CHAPTER VI
CAPACITY UTILISATION AND RECOVERY COST

Full capacity utilisation is necessary for a healthy working of the sugar industry. The Indian sugar mills Association (ISMA)\(^2\) 1987 pointed out that in the states of East Uttar Pradesh, Bihar, Andhra Pradesh, Madhya Pradesh, Rajasthan, West Bengal, Assam, Orissa, Nagaland, Kerala and Goa, about 125 sugar factories, approximately 15 percent of the industry, are suffering from under-utilisation of capacity. These factories are utilising hardly 60 percent of their capacity.

The capacity utilisation of a sugar factory depends upon the availability of sugar cane and the demand for sugar. It is said that there is no recession in the demand for sugar as the consumption increased from 5,208 thousand tonnes in 1979-80 to 10,221 thousand tonnes in 1989-90\(^2\). As Bala Subramaniam\(^3\), Bureau of Industrial Costs and Prices.

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1. Indian Sugar Mills Association, Memorandum to the Bureau of Industrial Costs and Prices, P 4 Feb 1987
revealed that the main constraint for the full 100 percent capacity utilisation was non-availability of the required quantity of cane. He attributed the non-availability of sugar cane to the faulty location of the factory, inadequate infrastructure facilities like irrigation, lack of motivation to plant sugar cane, absence of cane development activities, non-supply of inputs in time, bad relationship with the cane growers, intense competition from gur making, delay in cane payment etc. He also opined that the cost of production per bag of sugar was very low in 1982-83 in comparison with the previous year, inspite of the rise in price of almost every thing, because of high recovery and high capacity utilisation. In later years, the cost of production increased and the recovery percentage showed a downward trend although capacity utilisation and technical efficiency improved.

The formula, which was designed as per the Andhra Pradesh Sugar Cane Regulation of Supply and Purchase Rules 1961, was useful to calculate the actual cane used during the given period of time,

\[
\text{Actual cane crushed} = \frac{\text{Capacity Utilisation}}{\text{Installed capacity} \times 130\text{days}} \times 100
\]

and the minimum quantity of cane to be crushed by a sugar
factory during any crushing season is fixed as 130 days, as per the above rules.

The crushing capacity of the Kovur co-operative sugar factory was 1,250 TCD. The optimum crushing capacity of the factory was (1,250 x 130 days) 1,62,500 tonnes. Table 6.1 depicts the capacity utilisation of sugarcane in the Kovur co-operative sugar factory during 1978-79 to 1989-90. The capacity utilisation of the Kovur co-operative sugar factory was 11.75 percent during 1978-79 which decreased to 1.71 percent in 1979-80. The capacity utilisation was very low during these two years because of the first and the second trial crush. During the year 1980-81 the factory did not work, because of the non-availability of sugar cane. After starting commercial production in 1981-82 the capacity utilisation increased steadily upto 1985-86. The capacity utilisation was 47.37 percent in 1981-82 and increased to 137.54 percent during 1985-86, which showed an increase of 190.35 percent. During the year 1986-87 the capacity utilisation decreased to 124.71 percent which showed a decrease of 9.33 percent, compared with the previous year. This capacity utilisation increased to 147.91 percent in 1987-88 and decreased to 77.67 percent in 1988-89. Again the utilisation capacity increased to 131.15
<table>
<thead>
<tr>
<th>Year</th>
<th>Optimum Crushing Capacity (Installed capacity x130 M T )</th>
<th>Actual Cane Crushed (in M T )</th>
<th>Capacity Utilisation (in M T )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-79</td>
<td>1,62,500</td>
<td>19,092</td>
<td>11.75</td>
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<tr>
<td>1979-80</td>
<td>1,62,500</td>
<td>2,784</td>
<td>1.71</td>
</tr>
<tr>
<td>1980-81</td>
<td>1,62,500</td>
<td>-</td>
<td>-</td>
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<tr>
<td>1981-82</td>
<td>1,62,500</td>
<td>76,974</td>
<td>47.37</td>
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<td>1982-83</td>
<td>1,62,500</td>
<td>65,354</td>
<td>52.53</td>
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<td>1983-84</td>
<td>1,62,500</td>
<td>95,131</td>
<td>58.54</td>
</tr>
<tr>
<td>1984-85</td>
<td>1,62,500</td>
<td>1,02,694</td>
<td>63.20</td>
</tr>
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<td>1985-86</td>
<td>1,62,500</td>
<td>2,23,504</td>
<td>137.54</td>
</tr>
<tr>
<td>1986-87</td>
<td>1,62,500</td>
<td>2,02,661</td>
<td>124.71</td>
</tr>
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</tr>
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<td>1,26,218</td>
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<tr>
<td>1989-90</td>
<td>1,62,500</td>
<td>1,64,369</td>
<td>101.15</td>
</tr>
</tbody>
</table>

Source: Records of the Kovur co-operative sugar factory
percent in 1989-90. The capacity utilisation of our co-operative sugar factory was under utilised from 1978-79 to 1984-85 and in 1986-89, whereas it was over utilised from 1985-86 to 1989-90 except in the year 1988-89. The main constraint to full capacity utilisation was the non-availability of sugar cane and unforeseen stoppages. The non-availability of sugar cane was due to the low sugar cane price declared by the state government and the higher realisations from alternative crops. From the year 1985-86 to 1989-90 (except in 1988-89) the factory worked with over capacity utilisation even though the factory faced the cane arrival problem, mechanical problem and evaporator scale problem etc.

