CHAPTER - I

INTRODUCTION AND DESIGN OF THE STUDY

1.1 INTRODUCTION

India is the homeland of sugarcane and sugar. There are references of sugarcane cultivation, its crushing and preparation of Gur in Atharva Veda as well as Kautaliya’s Arthasastra. The scribes of Alexander the Great, who came to India in 327 BC recorded that inhabitants chewed a marvelous reed which produced a kind of honey without the help of bees. The Indian religious offerings contain five ‘Amrits’ (elixirs) like milk, curd, ghee (clarified butter), honey and sugar – which indicates how important sugar is not only as an item of consumption but as an item which influences the Indian way of life. It is understood that sugar was initially made in India during fourth and sixth centuries by cutting sugarcane into pieces, crushing the pieces by weight to extract the juice and then boiling it to crystallize. These crystals were called ‘Sarkara’ meaning gravel in Sanskrit. The word sugar is a derivative of ‘Sarkara’. The larger lumps were called Khand from which the English word ‘Candy’ is derived. Around 600 AD the Chinese Emperor, Tsai Hang sent an emissary to Bihar – where sugarcane was cultivated for making sugar – to learn the art of making sugar. Therefore, it is from India that the art of making sugar went to Persia and subsequently to the world over1.

Sugar industry is the second largest agro based industry in India. It plays a vital role in the development of rural economy, which supports about 50 million sugarcane farmers. A large number of agricultural labourers are involved in sugarcane cultivation, harvesting and ancillary activities that constitute approximately 7.5 per cent of the rural population. In addition about 0.5 million skilled and semi-skilled workers, mostly from the rural areas are engaged in the sugar industry2.

The constituents of sugar industry in India are co-operative, private and public sectors. A total of 527 mills (including 234 sugar co-operatives) were in operation in 2010-11 with a crushing capacity of 24.171 million TCD. The sugar production was 24 million tonnes

1 www.coopsugar.org
2 www.indiancooperative.com
with a recovery of 10.17 per cent\(^3\). Normally, the annual turnover of the Indian sugar industry is `1.00 lakh crores of which `55,000 crores is spent on sugarcane payment\(^4\). The sugar industry contributes `22.5 billion to State Government and Central Government as tax, cess and excise duty every year. Due to heavy domestic consumption, India is not in a position to export sugar in large quantity. As against an average annual rise of 2.5 per cent in world sugar production during the past ten years, global sugar consumption has grown by two per cent per annum, while in India the consumption has increased to 3.5 per cent per annum\(^5\).

### 1.2 DEVELOPMENT OF INDIAN SUGAR INDUSTRY

Few centuries ago, India exported sugar to China and to other countries. During the 20\(^{th}\) century, the sugar industry started reviving. The first serious attempt in developing sugar industry was made with the establishment of Sugarcane Breeding Institute at Coimbatore in 1912. Before that the indigenous varieties of sugarcane gave very poor yield of sugarcane and sugar recoveries were also low (six to eight per cent). After the introduction of varieties bred at Coimbatore, the cane yield went up and sugar recovery went up to 9.5 per cent a very substantial increase\(^6\).

The first sugar plant in India was established at Aska in Orissa in 1824 and the first vacuum pan process sugar plant was set up at Saran in Marhowrah in Bihar in 1904. By 1930-31, 29 sugar factories were in operation in India, all of which were in private sector and the area under cane was about three million acres. The total production of sugar during the period was only about 1.6 lakh tonnes. To meet the domestic demand of sugar, India imported eight lakh tonnes of sugar mainly from Java. In 1932, the Government of India through Tariff Board recommended grant of protection by way of imposing customs duty of 7.25 per cent plus surcharge of 25 per cent on sugar imports. Due to protection granted to sugar industry, the number of sugar factories increased from 29 to 135 in 1935-1936 and sugar production increased from 1.20 lakh tonnes to 9.34 lakh tonnes\(^7\). Although, the real growth of sugar industry started after India attained Independence in 1947, self sufficiency was obtained only after the Government of India decided to industrialize the country and passed the Industrial Policy Resolution on April 6, 1948, the policy which continued till

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\(^3\) [www.vsisugar.com](http://www.vsisugar.com)  
\(^4\) [www.articles.timesofindia.com](http://www.articles.timesofindia.com)  
\(^5\) [www.rkfml.accordfintech.com](http://www.rkfml.accordfintech.com)  
\(^7\) *Ibid.*, p.10
1998. The preference for getting licence for co-operative sector was given under this policy which was mainly responsible for the rapid development of the sugar industry in India.

To provide food security, particularly for essential commodities, the policy of partial decontrol has been adopted for sugar sales since 1967, resulted in ‘Dual Pricing System’ includes levy prices and free market prices (Non-levy). Levy sugar is supplied through Public Distribution System (PDS) to the Below Poverty Line families in all states. Levy price is fixed by the government based on ‘Statutory Minimum Price’ of cane (SMP). Non-levy prices are fixed based on open market prices. The Indian sugar industry is the major supplier of by-products like molasses for alcohol, ethanol for chemical industry, and bagasse for paper industry. Sugar mills have set up the bagasse based co-generation units for producing electricity (captive power) and the mills supply the excess power to the Electricity Board Grid.

Table 1.1
Table showing Production of Sugar in India vis-a-vis Tamil Nadu for the past 10 years

<table>
<thead>
<tr>
<th>Year</th>
<th>All India</th>
<th>Tamil Nadu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(in lakh tonnes)</td>
<td></td>
</tr>
<tr>
<td>2001-02</td>
<td>185.28</td>
<td>18.39</td>
</tr>
<tr>
<td>2002-03</td>
<td>201.45</td>
<td>16.44</td>
</tr>
<tr>
<td>2003-04</td>
<td>135.46</td>
<td>9.21</td>
</tr>
<tr>
<td>2004-05</td>
<td>126.91</td>
<td>11.08</td>
</tr>
<tr>
<td>2005-06</td>
<td>192.67</td>
<td>21.42</td>
</tr>
<tr>
<td>2006-07</td>
<td>283.64</td>
<td>25.39</td>
</tr>
<tr>
<td>2007-08</td>
<td>263.57</td>
<td>21.41</td>
</tr>
<tr>
<td>2008-09</td>
<td>145.39</td>
<td>15.97</td>
</tr>
<tr>
<td>2009-10</td>
<td>189.12</td>
<td>12.80</td>
</tr>
<tr>
<td>2010-11</td>
<td>243.94</td>
<td>18.46</td>
</tr>
</tbody>
</table>


The above table shows that the productivity of sugar industry in Tamil Nadu was considerable except in 2003-04 and 2004-05 (9.21 and 11.08 lakh tonnes). During the study period the notable highest sugar production were in 2005-06, 2006-07 and 2007-08. The share of sugar production of sugar co-operatives in Tamil Nadu during the study period has proved
that the emergence of sugar mills in Tamil Nadu contributes much to the Indian sugar industry to become the second largest sugar producer in the world.

