CHAPTER - III

Research Methodology and Review of Literature

<table>
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<th>Chapter Design</th>
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<td>This chapter explain research Methodology that will be adopted, the statement of the problem, the area of the research, the sample size of the research, the data collection method i.e. primary and secondary data, and techniques of data analysis used and Review of literature included Ph.D. thesis, Journals and Books.</td>
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A) Research Methodology:

3.0 Introduction:

Sugarcane in as agri-energy crop and India is the homeland of these crops. India is one of the largest producer and consumer of sugar in the world. Sugar industry is the second major agro based industry of our country next only to cotton industry, which can generate prosperity in rural area through increasing employment and income. These generated income and employment have multiplier effect and helps in over all development of the country.

Indian sugar industry is an important and big share in agriculture processing industry. It has very strong impact on our rural development and provides successful rural economy. In our country nearly 50 million farmers provide employment. The Indian sugar mills currently has 527 operational sugar mills out of that 234 are in co-operative sector. Total sugar production in India 243 lakh tones out of 108.55 lakh tones in co-operative sector in the year 2010-11 also total sugar production in the year 2011-12 was 262 lakh tones and also sugar production in the year 2012-13 are 250 lakh tones, estimated production in the year 2013-14 were 237 lakh tones.

The sugarcane is grown in 21 various states of India. Mianly sugarcane mills are operating in large sugarcane growing areas like Maharashtra, Gujarat, Tamilnadu, Karnataka and Utter Pradesh. In Maharashtra alone is producing 30% of national sugar on put and maximum number of sugar mills are also in Maharashtra compared to other states in India. In the year of 2011-12 sugar factory crushing season, 118-co-operative and 51- private sugar factories have crushed the sugarcane and the total sugar production of 90th Lakh tones and in the year 2012-13 sugar produced 70.44 lakh tones in Maharashtra State.
The experience of some of the progressive co-operative sugar factories, particularly those located in the State of Maharashtra in setting up and running the industries based on the by-products of the sugar industries have proved the multifarious advantages of such industries. The main by-products of the sugar industry are bagasse and molasses. By setting up industries to the first instance, it has been proved that waste materials can also be converted into wealth by adopting suitable technologies. In the second way, such industries create more employment opportunities in the rural parts of the country. Where the sugar factories are usually located such industries improve the economic status of thousand of sugarcane growers and the overall financial viability of the sugar factories there by making the working of the sugar factories much more successful. With the gradual decline in prices of sugar in India and increase in cost of production of sugar, the working of many sugar factories is not comfortable. Therefore this is the right time to launch some by-product industry, to make the sugar industry financially viable. The dynamic leadership given by some progressive co-operative sugar factories in this direction has encouraged many more co-operative sugar factories to set up such by-product industries.

3.1 Significance of the study:

In other countries sugar is a by-product, but in India sugar is the main product produced by sugar mills. India is producing large quantity of sugar because of our own needs, but now a day’s only sugar production is not production is not profitable for sugar mills. Sugar industry needs to increase their capacity in by-products like alcohol, ethanol co-generation etc. This could be possible only through fuller and better utilization of the by-products and alternative produce, so that the higher value products are manufactured from them and sugar industry derives maximum benefit from the sugar crop. The ultimate prosperity of the Indian sugar industry depends upon diversification into numerous avenues based on the by-products of the sugar industry. The following are reason for setting up by-product industries in India.

- To improve the general economy of the sugar industries and to make them financially viable.
- To improve the economic status of sugarcane growers and workers by way of paying higher prices for sugarcane crop.
- To create more employment opportunities in the rural areas by setting up industries based on sugarcane by-products.
• Judiciously utilizing sugarcane crop residues and industrial effluents to produce value-added products and minimize pollution hazards.

Biomass has always been an important energy source for the country considering the benefits it offers. It is renewable, widely available, carbon neutral and has the potential to provide significant employment in the rural areas. Biomass is also capable of providing firm energy. For efficient utilization of biomass, bagasse based cogeneration in sugar mills and biomass power generation have been taken up under biomass and cogeneration programme.

Sugar industry has been traditionally practicing cogeneration by using bagasse as a fuel. With the advancement in the technology for generation and utilization of steam at high temperature and pressure, sugar industry can produce electricity and steam for their own requirement. It can also produce significant surplus electricity for sale to the grid using same quantity of bagasse. The sale of surplus power generation though optimum cogeneration would help a sugar mill to improve its viability, apart from adding to the power generation capacity of the country.