Table 6.2 shows the number of days crushed and the stoppages during 1978-79 to 1989-90. During the trial crush year (1978-79) the number of gross days crushed and net days crushed were 57 days and 27 days respectively. Out of 1,354 30 total hours available for crushing, the total hours crushed was 592 40 and the total hours stopped was 761 50, which accounted for 43.76 percent and 56.24 percent respectively. The number of gross days crushed and the number of net days crushed were drastically decreased to 15 days and four days during 1979-80 which showed a decrease of 73.68 percent and 85.19 percent compared with the previous year. The total hours available
Table 6.2 Number of Days Crushed and Stoppages, 1978-79 to 1989-90

<table>
<thead>
<tr>
<th>Year</th>
<th>No of Gross days crushed</th>
<th>No of Net days crushed</th>
<th>Total hours available for crushing</th>
<th>Total hours crushed</th>
<th>Total hours stopped</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-79</td>
<td>57</td>
<td>27</td>
<td>1354 30</td>
<td>(100)</td>
<td>(43 76)</td>
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<tr>
<td>1979-80</td>
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<td>(24 66)</td>
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<tr>
<td>1980-81</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1981-82</td>
<td>97</td>
<td>60</td>
<td>2314 00</td>
<td>(100 0)</td>
<td>(65 63)</td>
</tr>
<tr>
<td>1982-83</td>
<td>95</td>
<td>73</td>
<td>2268 15</td>
<td>(100 0)</td>
<td>(70 93)</td>
</tr>
<tr>
<td>1983-84</td>
<td>110</td>
<td>88</td>
<td>2618 15</td>
<td>(100 0)</td>
<td>(74 97)</td>
</tr>
<tr>
<td>1984-85</td>
<td>116</td>
<td>95</td>
<td>2761 00</td>
<td>(100 0)</td>
<td>(75 63)</td>
</tr>
<tr>
<td>1985-86</td>
<td>246</td>
<td>197</td>
<td>5920 35</td>
<td>(100 0)</td>
<td>(73 24)</td>
</tr>
<tr>
<td>1986-87</td>
<td>202</td>
<td>179</td>
<td>4829 10</td>
<td>(100 0)</td>
<td>(61 72)</td>
</tr>
<tr>
<td>1987-88</td>
<td>260</td>
<td>224</td>
<td>6231 40</td>
<td>(100 0)</td>
<td>(79 22)</td>
</tr>
<tr>
<td>1988-89</td>
<td>132</td>
<td>110</td>
<td>3120 00</td>
<td>(100 0)</td>
<td>(77 13)</td>
</tr>
<tr>
<td>1989-90</td>
<td>162</td>
<td>142</td>
<td>3867 20</td>
<td>(100 0)</td>
<td>(80 74)</td>
</tr>
</tbody>
</table>

Note:
1) Gross days: days including stoppages
2) Net days: days excluding stoppages
3) The figures in the parentheses indicate their percentage share on total hours available for crushing

Source: Records of the Kovur Co-operative Sugar Factory
for crushing, total hours crushed and total hours stopped also decreased to 353.15, 87.10 and 266.05 respectively, which showed a decrease of 73.92 percent, 25.30 percent and 66.06 percent respectively during the same period. The percentage of total hours crushed and total hours stopped were 24.66 percent and 75.34 percent respectively of the total hours available for crushing in 1979-80. The decrease in number of gross/net days crushed, total hours available for crushing, total hours crushed and total hours stopped were due to the non-availability of sugarcane. During the year 1987-88 the number of gross and net days crushed reached a peak figure of 260 days and 224 days respectively, as against 246 days and 197 days in 1985-86 which showed an increase of 5.69 percent and 13.71 percent respectively. The total hours available for crushing and the total hours crushed also reached a peak figure of 6,231.40 and 4,936.35 as against 5,920.35 and 4,336.20, which showed an increase of 5.25 percent and 13.84 percent respectively during the same period. However, the total hours stopped decreased to 1,295.05 as against 1,584.15 which showed a decrease of 18.25 percent respectively during the same period. The reasons attributed for the increase in the number of gross days and net days crushed, total hours available for crushing, total hours crushed were an increase in sugar cane area, production and cane crushed during this period.
The number of gross days crushed and the number of net days crushed decreased to 162 days and 142 days during 1989-90 as against 260 days and 224 days in 1987-88, which showed a decrease of 37.69 percent and 36.61 percent respectively. The total hours available for crushing, total hours crushed and total hours stopped also decreased to 3,867.20, 3,122.20 and 745.00 respectively as against 6,231.40, 4,936.35 and 1,295.05, which showed a decrease of 37.96 percent, 36.75 percent and 42.47 percent respectively during the same period. The reasons attributed for the decrease in the gross number of days crushed, and net number of days crushed, were a decrease in cane acreage, sugarcane production and cane crushed. The reasons for decrease in the total hours available for crushing and the total hours crushed were the cane arrival problem, mechanical problem and evaporator scale problem etc.