**Table 1.2**  
Table showing the progress of Sugar Industry in India

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Sugar Mills in Operation</th>
<th>Area under sugarcane cultivation (in lakh Hec.)</th>
<th>Sugarcane Production (in lakh tonnes)</th>
<th>Yield per Hectare (in lakh tonnes)</th>
<th>Sugar Production (in lakh tonnes)</th>
<th>Average Recovery per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-02</td>
<td>434</td>
<td>44.11</td>
<td>2972.08</td>
<td>6.74</td>
<td>185.28</td>
<td>10.27</td>
</tr>
<tr>
<td>2002-03</td>
<td>453</td>
<td>45.20</td>
<td>2873.83</td>
<td>6.36</td>
<td>201.45</td>
<td>10.36</td>
</tr>
<tr>
<td>2003-04</td>
<td>422</td>
<td>39.38</td>
<td>2338.62</td>
<td>5.94</td>
<td>135.46</td>
<td>10.22</td>
</tr>
<tr>
<td>2004-05</td>
<td>400</td>
<td>36.62</td>
<td>2370.88</td>
<td>6.48</td>
<td>126.90</td>
<td>10.17</td>
</tr>
<tr>
<td>2005-06</td>
<td>455</td>
<td>42.01</td>
<td>2811.72</td>
<td>6.69</td>
<td>192.67</td>
<td>10.21</td>
</tr>
<tr>
<td>2006-07</td>
<td>504</td>
<td>51.51</td>
<td>3555.20</td>
<td>6.90</td>
<td>283.67</td>
<td>10.16</td>
</tr>
<tr>
<td>2007-08</td>
<td>516</td>
<td>50.55</td>
<td>3481.88</td>
<td>6.89</td>
<td>263.57</td>
<td>10.55</td>
</tr>
<tr>
<td>2008-09</td>
<td>489</td>
<td>44.15</td>
<td>2850.29</td>
<td>6.46</td>
<td>145.39</td>
<td>10.03</td>
</tr>
<tr>
<td>2009-10</td>
<td>490</td>
<td>41.75</td>
<td>2923.02</td>
<td>7.00</td>
<td>189.12</td>
<td>10.19</td>
</tr>
<tr>
<td>2010-11</td>
<td>527</td>
<td>49.44</td>
<td>3391.68</td>
<td>6.86</td>
<td>243.94</td>
<td>10.17</td>
</tr>
</tbody>
</table>


The table 1.2 depicts that there is a tremendous increase in the number of sugar factories in operation from 434 to 527 and the corresponding increase in the area under sugarcane cultivation from 44.11 to 49.44 lakh hectares and the sugarcane production from 2972.08 to 3391.68 lakh tonnes respectively. It clearly denotes that the growth of the mills has direct and favourable impact on agricultural economy. The sugar production has increased from 185.28 lakh tonnes in 2001-02 to 243.94 lakh tonnes in 2010-11, and the average sugar recovery was 10.23 per cent and the yield per hectare remained at the same level. The slight changes observed throughout the study period shows the improvement of sugar cultivation methods.

**1.2.1 Progress of Co-operative Sector of Sugar Industry**

During 1933-1935, the Co-operative Movement made inroads in the sugar sector. Adoption of land reforms policy by the Government of India was one of the reasons for the growth of sugar co-operatives. Ceiling imposed on land holding made the private sugar mills to non-workable units and growing consumption with increase in population urged the
Government of India to industrialize the co-operative sector. The growth of the Indian sugar industry had its beginning, when the Government of India passed the Industrial Act, 1956 where the principle of co-operation was assigned an important role for the country’s economic development, particularly for industry based on agricultural produce such as sugarcane. Under this policy, the co-operative sugar mills were given priority in getting licence. As a result, the first co-operative sugar factory was set up in Maharashtra at Ahmed Nagar (Paravara). The evolution of co-operative sugar industry in Maharashtra has been a trend setter for all the co-operatives in India. Presently, Indian sugar industry is dominated by the co-operative sector.

The growth of co-operative sector has got great significance in the present scenario especially in the liberalized economy because the co-operative effort made the Indian sugar industry globally competitive besides providing socio-economic benefits directly and indirectly to its farmers and the people living in the surrounding areas, by way of generating employment and other infrastructural facilities.

1.3 THE IN-FAMOUS INDIAN SUGAR CYCLE

- **Indian Sugar Production follows a 5 year cycle:**
  - 2-3 years of high production
  - Followed by 2-3 years of low production

- **Causes of Cyclicality:**
  - Fluctuations in sugar prices
  - Falling sugar prices against a stable or at times unaffordable cane prices
  - Weather conditions
  - Competition from other crops

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8 [http://www.coopsugar.org](http://www.coopsugar.org)
1.4  SUGAR INDUSTRY IN TAMIL NADU

Tamil Nadu is one of the leading producers of sugar in the country and its contribution is about seven per cent of the total sugar production of India. Tamil Nadu stands first in the sugarcane productivity at the rate of 110 tonnes per hectare. The growth and performance of the sugar co-operatives in Tamil Nadu is significantly related to the government policies. E.I.D. Parry’s sugar mill in Nellikuppam in the then South Arcot District which was started in 1897 is the oldest sugar mill in Tamil Nadu. Thereafter, establishment of many sugar factories increased in a large numbers because of sugarcane cultivation in a large scale in Tamil Nadu. At present, there are 44 sugar mills in Tamil Nadu comprising of 16 sugar mills in co-operative sector, two sugar mills in public sector and 26 sugar mills in private sector. The sugar production by sugar mills in Tamil Nadu was decreased in 2010-11 mainly due to decreased recovery per cent.
Table 1.3
Table showing the Growth of Sugar Industry in Tamil Nadu