Ethanol which is an alternatives fuel for automobile vehicle is produced from sugarcane molasses. The bio-ethanol blending program me reduce India’s dependence of fossil fuel import, it also ensures that the nation moves towards energy efficiency. It also has other very important advantages of being the best oxidant which helps burn the petrol better when blended with it thereby reducing environmental pollution that fossil fuel are infamous for.

The Government of India realized the benefits of fuel ethanol use in India with the fast growing sugar industry. India being the second largest sugarcane producer in the World, it accepted that there is a huge potential of production and availability of the fuel ethanol. It was accepted by the Government in 2006, that a mandatory 5% ethanol blending with petrol (EBP) program me would directly benefit the sugarcane farmers by assuring the sugar industry a stable and reasonable return for the molasses and then passing a significant part of the same to the farmers.

3.2 STATEMENT OF THE PROBLEM:

The cooperative sector plays an important role in the Indian sugar industry. Co-operative sugar factories are the processing unit established by the farmer in the
rural area. The capital is collected from the farmers for their economical and social development. It is established as per the co-operative norms and rules. These co-operative sugar factories have created ample opportunities for employment in rural area. Today co-operative sugar mills are facing many problems like competitive environment, cyclic nature of the industry, high support price payable to farmers, inadequate working capital, low yield of sugarcane outdated machinery in old co-operative sugar factory, competition with Gur and Khandsari industry. Sugar export policy was unstable, more government regulations, high cost of production etc. because of this problems the working of many sugar factories is not comfortable. This is therefore, the right time to launch some by-product industry to make the sugar industry financial viable. The dynamic leadership given by some progressive co-operative sugar factories in this direction has encouraged many more co-operative sugar factories to set up such by-product industries.

Because of importance of by-products of the sugar industry the researcher selected research problem, “An Analytical study of By-products of sugar industry with reference to Kolhapur Districts”

3.3 OBJECTIVES OF THE STUDY:

Researcher has conducted research work on the basis of set objectives, the specific objectives are as follows:-

1. To know the growth and development of sugarcane By-products industries and their ancillaries.
2. To examine the financial position of the co-operative sugar factories and its departments of By-products.
3. To study the economics of by-products in sample Sugar factories.
4. To study the functional areas like production, marketing, finance and Human Resource of by-products production in the sample units.
5. To know the financial liability of the by-products in sample sugar factories
6. To suggest product mix model to sample sugar factories.
7. To draw conclusion and suggest appropriate suggestion, if necessary.
3.4 HYPOTHESES OF THE STUDY:

1. Co-operative sugar factories are suffering from the losses due to high cost of production and low productivity in relation to by-product units.
2. Low level of efficiency is found at various By-product departments.
3. The functional areas of management like production, marketing, finance and HR are weak in the by-products sample units
4. By-Products production mix is not up to the mark in sample units.

3.5 Research Design and Methodology:

a) Sampling Design: It consists of selection of the study area and selection of the sample sugar factories.

- **Selection of the study Area:**
  India has emerged as one of the largest production of sugarcane and sugar in the world with highest number of sugar factories. In India, Maharashtra is one of the major sugars producing State in the country and in Maharashtra; Kolhapur District in particular, became a potential sugarcane belt area. Sugarcane occupies an important place in the economy of the district it is the most important cash crop of the District.

  The District as such as in the top on many indicators such as number of sugar factories, crushing capacity, cane crushed, cane recovery, Sugarcane by-product industries, etc. Kolhapur is the home district of the researcher, located in peninsular part of India of South-Maharashtra; it was chosen on convenient bases as the study area for the purpose of the present investigation.

- **Selection of Sample Co-operative Sugar Factories in the Study Area.**
  The total numbers of sugar factories in Kolhapur District are 21 Out of 17-sugar factories in co-operative sector. Researcher is selected 5 (30%) co-operative sugar factories. It is also considered that geographical location, area, size, age, crushing capacity, nature of production of by-products etc. The use of convenience sampling method was taken up for selection of the sugar factories.
Map No.3.1 Map shows location of Maharashtra:
Map no.3.2 Shows location of Kolhapur district
Map no.3.3 Location of Sample Sugar Factory
Table No.3.1 Details of samples co-operative sugar Factories in the Study Area