Table 6.3 depicts the component factors for stoppages during 1978-79 to 1989-90. The main components of stoppages were shortage of cane, mechanical and chemical process and miscellaneous. Miscellaneous include electrical problems and cleaning etc. Out of the 761.50 total hours stopped, 445.05 hours were due to cane shortage, 131.00 hours due to mechanical and chemical problems and 185.45 hours due to cleaning and electrical problems etc., which account for 58.44 percent, 17.20 percent and 24.36 percent respectively.
### Table 6.3 Component Factors for Stoppages, 1978-79 to 1989-90

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Miscellaneous</th>
<th>Electrical</th>
<th>Mechanical &amp; Process</th>
<th>Shortage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(in hours)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978-79</td>
<td>761 50</td>
<td>185 45</td>
<td>131 00</td>
<td>445 05</td>
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</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(24 36)</td>
<td>(17 20)</td>
<td>(59 44)</td>
<td></td>
</tr>
<tr>
<td>1979-80</td>
<td>266 05</td>
<td>7 30</td>
<td></td>
<td>256 35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(3 57)</td>
<td></td>
<td>(96 43)</td>
<td></td>
</tr>
<tr>
<td>1980-81</td>
<td>Lay off</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981-82</td>
<td>795 20</td>
<td>234 10</td>
<td></td>
<td>506 50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(29 41)</td>
<td></td>
<td>(63 75)</td>
<td></td>
</tr>
<tr>
<td>1982-83</td>
<td>659 25</td>
<td>219 15</td>
<td></td>
<td>351 40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(33 24)</td>
<td></td>
<td>(53 36)</td>
<td></td>
</tr>
<tr>
<td>1983-84</td>
<td>678 10</td>
<td>375 55</td>
<td></td>
<td>261 05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(55 44)</td>
<td></td>
<td>(38 50)</td>
<td></td>
</tr>
<tr>
<td>1984-85</td>
<td>672 50</td>
<td>217 25</td>
<td></td>
<td>420 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(32 31)</td>
<td></td>
<td>(63 47)</td>
<td></td>
</tr>
<tr>
<td>1985-86</td>
<td>1584 15</td>
<td>952 40</td>
<td></td>
<td>424 25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(60 15)</td>
<td></td>
<td>(26 78)</td>
<td></td>
</tr>
<tr>
<td>1986-87</td>
<td>882 50</td>
<td>470 20</td>
<td></td>
<td>330 00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(53 28)</td>
<td></td>
<td>(37 39)</td>
<td></td>
</tr>
<tr>
<td>1987-88</td>
<td>1295 05</td>
<td>866 55</td>
<td></td>
<td>152 00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(66 94)</td>
<td></td>
<td>(11 74)</td>
<td></td>
</tr>
<tr>
<td>1988-89</td>
<td>715 40</td>
<td>209 55</td>
<td></td>
<td>475 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(29 41)</td>
<td></td>
<td>(63 72)</td>
<td></td>
</tr>
<tr>
<td>1989-90</td>
<td>745 00</td>
<td>256 40</td>
<td></td>
<td>343 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(100 0)</td>
<td>(34 45)</td>
<td></td>
<td>(46 09)</td>
<td></td>
</tr>
</tbody>
</table>

Note: The figures in the parentheses indicate their percentage share on total hours of stoppages.

Source: Records of the Co-operative Sugar Factory.
vely of the total hours stopped during 1978-79. The total stoppages decreased to 659 25 hours in 1982-83 as against 795 20 hours in 1981-82, which showed a decrease of 17.10 percent. The cane shortage and miscellaneous stoppages also decreased to 351 40 hours and 219 15 hours as against 506 50 hours and 234 10 hours respectively during the same period, which showed a decrease of 30.62 percent and 6.39 percent respectively. However, the stoppages due to mechanical and chemical problems increased to 88.30 hours from 54 20 hours, which showed an increase of 62.92 percent during the above period. During the year 1985-86 the total hours stopped were 1,584 15 of which 424 25 hours were due to cane shortage, 207 40 hours due to mechanical and chemical problems and 952 40 hours due to miscellaneous problems representing 26.78 percent, 13.07 percent and 60.15 percent respectively. The total hours stopped and stoppage due to cane shortage, mechanical and chemical and miscellaneous problems decreased to 745 00 hours, 343 20 hours, 145.00 hours and 256 40 hours in 1989-90 representing 46.09 percent, 19.46 percent and 34.45 percent respectively, which showed a decrease of 52.97 percent, 19.10 percent 29.99 percent and 73.08 percent respectively compared with 1985-86. The stoppage due to cane shortage during 1981-82 (506 50 hours) were higher and were lower (152.00 hours) in 1987-88. The stoppage due to mechanical
and chemical problems were lower in (35 15 hours) 1984-85 and higher in (272 15 hours) 1987-88 The miscellaneous stoppages were lower in (9 30 hours) in 1979-80 and higher in (952 40 hours) in 1985-86