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Mills in Operation</th>
<th>Sugarcane Cultivation (in lakh Hec.)</th>
<th>Sugarcane Production (in lakh tonnes)</th>
<th>Recovery Per cent</th>
<th>Yield Per Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-02</td>
<td>36</td>
<td>3.21</td>
<td>326.20</td>
<td>9.61</td>
<td>101.6</td>
</tr>
<tr>
<td>2002-03</td>
<td>35</td>
<td>2.61</td>
<td>241.66</td>
<td>9.88</td>
<td>92.4</td>
</tr>
<tr>
<td>2003-04</td>
<td>34</td>
<td>1.92</td>
<td>176.56</td>
<td>9.92</td>
<td>91.9</td>
</tr>
<tr>
<td>2004-05</td>
<td>34</td>
<td>2.32</td>
<td>233.96</td>
<td>9.64</td>
<td>100.8</td>
</tr>
<tr>
<td>2005-06</td>
<td>35</td>
<td>3.36</td>
<td>351.07</td>
<td>9.24</td>
<td>104.7</td>
</tr>
<tr>
<td>2006-07</td>
<td>37</td>
<td>3.91</td>
<td>411.24</td>
<td>9.25</td>
<td>105.1</td>
</tr>
<tr>
<td>2007-08</td>
<td>37</td>
<td>3.54</td>
<td>380.71</td>
<td>9.32</td>
<td>107.5</td>
</tr>
<tr>
<td>2008-09</td>
<td>37</td>
<td>3.09</td>
<td>328.04</td>
<td>9.62</td>
<td>106.2</td>
</tr>
<tr>
<td>2009-10</td>
<td>40</td>
<td>2.93</td>
<td>297.46</td>
<td>8.94</td>
<td>101.5</td>
</tr>
<tr>
<td>2010-11</td>
<td>44</td>
<td>3.36</td>
<td>342.92</td>
<td>9.09</td>
<td>102.0</td>
</tr>
</tbody>
</table>


The above table delineates the growth of sugar industry in Tamil Nadu during the study period. It is clear from the above table that there is significant increase in the number of sugar mills in operation from 36 to 44 during the study period and the sugarcane cultivation area is also increased from 3.21 to 3.36 lakh hectares proves that Tamil Nadu stands first in the sugarcane cultivation. Sugarcane production increased from 326.20 to 342.92 lakh tonnes and contributed much to the rural development.

1.4.1 Sugar Co-operatives in Tamil Nadu

The establishment of co-operative sugar factories is a very good strategy introduced by the government through Co-operative Movement Act, 1904 to diversify the agricultural economy. All co-operative sugar factories have been the nucleus for the development of rural areas around them. It helps the farmers to generate income thereby reducing unemployment by providing direct and indirect employment to several thousands of people living in rural areas.

1.4.2 Tamil Nadu Co-operative Sugar Federation

The Tamil Nadu Co-operative Sugar Federation is an apex body of all sugar co-operatives. The department of sugar was formed in 1969 to devote special attention to the
development of sugarcane and for the establishment of sugar mills in co-operative sector. The Commissioner of Sugar is the head of the department for coordinating various functions relating to the sugar mills in the state. The sugar co-operatives in Tamil Nadu had a Board of Directors elected by members at General Body Meeting, till 1977. Thereafter, elections are not being conducted, and now the Special Officers / Chief Executives are vested with powers as per the bylaws of the mills concerned to cater to the needs of the mills.

Table 1.4
Table showing the Progress of Co-operative Sugar Industry in Tamil Nadu

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Mills in Operation</th>
<th>Cane Crushed (in lakh tonnes)</th>
<th>Recovery %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-02</td>
<td>15</td>
<td>54.70</td>
<td>9.53</td>
</tr>
<tr>
<td>2002-03</td>
<td>14</td>
<td>45.34</td>
<td>9.96</td>
</tr>
<tr>
<td>2003-04</td>
<td>14</td>
<td>23.48</td>
<td>9.88</td>
</tr>
<tr>
<td>2004-05</td>
<td>14</td>
<td>25.98</td>
<td>9.79</td>
</tr>
<tr>
<td>2005-06</td>
<td>15</td>
<td>53.17</td>
<td>9.38</td>
</tr>
<tr>
<td>2006-07</td>
<td>15</td>
<td>75.94</td>
<td>9.25</td>
</tr>
<tr>
<td>2007-08</td>
<td>15</td>
<td>56.75</td>
<td>9.35</td>
</tr>
<tr>
<td>2008-09</td>
<td>15</td>
<td>42.68</td>
<td>10.00</td>
</tr>
<tr>
<td>2009-10</td>
<td>15</td>
<td>31.95</td>
<td>9.13</td>
</tr>
<tr>
<td>2010-11</td>
<td>16</td>
<td>39.31</td>
<td>9.15</td>
</tr>
</tbody>
</table>


The table 1.4 shows the picture of existing sugar co-operatives in operation which were 15 in 2001-02 and 16 in 2010-11. It states that the growth of sugar co-operatives is almost static with slight change in the beginning of the year 2001-02. The cane crushed is 54.70 lakh tonnes in 2001-02 and it declined to 39.31 lakh tonnes in 2010-11 with very huge fluctuations throughout the study period.

1.5 STATEMENT OF THE PROBLEM

Tamil Nadu is the largest producer of sugarcane and sugar. The emergence of co-operative sugar sector and the private players in the sugar industry significantly influenced the production performance and contributed more to the rural development. Due to increase in domestic consumption, the share of export came down considerably in the recent past. The financial performance of private, co-operative and public sectors differs even with the same organizational set up and policies framed by the Government, particularly the financial report
of sugar co-operatives recorded continuous losses year after year. The growth and performance of sugar mills are directly related to the policies framed by the Government. Dual Pricing System is adopted for the sale of sugar. Levy prices fixed by the Government based on the statutory minimum prices normally falls below the cost of sugarcane. Raw material cost contributes 70 per cent of the total cost.

Indian sugar industry can be a global leader in export, if the cost of production is minimal and the technical efficiency is augmented. The factors, which significantly affect the total cost of sugar production needs to be determined to minimize expenditure to control the cost of production. Special attention is required to analyze the various cost components of sugar production and factors deciding the effective technical performance of sugar mills. Cost components associated with sugar industry includes,

1. Sugarcane cost
2. Conversion cost
3. Transport cost
4. Repairs and Maintenance cost and
5. Interest

As the Indian Sugar Industry is dominated by sugar co-operatives, the majority of them are in Tamil Nadu and due to their poor performance, sugar co-operatives of Tamil Nadu are selected for analysis.

1.6 SCOPE OF THE STUDY

The present study aims at analyzing the financial and technical performance of entire sugar co-operatives in Tamil Nadu. As the operating results of the sugar co-operatives is on a decreasing trend, the study is focused only on financial and technical performance of all the sugar co-operatives which are functioning during the study period.