<table>
<thead>
<tr>
<th>Name of the factory And address.</th>
<th>Year of the Registration</th>
<th>First Crushing Season</th>
<th>Age on 31.03.13</th>
<th>Installed Cap. (TCD)</th>
<th>Location From the Kolhapur</th>
<th>By products units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheri Datta Sahakari Sakhar Karkhana Ltd.; Datmannagar, Tal-Shirol.</td>
<td>1969</td>
<td>1971-72</td>
<td>43</td>
<td>7000</td>
<td>East</td>
<td>Distillers, Ethanol, Bio-composting, co-generation</td>
</tr>
<tr>
<td>Kumbhi Kasari Sahakari Sakhar Karkhana Ltd.; Kuditre, Tal-Karveer.</td>
<td>1960</td>
<td>1963-64</td>
<td>50</td>
<td>3000</td>
<td>West</td>
<td>Distillers, Bio-composting, co-gen. ENA (Projected)</td>
</tr>
<tr>
<td>Shri Tatyasaheb Kore Warana Sahakari Sakhar Karkhana Ltd.; Warananagar, Tal-Panhala</td>
<td>1955</td>
<td>1959-60</td>
<td>54</td>
<td>7500</td>
<td>North</td>
<td>Distillers, Ethanol, Paper mill, ENA, co-generation (Projected)</td>
</tr>
<tr>
<td>Shri Chh. Rajaram Sahakari Sakhar Karkhana Ltd.; Kasaba Bawada, Tal-Karveer.</td>
<td>1984</td>
<td>1985-86</td>
<td>27</td>
<td>2200</td>
<td>Central</td>
<td>--------</td>
</tr>
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b) Methods of Data Collection:

In this study the research work is based mainly on primary as well as secondary sources of information.

- **Primary Data**:

  The primary data the researcher has been visited to all sample sugar factories as well as through questionnaire, interview, discussion and observations. The researcher interview of the officials and management, by-product department heads, were organized questionnaire. Primary data has also been obtained through other methods like observation and field survey. The data about production performance, financial, marketing, and H.R. etc. it has been related with sample sugar factories and its by-products departments.
• **Secondary Data:**

The researcher has collected secondary data from Annual reports, books and published literature of the sample sugar factories. For theoretical background researcher has made use of textbooks related of the sugar industry and by-products industries.

Other necessary data is collected from:-

- Various Annual reports from the related sugar industry.
- Report of All India Distilleries Association.
- Reports of ethanol producers Association.
- Report of co-cogeneration producers.
- Books and Magazines etc.
- Published and unpublished research work.
- The Internet.

c) **Period of the study:**

The sugar industry is cyclical in its nature, which is normally of four to five years i.e. two years of number sugarcane crop followed by two years as shortage of sugarcane due to draught or of market position and one year is as normal because of by-products sugar industry also affected. Naturally this cycle affects the cost effectiveness and economy of the sugar mill. Therefore, the researcher has decided to cover the period of eight years, which starts from 2005-06 to 2012-13. It was considered as an appropriate for the analysis of sugar factory and its by-products units a period of time.

d) **Tools and Techniques Used:**

The study is based on primary as well as secondary information. The data draw from the questionnaire is analysis with the help of various tools and techniques. The statistical tool like percentage, Trend Analysis, Mean, Standard Deviation, Correlation and co-efficient of Variances etc. is used where ever required. The researcher also analyzed and interpreted the collected data by use of computer with the SPSS software.
3.6 Scope and Limitation of the study:
   The present study covers the sample sugar factories in Kolhapur District. The selected subject has following limitation.
   
   - The study relates the selected five co-operative sugar factories in the Kolhapur District only.
   - The researcher studied the functional areas like production, financial, marketing and human resource in relation to the sugar factories and its by-products developments.
   - This study does not necessarily cover all these technical aspect of sugar factories.
   - The period of the study is of only seven years i.e. from 2005-06 to 2012-13. Therefore time factor is the limiting factor.
   - The conclusions drawn in this study are based on the data made available by these sugar factories.
   - Use of statistical tools and technique has its own limitation

3.7 Chapteraization:

Chapter 1: Profile of Sample Sugar Factories:
   This chapter explains a brief profile of the sugar factory included in the study and its organization history and there by-products departments and sugar factory.

Chapter 2: Theoretical Background:
   This chapter deals with theoretical background of sugarcane industries and its brief history. Also the concept of sugar factory and present scenario and also the concepts of functional areas like production, finance, marketing and H.R.

Chapter 3: Research Methodology and Review of Literature:

A) Research Methodology: This part explain research Methodology that will be adopted, the statement of the problem, the area of the research, the sample size of the research, the data collection method i.e. primary and secondary data, and techniques of data analysis used and time period etc.

B) Review of literature: The review has been made in the following ways.
   - Published books related to the sugar industry and by-product industries and other functional areas books.
   - Research Articles, Journals and Reports on various institutions.
   - M. Phil and Ph.D. thesis.
Chapter 4: Analysis and Interpretation: By-products.

