to ratoon crop.

3) The resources used in sugarcane cultivation are not optimally used.

4) The cost of sugarcane cultivation decreases with every increase in the size of land holdings

5) Liberalization and globalization have negative impact on the working of sugar factories in the study area

6) Supply of sugarcane and working capital shortages have been the main production constraints to sugar factories.
7.2. METHODOLOGY

7.2.1. Sampling Procedure

Multistage stratified random sampling procedure was adopted to select samples for evaluating the objectives of the study.

7.2.1.1. Selection of Sugarcane cultivators

Karnataka is one of the important sugarcane growing states in India. It ranked fourth with respect to area under sugarcane (and production of sugarcane). Sugarcane, an important commercial crop grown in the state, plays a major role in the state’s economy. Hence, Karnataka state was purposively selected for the present study.

In the next stage Bagalkot district was selected for the analysis, as it ranked second (next to Belgaum) in terms of area and production of sugarcane. Since, Bagalkot district was formed during 1998-99, data were available since 1998. It is expected that the area under sugarcane will increase in the near future due to increased irrigational facilities after completion of Alamatti reservoir project. In view of this increased importance of sugarcane crop in the district, Bagalkot district was selected for the analysis.

In the third stage, three taluks of Bagalkot district, namely, Jamkhandi, Mudhol and Bilagi, were selected for the study based on the area under sugarcane. These taluks have largest area under sugarcane.

At the fourth stage, two villages were selected from each selected Taluk based on the largest area under sugarcane. The selected villages were Alagur
and Hirepadasalagi in Jamkhandi taluk, Malali and Gulagal Jambigi in Mudhol taluk and Kolur and Gudadinni in Bilagi taluk.

A systematic stratified random sampling technique was employed in selection of sample farmers. A representative sample was selected after giving due weightage to each strata. In all 240 sample farmers were selected.

7.2.1.2. Selection of sugar Industry

In selection of sugar factories for the purpose of evaluating the functioning of sugar factories, multistage random sampling procedure was adopted.

Karnataka state was selected at the first stage as it ranked third with respect to the total number of sugar factories installed next to Maharashtra and Uttar Pradesh.

In Karnataka, Bagalkot district was selected for an indepth analysis. Bagalkot district ranked second with respect to total number of working sugar factories in the state. Bagalkot district is also the second largest producer of sugar and sugarcane crusher in the state. Recently, more number of sugar factories have been operating in the area, signaling their importance in the economic growth of the district in particular and state in general. Hence, this district is selected for the present study.

To study the growth and performance of sugar factories in Bagalkot district as a whole all the seven sugar factories workings in the district (2005-06) were considered and they are-
1. Godavari Sugar Mills Ltd, Sameerwadi
2. Ryatar Sahakari Sakkare Karkhane Niyamit, Thimmapur
3. Nirani Sugars Ltd, Mudhol
4. Shri Prabhulingeshwar Sugars and Chemicals Ltd, Siddapur
5. Jamkhandi Sugars Ltd, Hirepadasalagi
6. Gem Sugars Ltd, Kundaragi
7. Bilagi Sugars Ltd, Badagandi
8. Badami Sugars Limited, Badami (stared crushing during 2006-07)

In the next stage, three taluks of Bagalkot district, namely Mudhol, Jamkhandi and Bilagi, were selected where sugar factories are concentrated.

One factory from Mudhol taluk and two from Jamkhandi taluk (though sugar factories are concentrated in Bilagi taluk, they were started crushing during 2002-03 and 2004-05, hence sufficient data were not available for the analysis, so we were unable to select sugar factories from this taluk) were selected for an in-depth of analysis of various aspects of sugar factory. Based on the availability of latest data, three factories were selected for the study. These sample units are,

1. Jamkhandi Sugars Limited, Hirepadasalagi (known as JSL),
2. Prabhulingeshwar Sugars and Chemicals Ltd, Siddapur (known as PSCL) and
Of these selected factories two (JSL and PSCL) were functioning under private (Public Ltd) and one (RSSK) in cooperative sector.

6.2.2. Nature and Sources of Data

The present study was based on both primary and secondary data.

6.2.2.1. Primary Data

The primary data relating to input costs, returns structure, cropping pattern, sources of finance, etc were collected from the selected farmers with the help of pre-tested, well structured schedules. These data were collected for the years 2004-05 and 2005-06.

For eliciting the opinion of the executives, chairman, directors and various department heads on the performance and working of the sugar factory, different schedule was used. These data pertained to the period 2000-01 to 2005-06.

6.2.2.2. Secondary Data

The secondary data pertaining to the sugarcane cultivation for a period of 25 years (1980-2005) were obtained from various publications and authoritative sources.