Literatures relating to sugar sectors show that the growth of the co-operative and public sectors are the same in the present scenario. Therefore, the researcher is firmly confident that the study of the performance of co-operative sector would be best suited to draw meaningful and logical conclusion. So the researcher has undertaken the present study on the sugar co-operatives and the conclusions are drawn based on the data availed from the sugar mills.
1.7 IMPORTANCE OF THE STUDY

The sugar industry is located in the rural areas, and Tamil Nadu is the largest producer of sugarcane. The demand for sugar, which is inter-linked with the sugarcane cultivation, is the main reason for the establishment of sugar mills, which directly help to improve the economic conditions of farmers in rural areas. The sugar industry is one of the contributors of revenue both to Central and to State Governments and more than 55 per cent of the sugar factories are in co-operative sector. When the co-operative sugar sector is concentrated to improve further, it is sure that it would have direct impact on the development of rural areas. Growth of sugar industry is linked with two main factors i.e. financial and technical performance of sugar mills. The financial performance of co-operative sugar mills is depending on cost and profitability factors. Rise in sales - sugar and by-products – leads to higher revenues and at the same time, cost reduction leads to profit maximization. Similarly technical performance in terms of sugar recovery, capacity utilization, crushing period, optimum utilization of machineries has impact on financial performance.

1.8 REVIEW OF LITERATURE

A record of *yester years* has dealt with the literature review of relevant data from the past.

1.8.1 Financial Performance

*The USAID/New Delhi (1993)*\(^9\) stated that the case studies were summarized in this report were designed to accelerate the introduction of co-generation in the sugar industry by processing several technical system, alternatives for three site-specific installations and estimating their cost and performance. The purpose was both to define better the prospects for co-generation in the Indian sugar industry in general and to identify specific opportunities for cost-effective investments by mill owners and others. In addition, the economic value of power produced by the selected mills to the State Electricity Boards in Maharashtra and Tamil Nadu, given each SEB’s generating capacity mix and fuel costs, using a methodology that would be applicable for evaluating the independent power from other sources as well and it is found that economic viability is highly sensitive to the amount of power exported per

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unit of capital investment and thus it depends upon year-round operation, with supplemental fuels during the off-season, and a large generating capacity relative to the internal electric demands of the mills.

*Abhijit Banerjee, Dilip Mookherjee, Kaivan Munshi and Debraj Ray (2001)*\(^{10}\) in their paper presented a theory of rent seeking within farmer co-operatives in which inequality of asset ownership affects relative control rights of different groups of members. Investment in roads and other infrastructure could also respond to the performance of the co-operatives in a district. They also state that providing strong support for the view that rent seeking by the large farmers is an important determinant of co-operative performance. It is possible that there are certain kinds of public goods that influence productivity. Whether or not these public goods are supplied could depend on the political economy of the region, which in turn is affected by the amount of differentiation among the farmers. If increased heterogeneity reduces the scope for collective action, it would render the co-operatives less productive, generating a U-shaped price-distribution relationship. However, this theory, perhaps like any other theory based on unmeasured differences in productivity across co-operatives, is inconsistent with the evidence on participation rates.

*K.K.Padmanaban (2001)*\(^{11}\) explained that the high cost of production of sugar industry are due to uneconomic nature of production, short crushing season, heavy excise duties, manipulation of stocks and hoardings etc.,

*Samar K.Datta and Kriti Bardhan Gupta (2001)*\(^{12}\) revealed in their article that Domestic Resource Cost (DRC) analysis is performed following a systems approach on a fairly large and representative sample of 131 sugar mills in India to estimate import competitiveness of Indian sugar under alternative assumptions. Besides discussing possible future strategies to attain competitiveness, it also identifies and ranks the various types of policy parameters at enterprise level, national level and international level, which may have significant effect on Indian sugar’s competitive strength. Three issues are found critical to this industry’s long-term survival growth – first, international strategies to get rid of current distortions in the global market, second, short-term domestic strategies to further liberalize

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\(^{12}\) “*Global Competitiveness Analysis of Indian Sugar*” – *Western Economic Association International’s Conference held in San Francisco, USA, July 4-8, 2001.*
and defend the industry against falling import prices, and third, long-term domestic policies to boost up investments in this sector to achieve quality-competitiveness for exports.

Suresh Gawali (2003) highlighted that the high level of domestic support given by many countries to their domestic sugar industry, including production subsidies and import barriers, has distorted international trade in the commodity. It has resulted in sugar dumping by inefficient producers at prices lower than the cost of production and also prevented the low-cost producing countries from finding a market.

Subash C.Bhattacharyya and Dang Ngoc Quoc Thang (2004) analyzed in their article about the potential for co-generation from the sugar industry in Vietnam under three different scenarios and found that between 100 and 300 megawatts of power-generating capacity could be supported by the bagasse generated from sugar mills, depending on the technology considered for sugar mills and co-generation and the possibility of renovation of the existing mills. It is found that the cost savings from co-generation would more than offset the cost of introducing co-generation in sugar mills with inefficient cane processing technologies. Sugar mills with modern technologies would have a significant amount of excess power and most of these plants would break-even if they sold excess power at around 4.5 per cent per kilowatt-hour. The break-even cost and the average production cost are sensitive to the investment cost assumption. It is suggested that co-generation from the sugar industry is an attractive option for investors in existing mills or new sugar mills alike.

Vikrant Sibal (2004) stated that sugar industry currently is highly regulated. Any de-control going forward with boost competition and profitability for efficient players it is pointed that the key risk associated with the industry is that of sugar price control by Government.

Economic Review (2004) expressed that policy matter should have a clear perception about the price mechanism and its impact with regard to the indigenous cost of production in the international scenario and formulate policies accordingly which will help the sugar industry to pay higher prices to sugarcane growers.

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Dr. S.M. Chockalingam and M. Thirunarayanasamy (2007)\(^{17}\) in their article explained that agro processing units including sugar units are plagued by the problem of sickness. The sugar industry is beset with a number of problems like shortage of sugarcane, obsolete technologies, under utilization of capacity, high cost of production etc. and these have impact on the sickness of the sugar co-operatives. He expressed the need for adoption of cost control techniques by establishing the various cost centers in the sugar mills and better cane management to reduce the losses.

Dr. S. Ganesan (2007)\(^{18}\) has attempted to analyze the commercial efficiency of co-operative sugar mills through applying leverage and turnover ratios, profitability ratios. His analysis reveals that Tamil Nadu Co-operative Sugar Mills faced problems of inefficient asset utilization, low productivity of resources, poor performance of debt management and heavy debt interest burden.