This is a core aspect of the research study analyze the data. The functional areas production of by-products units analysis this chapter.

Chapter 5: Analysis and Interpretation:

Other functional areas of By-products in this chapter an attempt has been made to analyze and interpret the data pertaining to the sample study areas like financial, marketing and H.R. in relation to the by-products units.

Chapter 6: Analysis and Interpretation By-products mix models:

This chapter has covered the appropriate suggestive models for By-products mix models relation to the production, marketing, financial and human resource.

Chapter 7: Conclusion and Suggestions:

The chapter has covered conclusion and Suggestions parts on the basis of study and derived models.

B. Review of Literature:

The researcher has been made review Ph. D. Thesis (14), research journal (11) and related books (10) total review 35 taken into account.

Ph.D. Thesis:

1. R.M. Karche (1985), for his doctoral research surveyed the co-operative sugar factories of Maratwade region in the light of the policy of the state Government towards the sugar industry, financial structure of the selected sugar factories, problems related to input supply and cane development, cost of production of sugar, working results, efficiency of the factories and the role of sugar co-operatives in area development. He also examined the policy of management in dealing with the problems confronted and offered useful suggestions. This Ph.D. thesis research about the co-operative sugar factories of Maratwade region in the light of the policy of the state government towards the sugar industry but does not study the by-products in sugar industry.

2. G.A. Nikam (1988), He study “Inter-Regional financial Statements Analysis of sugar co-operatives, in Maharashtra”, Ph.D. Thesis, Marathwade University, Aurangabad. In his analytical work on the inter-regional financial statement of the sugar co-operatives in Maharashtra, Selected nine sugar factories from different districts of Maharashtra. He analyzed their cost
structure and cost components, magnitude of total cost, cost trend, profitability, and financial strengths. He noticed that the volume of shareholders fund to net worth was negligible and the sugar factories relished depend on the borrowed capital. A comparison with the private sugar factories revealed that the percentage of the general and administrative expanses of co-operative sugar factories was higher than those of the private units. *This research about the co-operative sugar factories only Inter-Regional financial Statements Analysis but does not study the by-products of sugar factory and its financial area.*

3. **S.D. Potar (1998)**, “Working and Impact of Sugar cooperatives on the economic conditions of producer member in Kolhapur District” Ph.D. Thesis, Shivaji University, He enquired into the working and impact of sugar cooperatives on the economic conditions of the producer member in Kolhapur District. He studied Panchaganga cooperative sugar factory and analyses its role in the development of various infrastructure facilities, impact on economic conditions of producer members, development of by products, labor relations and co-structure with help of break even analysis. *In his research about the working and impact of co-operative sugar factories on the economy condition of producer member only but he has not given any financial and production of co-operative sugar factories.*

4. **V. M. Hilage (1989)**, His Ph.D. Thesis “Performance of Sugar cooperatives –A Comparative study of the two cooperatives sugar factories in southern Maharashtra”, Shivaji University Kolhapur. He studied into the performance of the sugar cooperatives by comparing the operational performance of two sugar co-operatives in southern Maharashtra. He emphasized the significance of cane development, development of lift irrigation, proper attention to harvesting and transportation of cane and control of pests and diseases.*The researcher study only two co-operative sugar factories in southern Maharashtra about only cane development, irrigation scheme.*

5. **G.S.Kamat (1965)**, He studied the management of co-operative sugar factories in Maharashtra by Selecting 14 cooperatives sugar factories established between 1950 to1962. He examined the polices relating to cooperative processing industries in India, in relation to production performance of sugar factories, financial structure and problems of cooperative processing provided
a spring board for rural development and cooperative sugar factories served as a modal in this tasks. He studied the management of co-operative sugar factories in Maharashtra by Selecting 14 cooperatives sugar factories established between 1950 to 1962 it is old study now.

6. S.K. Shirodkar (1967) studied the cooperative movement in Kolhapur District. Reference to the development of sugar cooperatives in District, he observed that they provided stability to agricultural incomes due to reasonable and guaranteed prices for sugarcane and thereby provided incentive for increase in overall agricultural production. The researcher studied only the cooperative movement in Kolhapur District reference to the development of sugar cooperatives in Kolhapur District.