Table 6.4 shows the percentage of stoppages on total hours available for crushing during 1978-79 to 1989-90 Out of 1,345 30 hours available for crushing the hours of stoppages were 761 50 hours which accounted for 56 23 percent in 1978-79 The percentage of stoppages reached a high level of 75 34 percent in 1979-80 which showed an increase of 33 99 percent compared with the previous year The reason for the increase the percentage of stoppages was the non-availability of cane for crushing in the factory The percentage of stoppages in the total hours available for crushing drastically decreased to 18 28 percent during 1986-87 as against 56 23 percent in 1978-79 which showed a decrease of 67 49 percent But the total hours available for crushing and the hours of stoppages increased to 4,829 10 hours and 882 50 hours as against 1,354 30 hours and 761 50 hours, which showed an increase of 256 58 percent and 15 89 percent respectively during the same period During the year 1989-90 the percentage of stoppages in the total hours available for crushing increased to 19 26 percent as against 18 28 percent in 1986-87 which showed an increase of 5 36 percent. However,
<table>
<thead>
<tr>
<th>Year</th>
<th>Hours available for crushing</th>
<th>Hours of stoppages</th>
<th>% of stoppages to total hours available</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-79</td>
<td>1,354 30</td>
<td>761 50</td>
<td>56.23</td>
</tr>
<tr>
<td>1979-80</td>
<td>353 15</td>
<td>266 05</td>
<td>75.34</td>
</tr>
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<td>1980-81</td>
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<td>Lay off</td>
<td>-</td>
</tr>
<tr>
<td>1981-82</td>
<td>2,314 00</td>
<td>795 20</td>
<td>34.37</td>
</tr>
<tr>
<td>1982-83</td>
<td>2,268 15</td>
<td>659 25</td>
<td>29.07</td>
</tr>
<tr>
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<td>25.93</td>
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<td>1984-85</td>
<td>2,761 00</td>
<td>672 50</td>
<td>24.37</td>
</tr>
<tr>
<td>1985-86</td>
<td>5,920 35</td>
<td>1,584 15</td>
<td>26.76</td>
</tr>
<tr>
<td>1986-87</td>
<td>4,829 10</td>
<td>882 50</td>
<td>18.28</td>
</tr>
<tr>
<td>1987-88</td>
<td>6,231 40</td>
<td>1,295 05</td>
<td>20.78</td>
</tr>
<tr>
<td>1988-89</td>
<td>3,120 00</td>
<td>713 40</td>
<td>22.87</td>
</tr>
<tr>
<td>1989-90</td>
<td>3,867 20</td>
<td>745 00</td>
<td>19.26</td>
</tr>
</tbody>
</table>

Source: Records of the Kovur co-operative sugar factory
the total hours available for crushing and hours of
stoppages decreased to 3,867 20 hours and 745.00 hours
as against 4,829.10 hours and 882.50 hours respectively
which showed a decrease of 19.92 percent and 15.50
percent respectively during the same period.
A. FACTORS INFLUENCING CAPACITY UTILISATION

The various factors influencing the capacity utilisation were the area under sugarcane, yield per hectare and proportion of levy price and free sale price etc. Except the area under sugarcane, the other factors do not have any explanatory power. Therefore the following formula is selected to find out the impact of the area under sugarcane cultivation on capacity utilisation.

\[ z_1 = \frac{z \times y_1}{y} \quad \text{and} \quad x = z_1 - z \]

Where in

- \( x \) - Increase in capacity utilisation percentage
- \( y \) - Average area under sugarcane cultivation (1758 hectares)
- \( y_1 \) - Increased area under sugarcane cultivation (1759 hectares)
- \( z \) - Existing average capacity utilisation percentage (74.92)
- \( z_1 \) - Increased capacity utilisation percentage

\[ z_1 = 74.92 \times \frac{1,759}{1,758} = 74.96 \]

\[ x = z_1 - z = 74.96 - 74.92 = 0.04 \]

For the purpose of calculating the average area under sugarcane cultivation and the average capacity utilisation, 12 years average, from 1978-79 to 1989-90, is taken into consideration.
From the above equation, we infer that if the area under sugarcane increases by one hectare, the capacity utilisation in the factory increases by 0.04 percent. This implies that the area under sugarcane is the most important factor determining the capacity utilisation of the factory. Therefore, any variation in the area under sugarcane is likely to bring about a variation in the utilisation of capacity. So, for better utilisation of capacity and to reduce the variation in its utilisation it is necessary to increase the area under sugarcane and reduce the fluctuation in it.

Relationship between Capacity Utilisation, Recovery and Cost per quintal:

The cost per quintal of sugar depends upon capacity utilisation percentage and sugar recovery percentage. Table 6.5 shows the relationship between capacity utilisation and the sugar recovery percentage in the Kovur co-operative sugar factory which stood at 11.75 percent and 6.04 percent respectively during the year 1978-79. The cost per quintal of sugar was Rs.1,123.30 during this year. During the year 1979-80 the capacity utilisation and recovery percentage of sugar was drastically declined to 1.71 and 4.61 percent respectively as against 11.75 and 6.04 percent in the previous year,
### Table 6.5: Capacity Utilisation, Recovery Percentage and Cost per Quintal, 1978-79 to 1989-90

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity Utilisation (% to optimum capacity)</th>
<th>Recovery Percentage</th>
<th>Cost per Quintal (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-79</td>
<td>11.75</td>
<td>6.04</td>
<td>1123.30</td>
</tr>
<tr>
<td>1979-80</td>
<td>1.71</td>
<td>4.61</td>
<td>4692.10</td>
</tr>
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<td>1980-81</td>
<td>Lay off</td>
<td></td>
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</tr>
<tr>
<td>1981-82</td>
<td>47.37</td>
<td>8.15</td>
<td>493.22</td>
</tr>
<tr>
<td>1982-83</td>
<td>52.53</td>
<td>7.88</td>
<td>576.60</td>
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<td>1985-86</td>
<td>137.54</td>
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<td>485.16</td>
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<td>1986-87</td>
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<td>596.10</td>
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<tr>
<td>1989-90</td>
<td>101.15</td>
<td>8.32</td>
<td>638.48</td>
</tr>
</tbody>
</table>

*Cost per Quintal is after deducting the cost of molasses*

*Source: Records of the our co-operative sugar factory*
which showed a decrease of 85.45 percent and 23.68 percent.