B.K. Mali, Pawar P.P., Shete S.M., and Yadav D.B. (2007)\(^{19}\) had told that there existed a gap in yield (demonstration yield minus average farm yield) to the extent of 17-45 per cent in the production of planted and ratoon sugarcane in Western Maharashtra. One of the reasons for such yield gap was rather the imbalanced use of crucial inputs than the recommended levels. The observed input use gap for the planted and ratoon sugarcane was 60-70 per cent in manures, 9-27 per cent in Nitrogen, 4-10 per cent in Phosphorus and 4-49 per cent in Potash. In addition to this, the excess use of Nitrogen (18 per cent), Phosphorus (11-65 per cent) and Potash (11-44 per cent) has resulted in economic loss. In order to reduce this gap in yield and to avoid the economic loss, there is a need to educate the farmers, to use the recommended levels of inputs in the production of sugarcane.

Global Scenario (2009)\(^{20}\) has mentioned, that the Brazilian Government has announced an accord with the country’s sugar industry, to provide decent working conditions for sugarcane cutters, local press reports said. Responding to criticism from European human rights groups, Brazil’s Government and industry representatives signed a labour accord that


commits them to improve existing working conditions, in the sugar industry. The document, which is not binding, represents a commitment on the part of the companies to provide decent working conditions for sugarcane labourers, as well as technical training. For its part, the Government has committed to improving its oversight of all cane cutters in the country. The pact does not directly address minimum wages, nor does it include any mandatory obligations for companies. So far, 303 out of the 403 firms in the industry have signed the accord.

**Dr.V.Dheenadhayalan, R.Devianbarasi (2009)** in their article stated that sugar industry in India in terms of factories, opening stock of sugar, production of sugar, consumption, export and closing stock of sugar have showed a tremendous change, and sugar industry creates good impact on the economy of India. Co-generation of power by sugar mills in India began a decade back in the year 1993-94. He also noted that the cost of sugarcane production and management has a significant influence on the cost of sugar production. The cost of sugarcane production is greatly influenced by productivity, i.e. per hectare yield of sugarcane.

**Kushagra Nayan Bajaj (2009)** pointed that the price of sugarcane is highly sensitive and politicizes subject in India. Due to constant upward climb of the SAP for cane, which is more of a political call than an economic evaluation, sugar mills often do not even recover their conversion cost. He pointed that the price of sugar in India is the lowest in the world and the price of sugarcane is the highest internationally. He suggested the policy measures such as providing subsidies for sugar export and fixing a minimum conversion cost that a mill has to necessarily recover to put the Indian sugar industry to be a prosperous one.

**Barbara Haya, Malini Ranganathan and Sujit Kirpekar (2009)** explained that bagasse co-generation has faced layers of informational, technical, regulatory and financial barriers that have changed over time, and differed significantly between the private and co-operative sugar sectors. Interviews at mills attempting to access carbon financing through the Kyoto Protocol’s Clean Development Mechanism (CDM) indicate that additionality testing is a challenge to the effectiveness of this mechanism. Any effort to exploit the remaining 86 per

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cent of the estimated national potential for high efficiency bagasse co-generation will need to address the special financial and political conditions facing co-operative mills.

Dr.A.P.J.Abdul Kalam (2010) had a word for the sugar technologists, that they have to create a partnership between agricultural scientists, extension workers and farmers, so that there is persistent effort to increase the per hectare cane productivity in all the states of the country taking the experience of high yielding varieties of different states.

Madhoo Pavaskar and Vaishnavi Naish (2010) had stated that the current sugar crisis essentially reflects the failure of government policy on sugar, on all fronts. The obsession of the government to continue with the bazaar regulations on cane marketing, sugar production, sugar distribution and import-export trade has perpetual sugar price cycle to the detriment of not only the sugar economy, but also the producers of cane and consumers of sugar. It is time for the government to free the sugar economy from all absurd regulations and controls, so that India can assume its rightful place in the global sugar market.

Dr.N.A.Ramaiah (2011) pointed that in the decade past the Indian sugar industry made commendable progress, contributed immensely for the country’s needs and acquired laurels and commendations from other countries too, and there is tremendous prospects of Indian sugar industry developing at a much faster pace than what has been achieved in the past decades.

Rangalal Mohapatra (2011) made an empirical analysis of profit efficiency of the effective heads of the farm households in sugarcane production in the Jaipur District of Orissa. It combines the concept of technical and allocative efficiency in the profit relationship and any errors in the decision making are assumed to be translated into lower profits or lower revenue for the producer. He used the Battesse and Coelli (1995) extended model, where the farm-specific profit efficiency and the linear factors of profit inefficiency was estimated together. The results of the joint estimation of parameters of profit function and the inefficiency components showed that 93 per cent differences in the efficiency scores are due

to profit inefficiency, and profit inefficiency reduces significantly with higher education. A grass roots level farming practice awareness program both by government and private agencies as well as the reorientation of the formal education curriculum toward farm-oriented curriculum were highly recommended in his article.

**Dr.S.K.Pagar (2011)**\(^{28}\) in his article revealed that co-operative sugar factories have made a greater contribution to the economic and social development of their areas, and these factories are instrumental in establishing educational institutions, hospital, dairy and poultry units, consumer stores, co-operative banks, libraries, recreation centers etc. The rapid growth of the sugar factories in recent years shows the potential for the development of this industry when the interest of the farmers and those of the manufacturers of sugarcane will be reconciled.

**G.U.Todkari (2011)**\(^{29}\) has studied the role of co-operative sugar factories in rural development. His study represents that the success of sugar co-operatives in their commitment to area development led to growth of other agro based processing units like dairy co-operatives, fruit processing units and it solved the problem of unemployment by providing employment. He concluded that co-generation and distillery projects can give large profits and more employment opportunity.

**Prof.R.G.Sathe (2011)**\(^{30}\) had analyzed previous five years financial statements from 2004-05 to 2008-09 by using ratio analysis. He observed that the particular unit needs to improve its liquidity position and should be utilized its financial resources, which is helpful for increasing the profitability of the sugar unit. He studied the factors determining the liquidity and profitability of co-operative sugar factory and identified the strength and weakness of the organization in the management of working capital.

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Dr.A.Vijayakumar (2011)\textsuperscript{31} in his articles tested the effect of the Cash Conversion Cycle on corporate profitability together with other control variables like size, growth, leverage and GDP growth using multiple regression model. The results of the study demonstrate that managers can create value by reducing their accounts are outstanding. Moreover, shortening the Cash Conversion Cycle also improves the firm’s profitability. The study also found that size, growth and GDP growth variables have positive relationship with profitability, whereas leverage have negative relationship with firms’ profitability. The study contributes to the literate on the relationship between the cash conversion cycle and corporate profitability.