The time series data relating to the growth and performance of sugar industry in India, Karnataka and in Bagalkot district were also collected for a period of 25 years (1980-81 to 2004-05) from various publications and government offices.
In order to make an in-depth analysis of the performance of the three sugar factories selected, a set of physical and financial variables were considered. The time series data for the period of six years from 2000-2006 were collected from the yearly summary statements of individual sugar factories. These selected sugar factories were started (regular and crushing) operating during 2000-01. Hence data pertained to the period 2000 to 2006.

6.2.2.3. Period of Study:


6.2.2.4. Identification of Performance Indicators

The present study identified 32 performance indicators having close association with the functioning of the selected sugar factories. Out of these, 10 variables were considered as physical indicators and 22 variables as financial indicators.

In order to analyse the performance of the three selected sugar factories, a set of physical and financial variables were considered and the time series data from 2000 to 2006 were collected.

6.2.3. Analytical Tools and Techniques employed.

Data collected from primary and secondary sources were analysed using different techniques.
6.2.3.1. **Tabular Analysis**

Tabulation is the basic device specially designed to bring out orderliness in the given data mass. The data in its arranged tabular forms were used to compute simple descriptive statistics like averages, percentages, etc.

6.2.3.2. **Compound growth Rate Analysis**

To study the changes in the area, production and yield (APY) of sugarcane on one hand and physical and financial indicators of the selected sugar factories on the other over a period of time, the growth rate analysis was carried out using exponential functional form.

6.2.3.3. **Functional Analysis**

A modified Cobb-Douglas type of production function was fitted to study the resource use efficiency in the production of sugarcane.

6.2.4.4. **Ratio Analysis**

The financial ratio analysis was carried out to evaluate the financial performance of the selected sugar factories in Bagalkot district.

6.2.4.5. **Principal Component Analysis (PCA)**

The PCA was adopted to identify the most important physical and financial indicators influencing on the performance of the selected sugar factories.
7.3. MAIN FINDINGS OF THE STUDY

7.3.1. Growth in Area, Production and Yield of Sugarcane

It is clear from the analysis that at all India level growth rates of area, production and yield of sugarcane were positive and significant during pre-liberalization period. Area contribution is more than the yield contribution in increasing sugarcane production at all India level during pre-liberalization period. But during post-liberalization period, though area increased significantly, insignificant positive growth was observed in case the of production and yield growth was negative and insignificant.

With respect to Karnataka state, analysis revealed that during pre-liberalization period, the area and production growth rates were positive and significant, but that of yield was positive and non-significant. The picture has changed during post-liberalization period, though area grew significantly, production and yield showed negative and insignificant growth. This was mainly due to draught during 2003 to 2005 and wholly aphid disease.

At the district level, there was positive and significant growth in area, production and yield during pre-liberalization period. The study found that the increase in sugarcane production during post-liberalization period was mainly due to increase in area under sugarcane and establishment of new sugar factories in the district.

It is clear from the analysis that the growth rates in area, production and yield of sugarcane in the district were higher compared to India and Karnataka state during the study period.
7.3.2. Cost and Returns Structure of Sugarcane Cultivation

From preparatory tillage to harvesting of sugarcane, many operations are involved. The study observed that in case of the sugarcane plantation crop, sample farmers incurred a total cost of Rs.9567, Rs.9372, Rs.9065, Rs.8917 and Rs.9334 (per acre) on labour input under marginal, small, semi-medium, medium-large and overall categories of farmers, respectively. On overall category of farms, the cost of human labour (Rs.5674) was the main item which accounted for 60.79 per cent of the total labour cost for the plantation of one acre of sugarcane crop, followed by tractor power (28.61 %) and bullock labour (10.61 %).

The total material cost of sugarcane cultivation amounted to Rs. 13229 on overall category of farms and the figures for marginal, small, semi-medium and medium-large categories of farms were Rs.13766, Rs. 13207, Rs.12880 and Rs.12048 per acre, respectively. The study found that total material cost decreased with increase in the size of land holding. FYM (21.88 %) and chemical fertilizers together accounted for 51.81 per cent of the total material cost on overall category of farms in the study area. The study observed that the farmers in the study area applied (used) more than the required dose of chemical fertilizers for both planted and ratoon crops and applied it on their own knowledge without testing the soil. Most of the sample farmers applied fertilizers as late as three to four months prior to harvest. They were not fully aware of spreading of FYM. Seed sett was the next item of cost which accounted for 26.72 per cent.
The total cost of production of planted sugarcane crop was Rs.30925 per acre for the overall category of farms and the total costs incurred by marginal, small, semi-medium and medium-large category of farms were Rs.31768, Rs.31007, Rs.30050 and Rs.29381, respectively. The study found that the total cost of sugarcane cultivation decreased with increase in the size of landholding. This indicates the economies of large scale production in the study area.