Owing to the decrease in capacity utilisation and sugar recovery percentage the cost per quintal of sugar drastically increased to Rs 4,692.10 as against Rs 1,123.30, which showed an increase of 317.71 percent during the same period. After starting the commercial production in 1981-82 the capacity utilisation and sugar recovery percentage increased to 47.37 percent and 8.15 percent as against 11.75 percent and 6.04 percent in 1978-79 which showed an increase of 303.15 percent and 34.93 percent respectively. Owing to the increased capacity utilisation and sugar recovery percentage, the cost per quintal of sugar drastically decreased to Rs 493.22 as against Rs 1,123.30 in 1978-79 which showed a decrease of 56.09 percent. The cost per quintal of sugar was low in 1983-84 at Rs 462.79, where the capacity utilisation and sugar recovery percentage increased to 58.54 percent and 8.42 percent in the previous year which showed an increase of 11.44 percent and 3.31 percent respectively. During the year 1986-87 the capacity utilisation increased to 124.71, whereas the sugar recovery percentage decreased to 7.20 percent which resulted in the increase in cost per quintal to Rs 596.10. The cost per quintal of sugar increased to Rs 638.49 in 1989-90 because of a decrease in capacity utilisation to 101.15 percent even though
the sugar recovery percentage increased to 8.32 percent.

It is obvious that whenever the capacity utilisation increases and recovery percentage decreases and vice versa, or capacity utilisation and recovery percentage decrease the cost per quintal is high. The cost per quintal is low, whenever both the capacity utilisation and recovery percentage increase. Though the Kovur Co-operative sugar factory has worked with over capacity utilisation from 1985-86 to 1989-90 (except in 1988-89), the sugar recovery percent was low resulting in an increase in the cost per quintal and loss to the factory. To achieve better results, the Kovur Co-operative sugar factory must improve its sugar recovery percentage along with capacity utilisation.

Cane Cost and Conversion Cost:

The capacity utilisation and recovery percentage of sugar were 11.75 percent and 6.04 percent respectively during the year 1978-79. The cane cost during that year was Rs. 254.02. The cane cost increased to Rs. 271.23 and the capacity utilisation and recovery percentage decreased to 171 percent and 4.61 percent respectively during 1979-80. During the year 1983-84 the capacity utilisation and sugar recovery percentage increased to 58.54 percent and 8.42 percent respectively as against 47.37 percent and 8.15 percent in 1981-82, which showed an
increase of 23.58 percent and 3.31 percent respectively. The cane cost per quintal decreased to Rs 247.00 as against Rs 267.22 which showed a decrease of 7.57 percent. The decrease in cane cost per quintal was due to a decrease in the cost of cane purchase and purchase tax to Rs 214.82 and Rs 18.59 as against Rs 246.89 and Rs 19.64 during the same period, which showed a decrease of 12.99 percent and 5.35 percent respectively, whereas the cost of loading and unloading charges, transport charges, cane development cess fund and subsidies increased by 44.29 percent, 100 percent, 100 percent and 100 percent respectively during the same period. During the year 1986-87 the cane cost increased to Rs 343.11 as against Rs 247.00 in 1983-84 which showed an increase of 38.91 percent. The cost of cane purchase, purchase tax, loading and unloading charges, cane development cess fund and subsidy cost per quintal were Rs 269.29, Rs 21.61, Rs 1.59, Rs 1.35 and Rs 21.79 in 1986-87 as against Rs 214.82, Rs 18.59, Rs 1.01, Rs 0.59 and Rs 9.86 in 1983-84, which showed an increase of 25.36 percent, 16.25 percent, 57.43 percent, 120.91 percent and 120.99 percent respectively during the same period, whereas the transport charges decreased to Rs 0.48 as against Rs 2.13 which showed a decrease of 343.75 percent during the same period. The capacity utilisation and recovery
percentage were 124.71 percent and 7.20 percent during 1986-87 as against 59.54 percent and 8.42 percent in 1983-84. In this period, the capacity utilisation increased by 11.03 percent, whereas the sugar recovery percentage decreased by 14.49 percent during the same period. The increase in cane cost per quintal was due to the decrease in sugar recovery percentage even though the capacity utilisation increased. The cane cost per quintal during 1989-90 decreased to Rs 332.17 as against Rs 343.11 in 1986-87 which showed a decrease of 3.19 percent. The purchase cost of cane per quintal and cane development cess fund increased to Rs 313.75 and Rs 1.91 in 1989-90 as against Rs 296.29 and Rs 1.35 in 1986-87, which showed an increase of 5.89 percent and 41.48 percent respectively. Whereas the cost per quintal of purchase tax, loading and unloading charges, transport charges and subsidies decreased to Rs 15.34, Rs 1.17, Rs 0.00 and Rs 0.30 respectively as against Rs 21.61, Rs 1.59, Rs 0.48 and Rs 21.79 which showed a decrease of 29.01 percent, 26.42 percent, 100.00 percent and 100.00 percent respectively during the same period. During the period the capacity utilisation decreased to 101.15 percent as against 124.71 percent which showed a decrease of 18.09 percent, whereas the sugar recovery percentage increased to 8.32 percent as against 7.20 percent which showed an increase.
of 15.56 percent. Because of the decrease in capacity utilisation and the increase in sugar recovery percentage, the cane cost per quintal decreased in 1989-90. It is obvious that cane cost per quintal depends upon the recovery percentage. The cane cost per quintal is low in the years where the capacity utilisation is high or low and the recovery percentage is high.