Rajendran Karuppannan (2011)\textsuperscript{32} revealed that all-round efforts should be taken to improve the operational efficiency at a reduced cost to improve the profitability of the mills. Cost reduction program should not be considered as a onetime action or programme. It is not confined to one department. All employees of the mills should carry out it in all departments continuously. Cost reduction does not mean arbitrary cost slashing. The effort of cost reduction should be first set by top executives. The right and need for cost reduction should be explained to all and the designed benefits be explained such as profitability, better liquidity etc. Above all cost reduction should not be carried out for the sake of reducing cost. All other factors should also be looked into. Cost reduction needs to be monitored continuously by the management for survival.

Dr.Martina. R. Noronha and Prof.Dilipsinh Thakor (2012)\textsuperscript{33} made an attempt to find the financial visibility of sugar factories located in South Gujarat in India. They used ratio analysis and discriminant analysis to give the actual prediction equation to classify new cases. He found that there is tremendous scope for India to emerge as a significant player in the world sugar trade improvement. He also added that making a fair degree of progress on agricultural efficiency (per hectare output of sugarcane and cost of production) as well as conversion efficiency. India will surely become a major exporter which will stabilize the industry and reduce its cyclicality significantly, as well as open up new vistas of growth for

the Indian Sugar Industry. An efficient and well-managed future trading mechanism needs to be put in place to facilitate price discovering both for farmers and millers in the domestic and global markets.

**Dr. Neeraj Kumar Gupta (2012)**\(^{34}\) has made an attempt to study the degree of financial health of the selected units with the help of Edward Altman’s Z-score model and the comparison of wealth health among the selected units with the help of statistical tools i.e. Mean, Standard Deviation and Co-efficient of variation. The study depicts the issues relating to the financial performance. The financial health of sugar mills is severely affected by the number of reasons. One problem leads to another problem. All the major problems of sugar sector are interlinked. For example, the low per cent of sugar in sugarcane leads to low recovery rate; the obsolete technology leads to high production cost; the accumulation of sugar stock leads to high interest burden; the state advised price leads to the additional burden on temporary loan. All these factors ultimately pull down the profit line on performance graph of the sugar mills.

**Todkari G.U (2012)**\(^{35}\) in his article explained that sugar co-operatives expansion gave importance to better sugarcane production, supply of appropriate agricultural inputs to farmers and increased irrigation facilities in their area of operation. In addition growth of educational facilities, medical facilities, etc. were also undertaken as a part of area development by these co-operatives led to growth of ancillary units, like paper plants, distillery units etc. which in turn increased employment and led to further industrial development in the rural areas. The success of sugar co-operatives in their commitment to area development led to growth of other agro-based processing units like dairy co-operatives, spinning mills, fruit processing units and such agro-based industrialization helped in the development of agriculture and brought about the necessary transformation of the rural areas and in the process the benefits of these activities reached the farmers and they too benefitted and progressed.


Malini Ranganathan project focused on Maharashtra, a large sugar producing state in India where almost all sugar is produced by co-operatives – farmer – owned entities that serve important social functions in the countryside. It evaluates the particular financial, institutional, and political characteristics of co-operative sugar mills that have prevented them from becoming electricity producers. It finds that domestic renewable energy programs and international projects have not yet taken into account the financial circumstances of co-operative mills. Her recommendation includes introducing alternative financing mechanisms; augmenting interaction and learning among co-operatives; and regulatory policies conducive to renewable power generation. In addition, it finds that if co-operative sugar in India is to emerge as a viable and independent energy producer, systemic changes in the sugar sector as a whole will have to be made.

Dr.N.Ramanjaneyalu and Mahantesh P.Biradar expressed in their article how the sugar producer will market their product, i.e. sugar, and how they will formulate the strategies to market their other sub-products, and also studied the various problems which are facing by the industry and by the firm. They also focused how the government will regulate the sugar industry and how they will affect the marketing and production of sugar in order to know their intervention. And also tried to analyze the sugar industry by the help of SWOT analysis and Porter’s Five Force Model with a taking HIRA sugars as a case study.

Sandip Sukhtankar found in his article that private sugar mills substantially reduce profits and raise costs for crops other than sugarcane, while sugarcane outcomes are not significantly affected by sugar mill ownership structure and he observed that private sugar mills intentionally discourage farmers from farming crops other than sugarcane in order to increase the supply of inputs to mills. He suggested that private firms in highly regulated markets may influence less-restricted related markets to maximize profits, with consequences that may not be anticipated by regulators. This presents a challenge to the literature that contends that regulated private firms, are similar to state-owned firms in their abilities to carry out a state’s distributional goals, and differ only in their efficiency.

37 “Problems and Analysis of Sugar Industry – A Case Study of Hira Sugars, Sankeshwar, Karnataka.
Veena Goel\textsuperscript{39} studied that mutual interdependences of the chain partners coupled with regulatory provisions such as announcement of SMP/SAP for cane have facilitated chain coordination for sugar mills with the upstream and downstream chain partners. This ensures timely cane supplies to sugar mills while timely cane disposal and payments to farmers. However, cane production has not kept pace with capacity expansion in the industry. Instead, the industry has received increased cane supplies from a continuous upward revision in the state advised prices that diverted its supplies from the gur making units. Further, cyclical nature of the industry adversely affects it supplies particularly during the downward phase. As a result, co-operative segment of the industry is beset with several concerns. However, private sugar mills because of comparatively greater market orientation and a paddock-to-plate mentality in its operations have steamed ahead of co-operative mills.

1.8.2 Technical Performance

Chung Chi Chou (2002)\textsuperscript{40} in his article stated that after reviewing and discussing operating data with sugar technologies from over forty countries around the world, it became obvious that technical performance varied significantly from company to company. Reasons given for poor performance, often not justified, are regional in nature, such as difference in social structure and culture. Also, the need for adequate training of operators / engineers / chemists in technologies and mid-level supervisors in management, which requires no capital expenditure, is often over looked. To compete in a global economy it is important to establish performance criteria/benchmarks for the purpose of achieving lowest cost sugar production. His paper discusses benchmarks for the sugar industry in order for the industry to compete in the global market.