Taking all the farmers together, the variable costs (Rs.24368) per acre accounted for 78.80 per cent and the fixed costs (Rs.6557) accounted for 21.20 per cent. The material cost accounted for the highest (42.78 %) share in the variable cost, followed by human labour (18.63 %), tractor power (8.63 %), interest on working capital (5.84 %) and bullock labour (3.20 %). In the total fixed cost, the rental value of owned land (Rs.5513) accounted for the major share (17.83 %), followed by interest on fixed capital (1.57 %) and others (1.81 %).

The total cost of sugarcane production per acre was Rs. 30925 and gross returns and net returns generated from the production of sugarcane worked out to be Rs.49312 and Rs.18386, respectively for the overall category of farms during 2005-06. The study found that the per acre gross returns generated in the production of sugarcane for marginal (Rs.53773) and small farmers (Rs.49663) categories were higher compared to semi-medium (Rs.47234) and medium-large (Rs.48737) categories of farmers.

The average yield of sugarcane per acre obtained by the overall category of farms, marginal, small, semi-medium and medium-large farmers were 39.83
tonnes, 40.24 tonnes, 40.12 tonnes, 38.68 tonnes and 39.79 tonnes, respectively. The study found that the marginal and small farmers were able to get more yield and realized higher gross returns in the study area. This was mainly due to the greater care given to the cane crop by the marginal and small farmers.

The net returns per acre for marginal, small, semi-medium, medium-large and the overall category of farms were Rs. 22006, Rs.18656, Rs.17184, Rs.19353 and Rs.18386, respectively. The ratio of costs to returns (Benefit Cost Ratio) worked out to be 1.69, 1.60, 1.57, 1.66 and 1.59 for the above categories of farms, respectively. Hence the results indicated that there is much scope to increase the income of the farmers by increasing sugarcane cultivation. It is interesting to note that the B:C ratios on marginal (1.69) and medium-large(1.66) categories of farms were higher than on small (1.60) and semi-medium (1.57) categories of farms. This was mainly due to higher returns in marginal farms and lower cost in medium-large categories of farms.

7.3.3. Cost and Returns Structure of Ratoon Sugarcane Crop

The total cost incurred on labour input in the cultivation of ratoon sugarcane crop by the overall category of farms was Rs.6030, of which human labour (Rs.4535) accounted for 75.21 per cent, bullock labour (Rs.909) accounted for 15.07 per cent and tractor power (Rs.586). The study observed that the wages labour for both planted and ratoon sugarcane crop decreased as the size of landholdings increased.
The total material cost of ratoon sugarcane crop amounted to Rs. 6212.50 on overall category of farms, of which chemical fertilizers (Rs.3523) accounted for 56.71 per cent, followed by irrigation (24.9 %), manures (7.53 %), pesticides (6.39 %) and electricity (4.47 %).

The total cost of cultivation of ratoon sugarcane crop was Rs.19771 for the overall category of farms, of which the variable costs (Rs.13222) accounted for 66.88 per cent. In the variable cost, material cost (Rs.6212.5) accounted for the highest share (31.42 %) where as in the fixed cost, rental value of land (Rs.5513) accounted for the highest share (27.88 %).

The gross returns and net returns per acre generated from the production of ratoon sugarcane were estimated to be Rs.39394 and Rs.19623, respectively for the overall category of sample farms in the study region. The net returns were found to be higher in case of medium-large (Rs.22812) category of farmers followed by semi- medium (Rs.21759), small (Rs.19480) and marginal farmers (Rs.16439). The returns per rupee of investment were Rs.2.15, Rs.2.13, Rs.1.99 and Rs.1.81 for the above mentioned categories of farms, respectively.

For the overall category of farms, it was Rs.1.99 on each rupee of cost incurred. The study found that gross and net returns per acre of ratoon sugarcane increased as the area under crop increased. The per acre net returns obtained by medium-large (Rs.22812) and semi-medium (Rs.21759) farmers were higher than that of marginal (Rs.16439) and small (Rs.19480) farmers per acre.
7.3.4. Comparative Analysis of Planted and Ratoon crops of Sugarcane

The variable costs per acre for the planted crop (Rs. 24368) were found to be much higher compared to those incurred on the ratoon crop (Rs. 13222). This was due to the absence of seed cost under the ratoon crop. There was no such difference in the case of fixed costs.

The per acre yield under the planted cane crop was found to be [39.83 tonnes] higher compared to the ratoon cane crop (35.53 tonnes). Despite having higher yield under the planted cane crop the profits per acre were found (Rs. 18386) to be lower compared to the profits obtained under the ratoon cane crop (Rs. 19623) on the overall category of farms. This was mainly due to lower seed set cost per acre incurred under the ratoon cane crop.