The Conversion Cost per quintal was Rs 871.43 at the capacity utilisation and sugar recovery percentage of 11.75 and 6.04 respectively during the year 1978-79. The conversion cost per quintal drastically increased to Rs 4,421.65 in 1979-80 with a capacity utilisation of 17.71 percent and sugar recovery percentage of 4.61 percent. The capacity utilisation and sugar recovery percentage showed a decrease of 85.45 percent and 23.68 percent respectively during the same period, whereas the conversion cost per quintal increased to Rs 4,421.65 as against Rs 871.43 which showed an increase of 407.40 percent during the same period. The components of conversion cost like pay and benefits to employees, manufacturing expenses, administrative expenses, packing expenses, depreciation and others increased to Rs 392.44, Rs 191.74, Rs 241.61, Rs 44.42, Rs 2,891.66 and Rs 159.78 in 1979-80 as against Rs 131.78 Rs 106.56, Rs 46.07, Rs 5.16, Rs 499.95 and Rs 81.91 in 1978-79 which showed an increase of 577.22 percent, 79.94 percent, 424.44
percent, 760.095 percent, 478.39 percent and 95.07 percent respectively. The increase in the cost of conversion per quintal was due to a decrease in both capacity utilisation and recovery percentage. During the year 1981-82 the conversion cost per quintal decreased to Rs 226.10 as against Rs 871.43 in 1978-79 which showed a decrease of 74.05 percent, whereas the capacity utilisation percentage and sugar recovery percentage increased to 47.37 and 8.15 percent as against 11.7; and 6.04 percent, which showed an increase of 303.15 percent and 34.93 percent respectively during the same period. The conversion cost per quintal decreased in 1981-82 because of an increase in both capacity utilisation and recovery percentage. The conversion cost per quintal decreased to Rs 201.32 in 1985-86 as against Rs 327.97 in 1984-85 which showed a decrease of 38.62 percent. However, the capacity utilisation increased to 137.54 as against 63.20 which showed an increase of 117.63 percent during the same period. But the recovery percentage decreased to 7.47 as against 8.25, which showed a decrease of 9.45 percent during the same period. During the year 1985-86 the components of conversion cost like pay benefits to employees, manufacturing expenses, packing expenses, administration expenses, depreciation, interest on loans
and others decreased to Rs 49.04, Rs 30.02, Rs 10.74, Rs 7.92, Rs 42.88, Rs 59.58 and Rs 1.14 respectively as against Rs 63.10, Rs 49.51, Rs 18.40 Rs 17.48, Rs 45.56, Rs 132.42 and Rs 1.60 in 1984-85 which showed a decrease of 22.28 percent, 39.37 percent, 41.63 percent, 54.17 percent, 5.68 percent, 55.01 percent and 28.75 percent respectively. During the year 1989-90 the conversion cost per quintal increased to Rs 313.64 as against Rs 257.72 in 1986-87 which showed an increase of 21.70 percent. The capacity utilisation decreased to 101.15 from 124.71 which showed a decrease of 18.89 percent, whereas the sugar recovery percentage increased to 8.32 percent from 7.20 percent which showed an increase of 15.56 percent during the same period. The amount of pay and benefits to employees, manufacturing expenses, packing expenses, administration expenses, interest on loans and others increased to Rs 83.40, Rs 51.36, Rs 12.63, Rs 12.85, Rs 106.55, and Rs 18.33 in 1989-90 as against Rs 63.12, Rs 37.75, Rs 8.82, Rs 12.45, Rs 92.11 and Rs 1.42 in 1986-87 which showed an increase of 31.56 percent, 36.05 percent, 17.60 percent, 3.21 percent, 15.60 percent and 1290.85 percent respectively, whereas the amount of depreciation per quintal decreased to Rs 23.08 as against Rs 42.05 which showed a decrease of 31.32 percent during
the same period. Even though the sugar recovery percentage increased because of decrease in capacity utilisation, the conversion cost per quintal increased during 1989-90.

It is obvious that conversion cost per quintal is low, whenever the capacity utilisation percentage is high whether the sugar recovery percentage increased or not. The conversion cost per quintal is high whenever the capacity utilisation is low, whether the sugar recovery percentage increases or not. Therefore we can draw the conclusion that the conversion cost per quintal depends upon the capacity utilisation but not on the sugar recovery percentage.