7. R.B. Anekar (1970), attempted an economic survey of the cooperative sugar in Maharashtra. His study covered twenty cooperative sugar factories in the state out of which four were in Kolhapur District. He examined the size, capital structure, cost structure, marketing structure, labor structure and social and economic effects of the sugar cooperatives, besides the linkage of sugar cooperatives with politics and their working. His study only covered twenty cooperative sugar factories in the State out of which four were in Kolhapur District in relation to size, capital structure, cost structure etc. but does not study the by-products in sugar industry.

8. M.A. Patil (2002), He study the problems of workers in sugar industry in the Kolhapur District are in a way. His area recruitment policy, working period, type of training, wage structure, bonus schemes, problems of children’s education, health problems, welfare activities, working conditions etc. in its objectives of the study are understand the problems of seasonal workers and to assess the wage structure, nature of salary, leave facilities provided by sugar factories to seasonal workers. He concluded that the sugar industry management should evaluate the areas of tension, theirs hopes and aspirations in life. He study the only problems of workers in sugar industry in the Kolhapur District but he has not include the area of workers in by-products of sugar industry.

9. Shri C.M. Shinde (2003), these investigation ender ours to study the working capital management of sugar factories in Satara District. In its study objectives are to examine the composition of the capital structure and various
sources used by the sugar factories for obtaining the capital also he study the trends of the current assets and current liabilities, to assets, liquidity position of the sugar factories. He conclude the study it may be said that the efficiency of the working capital management of the sugar factories in the district will be definitely increase. A lot of funds now invested in inventory alternative use. **He study the working capital management of sugar factories in Satara District. The researcher study only the capital structure and various sources.**

10. **Dr. A.M.Gurava (2003),** he selected to study the cost and productivity of cooperative sugar factories in Kolhapur District. These study has been specific objectives are to be few selected cooperative sugar factories in Kolhapur District. Also to know the cost of production at the aggregate and of level of various cost and work center, also study the impact of government policy on cost and productivity of sugar factories, inventory management in sugar factories. Lastly concluded that in all sugar factories cane price and conversion cost fluctuating more in the study period. He also studied cost of production and productivity analysis. **He has study the only cost and productivity of cooperative sugar factories in Kolhapur District but does not mentation the area of by-products industries in sugar industry.**

11. **Dr. S.M. Kamble (2005),** he studied for Ph.D. research under the title of “A study of problems and prospects of sugarcane harvesters and cane transporting laborers with special reference to Satara District.” He has studied in detail the problems of sugarcane cutters and transporting laborers with sugar factories, also he covered that the sugarcane cutters problems in the area of physical, psychological and socio-economical. **He only covered that the sugarcane cutters problems in the area of physical, psychological and socio-economical.**

12. **Dr. M. G. Pawar, (1995),** in his study entitled, “Raising and utilization of finances of by co-operative sugar factories in Satara District.” He suggested that for sugarcane development sugar factory experiment, develop and popularize bio-fertilizers among the cane growers’ adequate manpower should be appointed as per the rule of National Federation of Cooperative sugar factory, factories borrow short term funds to create current assets and long-term funds to create fixed assets. **The researcher study only the utilization of**
finances of by co-operative sugar factories in Satara District but neglected the area of production, finance.

13. V.K. Abitkar, (2002), she studied thirteen sugar factories in Kolhapur Districts. She identifies the deficiencies in the management process and application of management process at various levels in sugar factories. She observed that the organization are found to have developed and strategic controls measures, so she recommended that strategic control measures need to be devised to judge the overall functioning of the organization, factories have not given the importance to proper inventory management. The researcher identifies the deficiencies in the management process and application of management process at various levels in sugar factories but does not include the management process in by-product industries in the sugar factories.

14. Dr.V. A. Patial, (2002), he studied various problems related to seasonal workers i.e. recruitment, training and development, promotion, wage structure, salary, leave facilities. He suggested that recruitment and selection committee under the control of employment exchange, in every sugar factory there should be a fully fledged separate personnel department, statutory provisions in the factories act should be strictly implemented, provision of better canteen facilities, rest-shelters are to be required by the workers in sugar factories. He studied only various problems related to seasonal workers i.e. recruitment, training and development, promotion, wage structure in relation to the sugar factory but does not work area of by-product industries in sugar factory.

Journals:-

15. P.G.Bhoi and B.J.Takalkar, write article “Present Scenario of sugar Industry in Maharashtra And its Future strategies.” He was explained the main issues of cane yield and sugar recovery, sugar requirement and yield targets in India, Strategy for increasing sugarcane productivity and sugar recovery, Water management, Integrated soil fertility and plant nutrient management etc. The researcher study explained the main issues of cane yield and sugar recovery, sugar requirement and yield targets in India.