The average total cost and profit per tonne of sugarcane under ratoon crop were Rs. 556.46 and Rs. 552.29, respectively. The corresponding items under the planted crop were Rs. 776.42 and Rs. 408.58, respectively. On an average, each rupee invested under ratoon cane crop generated an income of Rs. 1.99 which was higher compared to Rs. 1.59 under the planted cane crop. In other words Benefit Cost Ratios were 1.99 in case of ratoon crop and 1.59 in case of planted crop on the overall category of farms.

7.3.5. Resource Use Efficiency

The functional analysis revealed that 92 per cent of the variation in sugarcane production was explained by nine independent variables included in the model. In the production of sugarcane, the regression coefficient of land (sugarcane acreage), farm yard manure and other manures (fish, poultry, pig,
varmi compost) and electricity were positive and highly significant at 1 per cent probability level. The regression coefficient of human labour (-0.7139) was negative and significant at 5 per cent probability level. The elasticity coefficients for bullock labour and tractor power (-0.6351), seed sets (-0.1974), chemical fertilizers (-0.1628) and irrigation (-0.2328) were negative and insignificant. The estimated elasticities of sugarcane production indicated increasing returns to scale (1.3551) in the case of pooled farmers.

7.3.6. Opinion of sample farmers about inputs used

From the opinion survey of the sample farmers, it was revealed that majority of the farmers adopted modern tools and implements to cultivate sugarcane, which helped in reducing the cost and they are not aware of proper utilisation of fertilizers. Majority of them are not aware of WTO and its implications. But they feel that due to government liberal attitude they are able to get reasonable amount of credit at subsidized rates, though not sufficient.

Most of the farmers found labour as a major problem. Most of them sold their produce to sugar factories because of good returns. But the problems faced by the farmers in marketing of sugarcane to factories were, improper weighment, long distance and bad roads. Otherwise farmers feel a very bright future for sugar factories in the study area.

7.3.7. Performance of Sugar industry - India, Karnataka and Bagalkot District

Growth rates in the number of sugar factories, cane crushed, production of sugar and installed capacity in India were found to be positive and
significant during pre (1980-81 to 1990-91) and post liberalization periods (1991-92 to 2004-05). The positive and non-significant growth rates were observed in case of recovery percentage of sugar during these periods. However, positive growth rates during pre-liberalisation period and negative (but significant) growth rates during post-liberalization period were observed for the duration of crushing season and capacity utilization. Positive and significant growth rate was observed for molasses production during pre-liberalisation period and it was positive and non significant during post-liberalisation period.

There were considerable increases in number of factories, cane crushed, production of sugar and installed capacity in Karnataka state during the study period. Positive and significant growth rates were found in the above mentioned physical indicators during pre and post-liberalisation periods in Karnataka. The positive (0.39%) and significant (at 5% level) growth rate was observed for recovery percentage of sugar from cane during pre-liberalisation period and it was positive and non-significant during post-liberalisation period. The positive growth rate (2.09%) was observed for the duration of crushing season during pre-liberalisation period and it was negative (-1.79%) during the post-liberalisation period. The production of molasses had significantly increased during post-liberalisation period.

The compound growth rates in respect of physical indicators, like cane crushed, sugar produced recovery percentage of sugar and installed capacity in Bagalkot district had increased and were found to be significant during pre and
post-liberalisation periods. The growth rates in respect of number of sugar factories and molasses production in the district were also found to be positive and significant (at 1% level) during the post-liberalisation period. Positive (4.05%) and negative (-2.64%) growth rates for the duration of crushing season were observed during pre-liberalisation period and post liberalisation period, respectively.

7.3.8. Performance of Selected Sugar Factories

Growth rates in respect of physical indicators (cane crushed, sugar production, net duration of crushing season, capacity utilization) of JSL and PSCL (under private sector) had increased and were found to be positive over the study period. The positive and significant growth rate was observed for net duration in JSL during the same period. In RSSK (co-op sector), all the above indicators were negative and non-significant. The positive and non-significant growth rates were found for recovery percentage of sugar, molasses production and power generation in JSL and were negative and non-significant in PSCL and RSSK over the study period.

The selected sugar factories, JSL, PSCL and RSSK, did not expand their initial crushing capacities (2500, 3500 & 2500 TCD, respectively) during the study period. It is important to note that the overall average recovery percentage of sugar in all the selected sugar factories was above 10 per cent (except during 2000-01 in JSL) through out the study period and even it was recorded to 12.05 per cent in PSCL during 2000-01.
The growth rates in the financial indicators, viz., share capital, reserve funds, owned funds, current assets, borrowings, total liabilities and total sales were found positive and significant in JSL during the study period (remarkable growth rate was registered in JSL due to the partial trial and partial commercial season of 2000-01). Positive and non-significant growth rates were observed for fixed assets, total assets, current liabilities, gross income and total expenditure in JSL over the study period.