Table 6.6 shows the sugar production, sugar sales and loss per quintal of sugar in the Kovur co-operative sugar factory during 1978-79 to 1989-90. The sugar production and sugar sales were 1 254 thousand tonnes and 1 054 thousand tonnes in 1978-79 and the loss per quintal was Rs 790.59. The sugar production and sales drastically decreased to 0 128 thousand tonnes and 0 328 thousand tonnes in 1979-80, which showed a decrease of 89.79 percent and 68.88 percent respectively. The loss per quintal increased to Rs 3,880.75 as against Rs 790.59.
Table 6.6  Sugar Production, Sugar sales and Loss per quintal, 1978-79 to 1989-90

<table>
<thead>
<tr>
<th>Year</th>
<th>Sugar Production ('000 tonnes)</th>
<th>Sugar Sales ('000 tonnes)</th>
<th>Loss per Quintal ( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-79</td>
<td>1 254</td>
<td>1 054</td>
<td>790 59</td>
</tr>
<tr>
<td>1979-80</td>
<td>0 128</td>
<td>0 328</td>
<td>3880 75</td>
</tr>
<tr>
<td>1980-81</td>
<td>Layoff</td>
<td>Layoff</td>
<td>Layoff</td>
</tr>
<tr>
<td>1981-82</td>
<td>6 273</td>
<td>6 203</td>
<td>14 53</td>
</tr>
<tr>
<td>1982-83</td>
<td>6 726</td>
<td>5 029</td>
<td>211 09</td>
</tr>
<tr>
<td>1983-84</td>
<td>8 010</td>
<td>9 737</td>
<td>70 82</td>
</tr>
<tr>
<td>1984-85</td>
<td>8 164</td>
<td>8 488</td>
<td>137 14</td>
</tr>
<tr>
<td>1985-86</td>
<td>16 590</td>
<td>12 746</td>
<td>55 45</td>
</tr>
<tr>
<td>1986-87</td>
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<td>161 87</td>
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<tr>
<td>1987-88</td>
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</tr>
<tr>
<td>1988-89</td>
<td>11 663</td>
<td>X</td>
<td>21 531</td>
</tr>
<tr>
<td>1989-90</td>
<td>13 676</td>
<td>12 647</td>
<td>81 46</td>
</tr>
</tbody>
</table>

Source: Records of the Kowar co-operative sugar factory
which showed an increase of 390.87 percent during the same period. The reason for the increase in loss is the decrease in sugar production and sales during the year and an abnormal increase in cost per quintal of sugar. The loss per quintal of sugar reached a peak figure of Rs 211.09 (after the commencement of the commercial production in 1981-82) in 1982-83 as against Rs 142.53 in 1981-82 which showed an increase of 48.10 percent. The sugar production increased to 6726 thousand tonnes as against 6273 thousand tonnes which showed an increase of 7.22 percent, whereas the sugar sales decreased to 5029 thousand tonnes as against 6203 thousand tonnes which showed a decrease of 18.93 during the same period. The loss per quintal increased even though the sugar production increased in 1982-83. During the year 1985-86 the loss per quintal of sugar decreased to Rs 55.45 as against Rs 137.14 in 1984-85, which showed a decrease of 59.57 percent. The sugar production and sugar sales increased to 16696 thousand tonnes and 12746 thousand tonnes as against 8164 thousand tonnes and 9488 thousand tonnes, which showed an increase of 104.51 percent and 50.16 percent respectively during the same period. The loss per quintal of sugar decreased due to the increase in sugar production and sales and also the decrease in sugar cost per
The loss per quintal of sugar increased to Rs 31.46 in 1989-90 as against Rs 55.45 in 1985-86 which showed an increase of 46.91 percent. The sugar production and sugar sales decreased to 13,676 thousand tonnes and 12,647 thousand tonnes as against 16,696 thousand tonnes and 12,746 thousand tonnes, which showed a decrease of 18.09 percent and 0.78 percent respectively during the same period. The loss per quintal is high, whenever the sugar production and sugar sales are low and vice versa. The loss per quintal of sugar not only depends upon the quantity of sugar production but it also depends upon sugar recovery percentage, the cost of cane and levy and free sale price of sugar etc.
B REASONS FOR UNDER/OVER UTILISATION

The Kovur co-operative sugar factory has under utilised its capacity from 1978-79 to 1984-85 and in 1988-89, and over utilised its capacity from 1985-86 to 1989-90 (except 1988-89)

During the years 1978-79 and 1979-80 the capacity utilisation of the factory was only 11.75 and 1.71 percent because of the first and second trial season. The factory worked only 57 days and 15 days only during the same period due to the non-availability of sugar cane. Because of non-availability of raw material, the management declared a lay off during 1980-81.

During the years 1981-82 to 1984-85 the factory worked with under utilised capacity which stood at 47.37 percent, 52.53 percent, 58.54 percent and 63.20 percent respectively. In all these years the factory worked with under utilised capacity because of non-availability of sufficient raw material for crushing.

From the years 1985-86 to 1989-90 (except in 1988-89) the factory utilised more than its installed capacity. The reason for over capacity utilisation was availability of large a quantity of sugar cane for
crushing in all these years. The factory crushed more than its installed capacity, even though the factory was facing the non-availability of cane cutting labour\textsuperscript{4}(cane cutting arrival problem), mechanical problems and evaporator scale problem etc, during that period.

