CHAPTER – IV
4.1 INTRODUCTION

In this chapter, an attempt has been made by the researcher to study the performance of Salem Co-operative Sugar Mills Ltd., Mohanur.

It is one of the best performing Co-operative Sugar Mills in India. Many awards have been received by this mill for its performance. Various steps have been taken by the Mill to improve the overall performance of the Mill. The cultivation of high sugar varieties of Sugar Cane is one of the important steps taken by this mill.

The Salem Co-operative Sugar Mills Ltd., Mohanur is having own cane farm in which new varieties are cultivated in trials and then such varieties giving high sugar is recommended to the cultivator for cultivation in future.

The main aim of an industrial concern is to maximize the profit. For this purpose, sugar mill will concentrate on increasing the sales and reducing the cost of production.
Improved performance is usually reflected in lower cost and high profit and this indicates the efficiency of operations.

The profit, Cane Crushed performance and sugar output performance and cost of production and sales performance are dealt with in this chapter.

In order to study the relationship among the variables Sales, profit, cost of production, profit, we use simple correlation analysis.

To study the movements of the variables over different years, we use trend analysis. The method of least square is used to fit the trend line.

4.2 HYPOTHESES:

The following are the hypothesis formulated and tested in this study.

1. There is no significant relationship between profit/loss account of the mill and cost of production in the Salem Co-operative Sugar Mills Ltd., Mohanur (Null).
2. There is no significant relationship between the profit/loss and sales volume in the Salem Co-operative Sugar Mills Ltd., Monahur (Null).
3. There is no relationship between the cost of production and sales volume in the Salem Co-operative Sugar Mills Ltd., Mohanur (Null).
4. There is no significant relationship between Cane Crushed and output of the Salem Co-operative Sugar Mills Ltd., Mohnaur (Null).

**TABLE NO. 4.1**

RELATIONSHIPS BETWEEN THE PROFIT/LOSS COST OF PRODUCTION AND SALES VOLUME IN THE SALEM CO-OPERATIVE SUGAR MILLS LTD., MOHANUR.

(Rs. in Lakhs)

<table>
<thead>
<tr>
<th>Year</th>
<th>Profit $X_1$</th>
<th>Cost of production $X_2$</th>
<th>Sales $X_3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-98</td>
<td>(-)475.27</td>
<td>1414.33</td>
<td>3944.29</td>
</tr>
<tr>
<td>1998-99</td>
<td>(-)187.58</td>
<td>1414.77</td>
<td>4160.07</td>
</tr>
<tr>
<td>1999-2000</td>
<td>(-)769.72</td>
<td>1367.13</td>
<td>4400.70</td>
</tr>
<tr>
<td>2000-01</td>
<td>(-)454.72</td>
<td>1451.27</td>
<td>4944.01</td>
</tr>
<tr>
<td>2001-02</td>
<td>(-)956.53</td>
<td>1434.82</td>
<td>6087.62</td>
</tr>
</tbody>
</table>

The above table shows the relationship between Profit (or) Loss, Cost of production and Sales volume.
$X_1$ - Profit/Loss (dependent variable)

$X_2$ - Cost of production (independent variable)

$X_3$ - Sales (independent variable)

**4.3 SIMPLE CORRECTION CO-EFFICIENT:**

We observe from the table 4.1.

The following simple correlation $r_{12}$, $r_{13}$ and $r_{23}$ have been calculated to study the relationship among them. The Coefficient of correlation is given by the formula

$$r = \frac{\sum xy - (\sum x)(\sum y)}{\sqrt{\sum x^2 - (\sum x)^2} \times \sqrt{\sum y^2 - (\sum y)^2}}$$
TABLE – 4.2

THE TABLE SHOWING CORRELATION
CO-EFFICIENT BETWEEN $X_1$, $X_2$ AND $X_3$.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Variables</th>
<th>$R$</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{12}$</td>
<td>Profit/Loss and Cost of production</td>
<td>0.2084</td>
<td>Low Degree of positive correlation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_{13}$</td>
<td>Profit and Sales</td>
<td>-0.2415</td>
<td>Low Degree of negative correlation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$r_{23}$</td>
<td>Cost of production and sales</td>
<td>0.4735</td>
<td>Moderate Degree of positive correlation</td>
</tr>
</tbody>
</table>

The above table shows the relationship among the variables $X_1$, $X_2$ and $X_3$.

Here, $r_{12}$ refers to the relationship between Profit/Loss and Cost of Production in Salem Co-operative Sugar Mills Ltd.,

$r_{13}$ refers to the relationship between Profit/Loss and Cost of Production in Salem Co-operative Sugar Mills Ltd.,
r_{23} refers to the relationship between Profit and Loss and Cost of Production in Salem Co-operative Sugar Mills Ltd.

Correlation between Profit/Loss and Cost of Production \( r_{12} \) indicates that there is a small increase in cost of production. Similarly Profit and Sales \( r_{13} = (-0.2415) \) are conflicted with one another by low degree of negative correlation.