The financial indicators such as share capital, owned funds, current assets, total assets, borrowings, total liabilities, total sales, gross income and total expenditure in PSCL had increased over the years and were found to be positive and non-significant during the study period. The negative and non-significant growth rates were observed for fixed assets and current liabilities in PSCL over the study period. There was no reserve fund in PSCL during the study period.

In RSSK, the financial indicators, such as share capital, fixed assets, total assets and gross income had increased and were found to be positive and significant over the study period. The growth rates in respect of reserve funds, owned funds, borrowings, total liabilities and total sales were negative and non-significant. Positive and non-significant growth rates were observed for current assets, current liabilities and total expenditure in RSSK during the study period.

The average net profits were negative in all the three selected sugar factories over the study period due to higher fixed cost and higher rate of
interest (during the establishment period 2000-2005). But it is significant to note that the PSCL made profit during 2001-02, 2003-04 and 2005-06 whereas JSL and RSSK made profits only during 2005-06 over the study period. It was appreciated that all the selected sugar factories (viz. JSL, PSCL and RSSK) had earned profits after completing their establishment period (2005-06).

7.3.9. Ratio Analysis

The current ratio was greater than unity in JSL and PSCL (private sector) in all the periods. But it was less than unity in the case of RSSK (co-op sector) in all the years of study period. The acid test ratio of JSL was found to be (1.067) above the standard ratio of 1:1 during the study period which indicated that the JSL had maintained adequate cash balances to meet day-to-day cash needs of the factory. But it was below the standard ratio of 1:1 in the case of PSCL (0.739) and was negative in the case of RSSK (-1.010) during the study period. The current assets to total assets ratio was higher in JSL (54%) than PSCL (38%) and RSSK (38%).

The inventory ratios of JSL (0.954) and PSCL (0.925) were found to be less than unity in all the years of the study period, indicating that these factories did not depend much on the net working capital to form their current assets. The liquidity position of JSL was quite satisfactory throughout the study period. It was not satisfactory in the case of PSCL. The liquidity ratios of RSSK were found to be unsound throughout the study period.

The total liabilities to owned funds and fixed assets to owned funds ratios were found to be above the prescribed norm in all the three selected
sugar factories (JSL, PSCL & RSSK) indicating poor financial structure and the problems of liquidation, respectively. The debt equity ratios of PSCL (2.756) and RSSK (2.138) were found to be within the standard norm of 3:1, indicating their financial soundness. But in the case of JSL (3.065), it was above this standard norm indicating its dependence on external debts.

The inventory turnover ratios of JSL (1.239) and PSCL (1.227) were more than one, indicating low stock exit and inventory was not well managed by these sugar factories. The total assets turnover ratios were found to be less than one in all the three selected sugar factories indicating their inefficiency of total turnover. The working capital turnover ratio was found to be more than 2 in PSCL, indicating greater efficiency of this factory in managing the working capital as compared to JSL (1.198) and RSSK (-2.653).

The efficiency of capital ratios were found to be less than unity in all the three selected sugar factories over the study period, reflecting inefficient utilisation of capital. The gross ratios of JSL, PSCL and RSSK were found to be more than 100 per cent during the establishment period which indicated that the total expenses of these factories were more than their gross income during their initial periods. Hence, all these three selected sugar factories incurred losses over the study period. This ratio was found to be the highest in RSSK (2515) indicating higher losses.

The analysis of profitability ratios (net profit to owned funds, net profits to total assets and net profits to total sales) indicated that except PSCL, the other two sugar factories (JSL and RSSK) had incurred losses in all the five
years of their establishment period and earned profits only during 2005-06. Hence the overall profitability ratios were found to be negative in all the three selected sugar factories over the study period. The tests of profitability of the selected sugar factories indicated that these factories did not properly utilize their fixed and total assets (except PSCL) during the establishment period.

The net worth of PSCL was positive during all the years of establishment period due to the increased assets compared to its liabilities. The net-worth was negative in the case of JSL (-539) and RSSK (-3241) due to excess liabilities compared to the assets. The private sugar factories (PSCL & JSL) had better networth compared to the co-operative sugar factory (RSSK). Same trend was followed in the case of net capital ratio. It was found to be more than unity in PSCL (1.201) and less than unity in JSL (0.932) and RSSK (0.651). The equity capital ratios were found to be less than 1.5 in all the three selected sugar factories, indicating lower accumulation of equity. The financial strength of PSCL was quite satisfactory throughout the study period compared to the JSL and RSSK.