S.P. Singh (2006)\textsuperscript{41} analyzed the performance of sugar mills in Uttar Pradesh by ownership, size and location. In his article, he pointed that average Overall Technical Efficiency (OTE) shows a cyclical pattern mainly due to fluctuations in the scale efficiency. The performance of the mills is found to vary significantly across sector, plant size, and region. The private sector mills achieved the highest efficiency scores, followed by the co-operative sector. It has also been observed that the mills with bigger plant size attain

\textsuperscript{39} “Chain Coordination Mechanisms and Concerns in Sugar Industry in Punjab, India”- www.ijkv.academic.edu.

\textsuperscript{40} First Biennial World Conference on “Recent Development in Sugar Technologies” May 16-17, 2002 www.esugartech.com.

\textsuperscript{41} “Performance of Sugar Mills in Uttar Pradesh by Ownership, Size and Location”- Prajnan Vol.XXXV, No.4, 2006, pp.333-334.
relatively higher efficiency scores. Labour and energy inputs are found highly underutilized in almost all the inefficient mills. Targets set for relatively inefficient mills suggest that on average, these mills can become as efficient as the mills in their reference set, if they could adjust their operation to the associated target point determined by the efficient mills that define their reference set.

Dr. Adya Prasad Pandey (2007)\textsuperscript{42} in his article stated that Indian sugar industry, in country, has a lion’s share in accelerating industrialization process and bringing socio-economic changes in under developed rural areas. It can be a global leader provided it comes out of the vicious cycle of shortage and surplus of sugarcane, lower sugarcane yield, and lower sugar recovery, ever-increasing production costs and mounting losses. It needs quality management at all levels of activity to enhance productivity and production. Attention is required on cost minimization and undertaking by product processing activities. Most of the sugar units utilize production capacity below 50 per cent mounting losses and decreasing net worth of sugar factories have been responsible for sickness of sugar industry. According to his view, daily crushing capacity should be extended and to enhance the share of Indian sugar industry needs to be enhanced.

N.P. Singh, Paramatma Singh and R.P. Singh (2007)\textsuperscript{43} described in their article that the sugar industry has shown considerable instability in the level of production as a result of inter-dependence and inter-relationship between sugarcane, gur, khandasari and white sugar, leading to fluctuations in the production of sugarcane as well as sugar. The author presented the status of sugar industry in terms of its efficiency in operations. It has urged the policy makers to streamline strategies that promote stabilization of sugarcane economy and make the state a credible supplier of sugar in the international market, benefitting growers, processors and in turn, consumers. The average efficiency of co-operative sector was low due to the presence of few factories, operating at less than 50 per cent of the efficiency level. The variation in efficiencies was largely due to the systems of operation and management skills. The private sector mills are mostly new, with a large plant size and professional management, which reduce the manufacturing costs and other operating expenses. This needs to be considered while formulating strategies for the efficient management of the sugar industry.

Chun-Chu Lin (2008)\textsuperscript{44} has stated that in recent years, as competition among major ports has become increasingly intense, there has not been a port that has not hoped to increase its own operational efficiency, and hence, its ability to compete internationally. By evaluating efficiency, it is possible for a port to understand its strengths and weaknesses, and to recognize the crises and opportunities likely to exist within the competitive environment, so that it may adopt appropriate response measures. It is for this reason that a set of impartial and objective tools to evaluate efficiency is deemed necessary.

Performance Audit (2009)\textsuperscript{45} revealed that the co-operative sugar mills in the state suffered heavy losses due to high cost of production. They failed to diversify into power generation, distillery operations etc., to augment their revenue. Lack of scientific approach in sugarcane development, problems in sugarcane linkage, crushing of overage sugarcane, frequent breakdown of machineries, non-maintenance of correct technical parameters in sugar mill operations etc., affect the efficiency of co-operative sugar mills. Excess work force, failures in marketing and excessive dependence on borrowed funds for working capital contributed to the high cost of production, which led to recurring losses and resulted in huge accumulated losses.

Corios Ascosta Colzado (2011)\textsuperscript{46} in his article applied the discounted cash flow analysis for a hypothetical Mexican sugar mills with the aim to incorporate the valuation model to find the most significant variable that affects the sugar production process as well as operational and financial factors of a common sugar mill which are driven by the current legislation in terms of sugarcane pricing and labour cost. By considering the cost structure of maximum sugar mill remain unchanged in the short run. Sugar mills should devote more resources to increase sugar-land for sugarcane and enhance factory efficiency by reducing sugar loss, and increasing working days.

Pesala Busenna and Ramesh Vadlamudi (2011)\textsuperscript{47} in their article stated that high efficiency is very important for the survival of the factory. Technical efficiency of a sugar factory depends upon its capacity to extract maximum sugar from the sugarcane. It is

\textsuperscript{46} “Valuation of a Mexican Sugar Mill and Driving Value Factors” – Business Intelligence Journal-2011, Vol.4. No.1 p.91.
determined by several factors such as Reduced Mill Extraction, Reduced Boiling House Extraction, Reduced Overall Extraction and sugar loss.

*Sarbapriya Ray*(2012)\(^{48}\) examined the economic performance of Indian Sugar Industry in terms of capacity utilization. Her study revealed that a significant variation in the capacity utilization rates during the study period within the same industry was found. She stated in her study that there has been diminishing capacity utilization growth rate in this industry during post reform period. The impact of liberalization on economic capacity utilization of Indian Sugar Industry is notified to have significant negative impact.

*M.B.Ninela, D.J.Muzzell and D.J.Love*\(^{49}\) stated that the primary route to achieve good technical performance is usually close control of process operations, guided by detailed measures of factory performance and identifying and correcting issues of design and maintenance that adversely affect process performance usually requires close attention to details combined with sufficient technical knowledge. They also attempt to provide a framework to assist in the process of identifying and correcting issues that affect sucrose loss in final molasses. This is done through a set of simple guidelines that are explained by using anecdotes from the combined experience of the authors to illustrate the type of problems that can be encountered and corrected.

**1.9 OBJECTIVES OF THE STUDY**

The sugar co-operatives of Tamil Nadu are selected for the analysis with the following objectives.

- To study the role of sugar co-operatives in rural development.
- To assess the financial performance of sugar co-operatives by considering the variables such as sales, cost of production, operating income etc.,
- To measure the technical performance of the sugar mills by considering the variables such as capacity utilization, sugar recovery, sugar bagged quantity etc., and to predict the production.
- To suggest the recommendations for improving the performance of the sugar co-operatives.


1.10 HYPOTHESES

The researcher has framed the following hypotheses and tested in the study.