16. S.Ravi , in his article “Ethanol : A Solution to global fuel Demand.” This article was developed and indicates that the ethanol becomes only solution to
the global fuel demand and it is one of the alternative fuel that suits the developing countries and safe fuel to the increasing vehicular populations. In his article Ethanol: A Solution to global fuel Demand related only world scenario but does not study the Indias point of view.

17. P.Ramasamy, Write the paper “Ethanol production in sugar complex.” In the lines this paper was the present scenario of sugar, Fossil oil stock and power shortage make it imperative to go for non-conventional, Bio-liquid fuel production and power production to cope up with the present and future demand. He write the paper “Ethanol production in sugar complex” but he neglected marketing of ethanol and marketing channel.

18. J.J.Bhagat and Dilip Jain, write article “Indian sugar Industry-An overview.” The paper discusses about the structure, size and influence of India sugar industry on world sugar market and present an overall view of the sugar industry and its socio-economic impact. The paper high lights the Indian sugar industry scenario, technology issue, efficiency improvement, by-product usage and environmental safeguards addressed by the Indian Sugar mills. This research article only Indian sugar Industry-An overview in relation to technology issuee, efficiency emprovement and by-product usage.

19. D.K.Pant, S.N.Saraswat and Ajay Mishra, in his article “Sugar Industry Diversification For Valve Addition” He expressed clear that sugar factories cannot survive only on the basis of sugarcane to sugar. Unless the sugar factories diversify by setting up value addition industries based on the by-product of sugarcane i.e. molasses, press mud and bagasse etc. the realization of sugar industry cannot increased. In his article only focus Sugar Industry Diversification For Valve Addition product theoretical basis.

20. Shri Y. Sudarsan and P.K.Agrawal, Write article “Some Factors Affecting Quality of Molasses for Alcohol Production.” In this article cane molasses being the raw material for alcohol production in India, its composition is of great significance to distilleries. However molasses is a by-product of sugar industry and distilleries have little control over its composition. This paper describe clarification and processing procedures of cane juice which in turn, affected the composition of molasses and suggests ways and mean to improve the quality of molasses of sugar factory level. This article include cane
molasses being the raw material for alcohol production in India and its composition is of great significance to distilleries.

21. Shri. S.K. Sharma, Write paper “Increasing Potential of sugar mill By-product.” This paper focus Sugar production from cane yields a series of by-product that can be grouped according to the parts from which they are obtained i.e. those which are available during the cane harvest itself, such as cane tops and straw and those which are the result of the industrial process specifically bagasse, final molasses, and filter mud. Sugar industry is cyclic and is susceptible to the vagaries of nature. Moreover it is subject to various controls which restrict its profitability. These factors make it necessary to develop the concept of sugar mill complexes. 

This paper given importance to Increasing Potential of sugar mill By-product.

22. Shri. P. Thangamutha, and G.M. Jenekar write paper “Production of Poor man’s LPG from Press Mud” In those article the utilization of press mud for the efficient of bio-gas which was clean and cheap fuel. Those process called “Digestion” It was non conventional energy source. The Central and state Government are encouraging this programme. In Tamil Nadu State sugar factories are utilizing the Press-mud for the production of Bio-Gas which was called poor-man’s LPG by avoiding deforestation to keep the environment without any change. In those research article given importance the utilization of press mud for the efficient of bio-gas which was clean and cheap fuel.

23. R.D. Mahuli, Write article “Glories of Sugar Industry” He explained the co-operative movement in Maharashtra in post independence period i.e. 60’5, 70’5, 80’5 and first half of 90’5 have been considered as golden era for cooperative movement and more particularly for cooperative sugar industry. Second half of 90’5 and the first decade of 21st century has really been a setback for the cooperative sugar industry. He writes what is short margin? Most of the Sugar factories are facing this problem. What does it mean? Short margin simply means excess borrowing of in other words the existing stock if it is sold the entire liabilities cannot be liabilities over current assets. He lastly conclude we must say that there are some grey areas in the operation of sugar industry in co-operative sector and these are to be arrested and necessary corrective actions are to be taken on war footing to reestablish the glories of
co-operative sugar industry. He explained in his research article only the co-operative movement in Maharashtra in post independence period.