4. The sugar-cane cutting labour are brought from Pondicherry every year because the local labour are not trained for cane cutting. The labourers brought from Pondicherry are often give troubles. They return to Pondicherry in the middle of the season and did not turn up in time.
C ECONOMIES OF SCALE

The size of a plant is crucial to the efficiency of production in sugar industry, apart from the availability of quality cane. The concept of size relates to three categories. The first is a 'Plant' which comprises a single production process beginning with the crushing of cane and ending with the manufacture of sugar. The second is a 'Mill' which may consist of more than one plant. A single mill may comprise two or three plants each assembled in separate sheds within the premises. The third concept is that of 'firm'. A 'firm' is a business enterprise. A sugar manufacturing firm may comprise one or more mills each located in different places. The discussion of scale economies in the theoretical literature refers to all these three levels. Purely technical or engineering economies of scale are relevant only at the plant and mill level, whereas, managerial, organisational and financial economies of scale are relevant at firm level.

Most of the Indian sugar plants are operating with 1250 TCD (tonnes of cane crushed per day). There are some mills whose crushing capacity is 2500 or 3700 TCD.
but it is normally a mill operating with two or three standard plants. It is only recently, that sugar technologists have argued in favour of a large capacity of a plant of about 2500 T C D as the 'minimum efficient size'. In fact, cane development and expansion of capacity of a sugar plant are complementary to each other. A larger plant would help reduction in the cost of production and the achievement of economies of scale.

In December 1986, the Union Government announced the sugar licensing policy for the 7th Plan. Under this policy, the initial capacity of new sugar units was fixed at 2500 T C D against 1250 T C D in the earlier plan. This, according to Mr Sukh Ram, the Ex-Minister of State for Food and Civil Supplies, was done to take advantage of the economies of scale and to facilitate the incorporation of modern technology.

Again, in April, 1989, the Government of India reduced the minimum economic size of a sugar plant to 1750 T C D on the basis of the representation made by a hundred members of the Parliament belonging to

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5 Balbir K Punj, Sugar Policy, A case of Political Expediency, Indian Sugar, Vol XXIX, No 1, PP 9-11 1989
Congress (I) Party to the Prime Minister stating that the size be reduced to 1750 T.C.D and suggested that otherwise the policy would favour Western U.P and Maharashtra and put the states like Orissa and Bihar into inconvenience.

Sanjaya Baru, in his thesis work has rightly pointed out 'that sugar policy in India is woven as much by the political warp as the economic woof is by now a well known fact' Even so, it comes as a surprise when intense political lobbying surround the formulation of such 'technical' aspects of industrial policy as the specification of what constitutes the 'economic size' of a sugar mill in a 'backward area' He also pointed out, 'We should note that India, like Mauritius, has not taken advantage of the economy of scale and that the average Indian Sugar Mill has a crushing capacity of only 1500 T C D (1590 T C D in U.P, and 1822 T C D in Maharashtra) In Mauritius the average capacity is

6 Financial Express, April 24, 1986
7 Sanjaya Baru, Scale, Location and Diversification of Sugar Mill Industry in India, Economic and Political Weekly, May 28, 1988, p M-39
about 2200 TCD and in France, it is about 7400 TCD. The lesson to be derived from these two figures is that generally speaking the average sugar mill in India has too small a capacity and that the sugar cane produced per hectare is relatively low by international standards.

Ramachandraiah, Member, Bureau of Industrial Costs and Prices is of the view that the incidence of salaries and wages on cost of production can be reduced if the capacity of the factory is higher. In this regard, ISMA pointed out that a larger plant would help reduction in the cost of production and the achievement of economies of scale. Further, the installation of new units involves a sizeable capital investment which the country can ill afford. This would also result in an avoidable diversion of land from other crops to sugarcane which cannot be in the longterm interest of the country’s agricultural economy. Necessarily, therefore, greater emphasis has to be laid on the expansion of existing units rather than on new installation.

Scale of Production and Cost per Quintal

With the objective to know the relationship between the scale of production and the cost per quintal and in

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order to test the hypothesis, the data pertaining to cost per quintal of three sugar plants with different capacity size i.e., 1250 TCD (Kovur), 2000 TCD (Madhunagar) and 3500 TCD (Shekarnagar) for a period of five years i.e., 1985-86, 1989-90 were collected and the following model is used:

\[ Y = 566.6663 - 424.475 \]

\[ (25.5569) \quad (7.692) \]

Where \( Y \) = cost per quintal of sugar (in rupee)

\[ x^1 = \text{Dummy variable which takes value '1' for the plants above 1250 TCD and value '0' for 1250 TCD plant.} \]

From the above equation, we infer that there is an inverse relationship between the scale of production and the cost per quintal. The plants have been divided into two categories i.e., the plants with capacity size of more than 1250 TCD and the plant with a capacity of 1250 TCD. To distinguish these types of plants dummy variable is used, which takes value '1' for the plants with more than 1250 TCD and value '0' for the plant with 1250 TCD.
The standard error in the bracket indicates that the result is significant.

The co-efficient of $X^1$ shows that increase in the scale of production above 1250 TCD reduces the cost per quintal. Hence, it is concluded that the scale of production, i.e., capacity size of the plant should be increased to reduce the cost of sugar per quintal.