- The effect of Material Cost, Conversion Cost, Interest etc., on Cost of Production are not significant.
- The Net Profit is not significantly affected by Net Sales.
- The quantity of sugar produced is not significantly affected by the capacity utilization.
- There is no significant difference in EBDIT/Net Sales, EBIT/Capital Employed, EBIT/Total Assets etc., among small, medium and large size mills.
- The sugar bagged has no significant relationship with recovery Per cent.

1.11 OPERATIONAL DEFINITIONS OF CONCEPTS

1.11.1 Financial Performance

Financial performance is a subjective measure of how well a firm can use assets from its business, generates revenues, and identifies the overall financial health over a given period. It can be used to compare similar firms across the same industry, or to compare industries or sector in aggregation. The level of performance of business in a given period is expressed in terms of overall profit and loss during that time. Evaluation of financial performance allows decision makers to judge the results of business strategies and activities in objective monetary terms. Financial Performance is defined as “measuring the results of a firm’s policies and operations in monetary terms. These results are reflected in firms return on investment, return on assets, value added etc.,”

1.11.2 Technical Performance

Technical performance is measuring the technical efficiency of firms in the process of production and maximizing production of goods and services from the available resources. The maximum amount of physical production is obtained from the given resource inputs. The concept of technical performance is intrinsically related to the estimation of a production frontier since it can only be defined with respect to a benchmark i.e. an ideal level of performance. Technical efficiency is defined as “situation where it is impossible for a firm to produce with a given know how (i) large output from the same inputs, (ii) the same output with less of one or more inputs without increasing the amount of other inputs”.

1.12 GEOGRAPHICAL AREA

The area of study covers the state of Tamil Nadu. Since the sugar industry is the only industry, which is located in rural areas, and its functioning depends on agriculture, the researcher has undertaken this study to find the extent of contribution of the sugar mill to the rural development and also for measuring the growth of the mills.

1.13 PERIOD OF STUDY

The period of study is 10 years from 2001-02 to 2010-11. The growth trend and performance of sugar industry cannot be measured by scanning the financial records for shorter period. Hence, the period of study of 10 years has been taken for analysis.

1.14 METHODOLOGY

Since the present study is focused on finding the factors responsible for the performance of sugar co-operatives in Tamil Nadu, the research is characterized as exploratory research. As a part of collecting primary data, the researcher had met the officials and cane growers of some selected sugar co-operatives and Executives of Co-operative Sugar Federation and conducted an interview by personal visit to collect the primary data. The financial and technical performance of the sugar co-operatives were discussed with the officials of the sugar mills and the data to know about the extent of benefits given by the sugar mills and its contribution to the development of rural areas were collected from the beneficiaries of the sugar mills and people living around the sugar mills.

1.14.1 Secondary Source

The financial statements of sugar co-operatives and the data needed for analysis of technical performance are collected from the annual reports of each mills from the Commissioner of Sugar through personal visit by the researcher. In the absence of some accounting information, the data are collected from the individual mills.

1.14.2 Sampling Method

Census method has been adopted in this study for analysis. Out of 16 sugar co-operatives in Tamil Nadu, 14 mills are taken for analysis as they are functioning without any interruption (or) production stoppage throughout the study period. Census refers to the aggregate of data source i.e. population (or) universe.
1.14.3 Framework of Analysis

The data needed for this present study is collected from both primary and secondary sources but for analytical purpose only the secondary data are considered. Data were analyzed by applying statistical tools such as Mean, Standard Deviation, Regression, Ratio Analysis, Descriptive Analysis, Co-efficient of Variation, F-test, T-test and ANOVA and Growth Rate is measured through AGR, LAGR and CAGR. In addition to this, COBB-DOUGLAS production function is also employed in this study.

1.14.4 Classification according to size

The sugar co-operatives in Tamil Nadu have been divided into three groups as small, medium and large based on the average total assets. The ten years average of total assets and mean values for each sugar mills are found out initially. From these, the overall mean and standard deviation are found out for the 14 sugar mills. Using these mean and standard deviation, small, medium and large sized sugar mills are found out by applying the formula $X \pm 0.5 \text{ S.D.}$ The sugar mills whose average assets falling below $X \pm 0.5 \text{ S.D.}$ are considered as small and whose average assets falling above $X \pm 0.5 \text{ S.D.}$ are considered as large and whose average assets during the study period falling between $X \pm 0.5 \text{ S.D.}$ and $X \pm 0.5 \text{ S.D.}$ are considered as medium sized sugar mills.

Table 1.5

<table>
<thead>
<tr>
<th>Size of the Mills</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambur</td>
<td></td>
<td>Dharmapuri</td>
<td>Salem</td>
</tr>
<tr>
<td>Amaravathi</td>
<td></td>
<td>Vellore</td>
<td>Kallakurichi-I</td>
</tr>
<tr>
<td>Tirupattur</td>
<td></td>
<td>M.R.K.</td>
<td>Chengalrayan</td>
</tr>
<tr>
<td>Tiruttani</td>
<td></td>
<td>Cheyyar</td>
<td>Subramania Siva</td>
</tr>
<tr>
<td>N.P.K.R.R.</td>
<td></td>
<td></td>
<td>Kallakurichi-II</td>
</tr>
</tbody>
</table>

Source: Computed

The above table 1.5 exhibits the list of mills, which are coming under small, medium and large size. Out of 14 mills, five mills come under small size, four mills come under medium size and rest of the five mills comes under large sized mills.
1.15 LIMITATIONS OF THE STUDY

Amaravathi and Salem sugar co-operatives have distillery units. The sales data of these two mills include the sale of products of distillery units, which cannot be segregated. The period of study covers 2001-02 to 2010-11 and conclusions are drawn based on the prevailing government policies during the study period only. Hence, the conclusions drawn from this study may not be suitable for other sectors.

Financial performance analysis mainly includes the area relating to production, sales, and profitability. Similarly technical analysis are limited to some of the general operational techniques of the mills such as sugar bagged quantity, capacity utilization, recovery per cent etc., and it does not include intricate production, storage techniques like modernization of production functions, extent of automation etc.,

1.16 ORGANIZATION OF THE STUDY

*The thesis consists of six chapters.*

The *first chapter* deals with the introduction, statement of the problem, objectives, methodology adopted, scope of the study, period of study etc.,

The *second chapter* explains the profile of the sugar co-operatives.

The *third chapter* discusses the sugar co-operatives and rural development in Tamil Nadu.

The *fourth chapter* contains the measurement of financial performance.

In the *fifth chapter*, an evaluation of the technical performance in relation to sugar production and its related input variables has been made.

*Chapter six* summarizes the findings and offers suggestions.