24. Shri G.D. Patil & B.N. Shinde, write article “Chemical Nature of Spent wash/spent slurry Press mud compost” this article focus spent wash the effluent after alcohol distillation and spent slurry, the effluent after methane generation from spent wash pose problems of disposal and pollution. Composting of spent wash with press mud at 2:1 ratio has been adopted by some distilleries for spent wash disposal. However at this ratio all the spent wash and spent slurry generated cannot be composed with press mud. Hence increased ratio in composing and reported that compost with high C:N ratio could be prepared even from 2:1 to 6:1 ratio of spent wash and press mud within 15th 30 days. It was therefore the chemical nature of these composts for their use in crop production. The researcher write article on Chemical Nature of Spent wash/spent slurry Press mud compost it is a by-product of sugar factory and distillery.

25. P.J. Manohar Rao, Write paper “Energy conservation leading to Successful By-Product Industries.” He was explained sugarcane is used as Food (sugar) fiber (cellulose), Fuel (Bagasse) and Foddlle (Green tops, Trash molasses etc.) he also studied the main by-product of the sugar industry are 1) Bagasse 2) Molasses 3) Filter Press Cake, The other by-product which are of less commercial value are 1) Sugarcane Trash 2) Sugarcane Tops 3) Boiler Ash 4) Effluent. He is explained the sugar factory bagasse it is traditionally used as captive fuel. He is studied Adoption Energy conversation measures in Sugar Factories to save bagasse and Substitution of bagasse with alternate fuels and other uses explained bagasse based industries. He is an also studied molasses based industry that is use of molasses for Ethel alcohol Production, use of molasses for citric acid, Lactic acid, Use of molasses for cattle feeds. The researcher studied the main by-product of the sugar industry are 1) Bagasse 2) Molasses 3) Filter Press Cake only theoretical background.

Books:

26. P.J. Manohar Rao: The author wrote the book “Industrial Utilization of Sugar Cane and Its co-products.” The author of this book was a chemical Technologist with specialization in sugar and alcohol technologies. He worked for a number of years in different sugar factories, distilleries and paper
factories in India. The author had to visit the co-product industries in many countries in order to see for himself the working of these plants and collect data with the help of his friends in different countries. He was explained the two main part of co-product that is field co-product and factory co-product. In field co-product some part of sugarcane, such as leafy trash and green tops which as used as cattle feed. In factory co-product include Bagasse, Molasses and Filter mud. Main product of bagasse various uses i.e. burnet in the boilers and create a steam, used paper industry, Particle Boards, Boxes, furfural and co-generation etc. Another by-product of molasses can be converted into many value added product by application of modern technologies, the author was described in detail. Lastly the he explained the topic in filter cake and its different uses. This book gives information about sugarcane by-product industries theoretical background in the old concept but not include current status of by-product industries in this book not include Indian sugar industry current status.

27. R. S. Dubey and N.C. Varma: They wrote and published the book “Sugar by-products and subsidiary industries.” They were writing proper utilization of the by-products is not only essential from the disposal point of view but also for reducing the cost of production of sugar. The by-products of the sugarcane industry are explained main two parts I) By-products of the sugarcane farm namely cane tops and cane trash. II) By-products of sugar manufacture namely bagasse, molasses, press mud and furnish ash. Amount to about 40 percent to the weight of cane crushed. They were explained chapter two Bagasse its meaning and various uses of bagasse. Chapter three the waste molasses is largely being used for the production of industrial alcohol is being utilized for the production of a few organic chemicals. Chapter five Press-Mud its meaning and its used. A study of the subject has, therefore, been made in considerable detail with a view to collecting relevant technical information about the by-products, their avenues of utilization and scope for development of by-product industries in the context of the Indian sugar industry. This book proves to good reference to the research of sugarcane by-product industries. This book written by R.S.Dubey and N. C. Varama explain in detailed about sugarcane by-product industries about indian scenario but there is no reference to sugarcane by-product industries in
current context and particularly about sugarcane by-product industry in Kolhapur district.

28. D.P. Kulkarni and R.K. Sardeshmukh: Write a topic “Utilization of Sugarcane Bagasse for fuel and co-generation of power in the sugar industry.” In the book of “Sugarcane: Agro-Industrial Alternatives.” He expressed the rising development of the by-product industry and the tradition energetic commitment of bagasse are being to assume significant economic importance. He also explained bagasse based power co-generation in sugar factories. The author Write a topic on Utilization of Sugarcane Bagasse for fuel and co-generation of power in the sugar industry it is a main by-product in sugar industry now.

29. Dr. R.S. Verma: He wrote book “Sugarcane Production Technology in India.” He write chapter first Sugarcane in India, this topic included economic importance, Sugarcane origin and history, the global distribution of sugarcane and in India, Area, production and productivity in world and in India, fluctuations in sugarcane productions, Development of the India sugar industry, utilization of sugarcane for different purposes, consumption of sweetening agents in India, and India sugar exports. The author write chapter Sugarcane in India only given importace to sugarcane in India, area, production but not coveread the area of by-product of sugar industry.