The PSCL had higher fixed assets ratios [fixed assets to networth and fixed assets to total sales] compared to their respective counterparts, indicating the creation of sufficient fixed assets as proportions of networth and total sales. The RSSK (0.894) had higher fixed assets to total assets ratio compared to JSL and PSCL, which indicated that the fixed assets formed 89.48 per cent of the total assets.
7.3.10. Principal Component Analysis

The results of principal component analysis indicated that the most commonly identified (financial) indicators with high factor loadings in the JSL and PSCL were total liabilities, total expenses, current assets, total assets, borrowings, total purchases and total sales. The physical indicators like sugar production, cane crushed and capacity utilization were commonly included in the first component of JSL, PSCL and RSSK. The net worth was the only component commonly included in the second component of all the three selected sugar factories. The cumulative variation explained by the physical and financial indicators relating to the performance of selected sugar factories varied from 89 per cent to 95 per cent.

The analysis found that the financial indicators were relatively more important than the physical indicators in the case of private owned sugar factories (JSL and PSCL). But in the case of RSSK (co-operative), the physical indicators were relatively important than the financial indicators. The profit was identified in the first component for PSCL and RSSK while in the case of RSSK, it was found to be associated negatively with this component and it was identified in the third component for JSL, indicating the need of improving the position of profit of both JSL and RSSK.

7.4. POLICY IMPLICATIONS

Based on the findings of the present study and the observations of researcher on the latest issues, following policy implications are envisaged and
suitable strategies are suggested for enhancing the performance of production and marketing of sugarcane and the sugar factories.

1. There was a positive growth in area, production and yield of sugarcane in India, Karnataka and in the district and found that the increase in sugarcane production was mainly due to increase in area under sugarcane and not the yield. The increase in area was mainly due to increase in gross irrigated area due to establishment of new sugar factories. The farmers are not able to get more yields due to lack of technical knowledge about the improved technology. Thus, there is a need to educate the farmers regarding the adoption of latest technology in the cultivation of sugarcane through appropriate research extension services, so that yield could be improved.

2. Highest proportion of human labour was used for irrigation, particularly in marginal and small farms and it was further increased due to irregular supply of electricity. Majority (93%) of the sample farmers expressed their inconveniences to adopt drip irrigation and the shortage of labour as a burning problem. Hence, there is a need to encourage the farmers to adopt drip method of irrigation through appropriate extension of drip subsidies, particularly for marginal and small farmers. It is also necessary to educate and train them to adopt drip irrigation, so that they can save labour and at the same time the wastage of water can be avoided. Drip Irrigation will facilitate improvements in production and optimize use of fertilizer and other nutrients.
3. The economic analysis of sugarcane cultivation revealed that the cost of cultivation of ratoon crops was found to be lower and despite of low yields, the B-C ratio was higher as compared to planted crop. Due to negligence of the farmers the yield of ratoon crops had (tremendously) reduced as the number of ratoon increased. Therefore, efforts should be made towards the cultivation and maintenance of ratoon crops as far as possible and the farmers are advised to take proper supervision in maintaining the ratoon crops through appropriate measures to increase the yield of ratoon crops.

4. The results of the functional analysis revealed that human labour, bullock labour and tractor power, irrigation, seed setts and chemical fertilizers were excessively used which increased the cost of sugarcane cultivation. It was also found that majority of the farmers applied fertilizers without testing the soil or any office direction and most of them were not aware of soil testing or its importance. Hence, it is essential to educate and re-orient the outlook (attitude) of the farmers towards competitive efficiency in terms of cost effective use of resources in the era of liberalization and globalization.

5. It was observed that more than four-fifth (86.70 %) of the sample farmers did not take lot of strain in availing loan from the financial institutions, but the amount of crop loan advanced for sugarcane by these institutions was inadequate. The limit of finance for the cultivation of planted and ratoon were Rs.20000 and Rs.15000 per acre, respectively at 7 per cent interest in the study area (during 2005-06). The study found that the total cost of cultivation of planted and ratoon sugarcane crops were Rs.30925 and
Rs. 19771 per acre, respectively. Hence the farmers were forced to borrow remaining Rs. 11000 per acre of sugarcane cultivation from the money lender at the rate of 36.48 per cent, which compelled them into debt trap and resulted in farmer's suicides. About 217 cases of farmer's suicides were reported in Karnataka state in 2006, of which 23 and 7 were in Belgaum (highest) and Bagalkot district, respectively. The scale of finance is not up to the mark and thus there is a need to revise the scale of finance to the required level every year.