30. K.K. Mishra (1985), worked on sickness in Indian Sugar Industry. The work was undertaken to study the causes of sickness of sugar industry and assess the cost, realization and profitability of each of sixteen zones in the country. He also studied the impact of government policies on the health of the factories in various zones. He noted four basic causes of sickness of sugar industry, viz. lack of availability of good quality of cane within a reasonable distance, high cost of conversion, pricing of sugarcane and pricing of sugar. He concluded with these suggestions:

- To direct the extra labor force of the factory to the field of cane management.
- Provision of adequate good quality of cane in vicinity of the factory.
- Pricing of levy sugar on the basis of zoning of the factories based on their age and production capacity. The author work was undertaken to study the causes of sickness of sugar industry only.
31. **R.V.Sinha (1988)**, Studied the sugar Industry in India. In his work he analyses critically the economics. Of sugarcane production problems of cane marketing and transport, technical performance, cost structure, utilization of by products, labor relations, sugar policies, fiscal and financial aspects of the sugar Industry.

32. **D.P.Kulkarni**, studied cane sugar manufacturing in India. This book first topic sugar and sugarcane explained historical aspect of sugarcane, Growth of sugar Industry after 1995, Present status of the world cane sugar industry, Indian cane sugar industry scenario, Sugarcane, with its high fiber and carbohydrate content constitute an important renewable source of energy. He also explained the major components of sugarcane i.e. sugars as sucrose and Glucose, starch, Fiber and other organic polymers. And process of manufacture of sugar from sugarcane brief outline. The important topic analyses this book topic no seventeen Utilization of by-products of cane sugar manufacture i.e. bagasse, molasses and Filter cake. The author studied cane sugar manufacturing in India. This book first topic sugar and sugarcane explained historical aspect of sugarcane, Growth of sugar industry but does not include the by-product industries significance.


34. **G.M.S. Mann**, explained Indian Sugar Industry Retrospect and Prospect. The sugar industry is one of the highly regulated industries, starting from sugarcane to the end product i.e. Sugarcane. He also examined export potential, India is one of the leading sugar exporting countries of the world. Even where the factories make some profit it is quite merge and does not compare with the return available on investment in other industries. The Government has been emphasizing diversification into by-product based
industries such as alcohol, paper, co-generation of power etc. the
diversification into by-product based industries is also quite significant
considering its importance to the national economy. The author explained

*Indian Sugar Industry Retrospect and Prospect in relation to Indian sugar industry.*

35. **B. Singh and S. Solomn**, He studied the topic on Alternative Products from Sugarcane. Industrial and Agricultural uses. He analyzed the main reasons for setting up industries based on the alternatives products in developing countries, especially in India, are as follows.

- To improve the general economy of the sugar industries and to make them financial viable.
- To improve the economic status of sugarcane growers and workers by way of paying higher prices for sugarcane crop.
- To create more employment opportunities in the rural areas by setting up industries based on sugarcane by-products.
- Judiciously utilizing sugarcane crop residues and industrial effluents to produce value-added products and minimize pollution hazards. The author studied the topic on Alternative Products from Sugarcane, Industrial and Agricultural uses onle theorital background.

3.8 Conclusion:

The above Research Methodology and Review of Literature reveal that the researcher. India has emerged as one of the largest production of sugarcane and sugar in the world with highest number of sugar factories. In India, Maharashtra is one of the major sugars producing State in the country and in Maharashtra; Kolhapur District in particular, became a potential sugarcane belt area. Sugarcane occupies an important place in the economy of the district it is the most important cash crop of the District. The dynamic leadership given by some progressive co-operative sugar factories in this direction has encouraged many more co-operative sugar factories to set up such by-product industries. Because of importance of by-products of the sugar industry the researcher selected research problem. The experience of some of the progressive co-operative sugar factories, particularly those located in the State of Maharashtra in setting up and running the industries based on the by-products of the sugar industries has proved the multifarious advantages of such industries.
References:

Ph.D. Thesis:


Journals:

Books:
27. Dubbey R.S. and Varma N.C. “Sugar by-products and subsidiary Industries” Published by Deccan sugar Institute PUNE. (1979)
29. Varma R.S. “Sugarcane Production Technology in India” Page no. 1 to 21.
32. Kulkarni D.P. “Cane Sugar Manufacture in India” Published by the Sugar Technologists Association of India. Page no. 1 to 10.

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