6. Almost all the (97%) sample sugarcane growers expressed their dissatisfaction about the weights and measures prevailed in the factory premises. Thus, there is a need to establish a specific market like regulated market for sugarcane to ensure correct weights and measures. Hence, there is a need to establish Weigh Bridge in every taluk or centre place to ensure correct weights of sugarcane at reasonable price to the sugarcane growers by the department of weights and measures (GOK).

7. Nearly 80 per cent of the sample farmers in the study area participated in strikes (during October, November 2005), demanding higher price for sugarcane. While fixing the price of sugarcane, it would be desirable to take into account the cost of production of sugarcane and the net returns from sugarcane, including the net income from mixed crops on one hand and the proportion of sugarcane cost in the overall costs of sugar production and the net returns from sugar including the net income from by-products on the other. Thus, there is a need to fix scientific price for
sugarcane and it has to be subjected to revision from time to time according to the changes in the costs of sugarcane production and the requirements of the sugar producers. These revisions in the prices of sugar and sugarcane have been introduced and implemented on an adhoc basis. Therefore, the government has to maintain a proper balance between these two while fixing the Statutory Minimum Price or State Advisory Price. There is a need to establish a tripartite body consisting of the representative of the farmers, millers and the government (both central and the state).

8. It was observed that majority of the sample farmers were not aware of liberalization and WTO, but they were aware of the subsides and incentives provided by the government. But only two-thirds of the sample farmers (especially the medium large farmers) did make full use of subsidy on loan, interest, pesticides, implements and other incentives. More than two-third of the farmers were not aware of the information technology (IT) and biotechnology (BT) and their role in increasing the productivity of agriculture. Hence special attention is required to create awareness among marginal and small farmers to make the full use of available subsidy and incentives of the government. There is an urgent need for providing the knowledge of IT and BT through appropriate policy measures.

9. Majority of the sample farmers (88.80%) expressed the need of education and training to adopt new practices (latest technology) and methods of cultivation and only one-third of the farmers participated in Krishimela (organized by Agriculture University, Dharwad and Bangalore), farmer's
meet and conferences organised in Karnataka state. In a technology driven world with rapid changes in technology, training of the farmers is necessary. Therefore, the existing training facilities have to be upgraded and strengthened and new facilities to be created to meet the above needs. The course of content and the training system should be revised from time to time in line with the changing needs of the farmers. Such trainings should be practical oriented.

10. The negative growth rate was observed for the duration of crushing season in India, Karnataka and in the district during the post-liberation period. This was mainly due to the fall of sugarcane production, due to incidence of woolly aphid. The low yield of sugarcane is a matter of great concern to the sugar industry. Cane development activities with specific targets are necessary to achieve improvements in yield and quality of sugarcane. It was found that the farmers in some regions like UP, Bihar, Maharashtra, Karnataka and even in Bagalkot district continued to use low sugared cane varieties in spite of being rejected by the state governments. Therefore, there is an urgent need for replacement of such rejected varieties through extension services. The sugar factories and the state governments should take suitable steps to ensure that sufficient sugarcane is developed and grown in the mill area for the economic viability of sugar factories and to prolong the duration of crushing season.

11. Most of the sample farmers were not aware of soil testing and its importance. Some sugar factories in the district (Bagalkot) have soil testing
laboratories but are not effectively working. The factories should advise the farmers and distribute only the recommended varieties suitable to the regions which are high yielding and have high sugar content. There is a saying 'sugar is made in the field not in the factory'; sugarcane quality thus can basically be improved in the field itself before harvesting the cane. Thus the sugar factories should give special attention for soil testing and make it mandatory through appropriate policy and encourage the farmers to cultivate the newly developed high sucrose containing varieties (like coc-671, co-86032 & co-92061) and woolly aphid control varieties (like SNK-44, SNK-61 and SNK-754).

12. All the selected sugar factories depended on borrowings for financing their working capital need. This has resulted in the overburden of interest charges. The sugar factories should strengthen their equity base by increasing the equity share capital, accumulate reserves and owned funds by ploughing back profits, mobilize deposits from sugarcane suppliers and introduce attractive deposit schemes.

13. The sugar factories should not use the short term funds for financing the fixed assets for an effective and efficient utilization of working capital. It is necessary for the sugar factories to maintain adequate cash balances to meet day-to-day needs, instead of depending much on inventory.

14. The analysis revealed certain weak points for the successful running of a sugar factory. Based on these weaknesses and opinions of various
executives of the factories, the study suggested the basic principles involved in the successful running of a sugar factory.

i) There must be effective co-ordination and co-operation between various departments like cane department, manufacturing department, engineering department, the stores, accounts and administration departments, etc.

ii) It is absolutely necessary to have a detailed account of working of the plant and machinery and also a detailed break down analysis during the previous and the present working seasons and make them ready in all respects to run it efficiently and to avoid break downs in the ensuring season. The successful trials of all these equipment are essential before the commencement of the next crushing season. Here the engineering department has the greatest role in running the plant successfully without any stoppage.

iii) Every sugar factory must have an efficient sugarcane development department. It is the responsibility of the department to supply good, clean and fully matured sugarcane to the factory for crushing during the entire season of a factory to work economically with highest efficiency and high recover percentage (in this respect PSCL performed well 11.31%). The department could perform following important functions.

a) Selection and introduction of early maturing, disease control and high sucrose content varieties
b) Conducting pre-harvest maturity test
c) Harvesting of cane on the basis of maturity instead of date of plantation and harvest only matured cane
d) Preventing excess harvesting and harvested cane remaining in the fields.
e) Harvested cane should be transported and crushed within 18 to 24 hours of harvesting to prevent sugar losses. The time between the harvesting and crushing should not be more than 24 hours under any circumstances.
f) Frequent inspection of the sugarcane fields,
g) Guiding the farmers in respect of fertilizer and manure application.
h) Guiding the farmers in respect of soil testing and preventing excess use of fertilizers and other inputs.
i) Immediate arrangement in case of break down, accident of loaded cane vehicle and also the burned cane.
j) Supply credit, fertilizers and pesticides.
k) Create awareness abut latest technology (BT).

iv. The laboratory attached to the manufacturing department is something like an eye and plays a special role when it comes to the question of accurate analysis of sugarcane, cane juice, final product, the intermediate product and the by-product. Therefore the sugar factories should find out their basic weaknesses and try to avoid
them by increasing their operation efficiency. For this, proper co­
ordination between various departments is absolutely necessary.

15. Net profits were negative in all the selected sugar factories over the study
time. This was due to mismatch between the gross income and total
expenditure. The gross ratio of these factories also indicated that the total
expenses were more than the gross income. In order to improve
profitability of the sugar factories (JSL & RSSK) through value addition to
by-products like bagasse, press mud and molasses, the sugar factories
having potential for setting up diversification projects may be encouraged.
It is essential on the part of the government to modify its sugar policy for
the effective exploitation of by-products: regarding

a) Oxygenation of gasoline may be made compulsory
b) Long term policy for blending of petrol with ethanol
c) Fiscal and other incentives by the government for blending petrol with
ethanol at least for a period of 10 years without any gap.
d) Purchase price of ethanol should be fixed at least for a period of 2 years.
e) The KPTCL had an agreement to buy power at Rs.3.16 per unit from
sugar factories and have now (Aug 2003) gave notice to cancel it. Hence
the central government should intervene to prevent such frequent
changes in Power Purchase Agreements (PPAs) for cogeneration units.

16. Profitability of the sugar factory can be improved by the following
measures. 1) reduction in cane cost, 2) reduction in conversion cost, 3) reduction in over heads, 4) reduction in sugar losses in the factory, 5)
maximization of cane crush, 6) increasing sugarcane yield per acre and 7) increasing the sale realization per quintal of sugar. Any factory's existence is measured only on its earning capacity. Hence, careful planning, effective utilization of the capacity and by-products, making higher profit margin, etc., are the prime criteria to bring down the cost of production of sugar at an economic cost and to improve the profitability and competitive ability of the sugar industry.

17. Sugarcane has been conventionally used, as raw material for manufacture of sugar in India and the sugar industry is solely dependent on this crop. The sugarcane yield has remained stagnant for the past many years and the sugar content also has not indicated any significant increase despite efforts of the industry. Recent studies have shown that it is possible to cultivate sugar beet under tropical conditions. Sugar beet can be used as a co-crop to sugarcane to prolong the duration of the crushing season and also increase the sugar yields. Sweet sorghum is another crop, which has a good potential in improving the economics of the sugar industry.

The committee (Tuteja), which was constituted in March 2004, suggested the use of alternatives, such as sweet sorghum and sugar beet. Vasantdada Institute of Sugar Technology in Maharashtra and Tamil Nadu Agricultural University have conducted trials which confirmed that sugar beet can be cultivated in Indian climatic conditions. It can be processed alongside sugarcane or sugar beet to produce ethanol. Thus a combination of cultivation of sugarcane, sugar beet and sweet sorghum can effectively solve the problems
of shortage of sugarcane. The operational period of the sugar industry in the country ranges from six to eight months and alternatives need to be explored to optimise its capacity. Thus there is a need to encourage the use of sugar beet and sweet sorghum to extend the crushing season and the government should provide special incentives for the cultivation of these crops.

18. All the sugar factories in the district are regularly facing the problem of inadequate supply of sugarcane and shortage of working capital, which results in mounting cane arrears. The Managing Director and all the executives of the sugar factory must set performance goals for all the departments and allocate responsibility for achieving the same within a stipulated period of time.