On the other hand \( r_{23} = 0.4735 \) indicates, a moderate correlation between cost of production and sales revealing that there is considerable change in the cost of production corresponding to the change in sales. This moderate correlation between cost of production and sales is the reason for the low relatively of project to cost of production and sales.

\( t - \text{TEST:} \)

The significance of correlation co-efficient is tested by applying "t" test.
HYPOTHESES:

1. There is no significant relationship between profit/loss account of the mill and cost of production in the Salem Co-operative Sugar Mills Ltd., Mohanur.

2. There is no significant relationship between the profit/loss and sales volume in the Salem Co-operative Sugar Mills Ltd., Monahur.

3. There is no relationship between the cost of production and sales volume in the Salem Co-operative Sugar Mills Ltd., Mohanaur.

The test procedure is as follows:

The test Statistic is

\[ t = \frac{r}{\sqrt{n-2 \times \left(1 - r^2\right)}} \sim t_{n-2} \]

Level of significance: \( \alpha = 0.05 \)

Degree of freedom:

\[ V = n - 1 \]

Inference: If calculated value of ‘t’ is greater than \( t - \) table value at 5% level of significance, we reject the hypothesis otherwise we accept the hypothesis.
### TABLE – 4.3

**TEST FOR THE SIGNIFICANT OF SIMPLE CORRELATION CO-EFFICIENT**

<table>
<thead>
<tr>
<th>Correlation coefficient</th>
<th>d.f.</th>
<th>t value</th>
<th>Table value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{12} = 0.2084$</td>
<td>3</td>
<td>0.369</td>
<td>3.182</td>
<td>Not significant</td>
</tr>
<tr>
<td>$R_{13} = 0.2715$</td>
<td>3</td>
<td>0.431</td>
<td>3.182</td>
<td>Not significant</td>
</tr>
<tr>
<td>$R_{23} = 0.4735$</td>
<td>3</td>
<td>0.931</td>
<td>3.182</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

**4.4 Hypothesis 1:**

There is no significant relationship between profit of the mill and cost of production of the Salem Co-operative Sugar Mills Ltd., Mohanur (Null).

In the above table, the calculated ‘t’ value of $r_{12}$ (0.369) is less than the table value at 5% level of significance ($t_{0.05} = 3.182$), the simple correlation between profit/loss and cost of production is not significant.

Thus, the above null hypothesis 1 is accepted.
Here, it is found that there is no significant relationship between profit of the mill and cost of production of the Salem Co-operative Sugar Mills Ltd., Mohanur.

So, the increase or decrease of profit of the mill will not depend upon the increase (or) decrease of the cost of production of the mill.

4.5 Hypothesis 2:

There is no significant relationship between the profit/loss and sales volume in the Salem Co-operative Sugar Mills Ltd., Mohanur.

The calculated 't' value of $r_{13} (0.431)$ is less than the table value at 5% level of significance ($t_{0.05} = 3.182$). The simple correlation between profit and sales volume is not significant.

Thus, the above null hypothesis is accepted.

So, the increase of profit or decrease of profit will not depend upon the quantity of sugar sold.
4.6 Hypothesis 3

There is no relationship between the cost of production and sales volume of the Salem Co-operative Sugar Mills Ltd.

The calculated ‘t’ value of $r_{23} (0.931)$ is less than the table value at 5% level of significance ($t_{0.05} = 3.182$) and hence we conclude that the simple correlation between the cost of production and sales volume is not significant.

Thus, the above null hypothesis 3 is accepted.

So, there is no relationship between the cost of production and Sales Volume of the Salem Co-operative Sugar Mills Ltd., Mohanur.

4.6 Hypothesis 4:

There is no significant relationship between cane crushed and output of the Salem Co-operative Sugar Mills Ltd., Mohanur.
TABLE – 4.4

CANE CRUSHED AND OUTPUT

<table>
<thead>
<tr>
<th>Year</th>
<th>Cane crushed (in lakhs)</th>
<th>Output (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-98</td>
<td>3.66</td>
<td>3.816</td>
</tr>
<tr>
<td>1998-99</td>
<td>4.18</td>
<td>4.034</td>
</tr>
<tr>
<td>1999-2000</td>
<td>5.07</td>
<td>4.2129</td>
</tr>
<tr>
<td>2000-01</td>
<td>4.52</td>
<td>4.486</td>
</tr>
<tr>
<td>2001-02</td>
<td>4.41</td>
<td>4.694</td>
</tr>
</tbody>
</table>

From table No.4.4 given above the cane crushed was increased from 3.66 lakhs tonnes in year 1997-98 to 4.18 lakhs tonnes in the year 1998-99. Further it was increased to 5.07 lakhs tonnes in the year 1999-2000. In the year 2000-01 it was decreased to 4.52 lakhs tonnes and cane crushed was further decreased to 4.41 lakhs tonnes in the year 2001-02.
Cane Crushed and Output

![Graph showing cane crushed and output over years (1997-98 to 2001-02).]
Coefficient of correlation between cane crushed and sugar output is \( r = 0.9236 \).

Cane Crushed is increased with corresponding increase in Sugar output. Therefore the cane crushed and sugar outputs are dependent with each other.

The \( r \) squared statistic indicates that 84.64% of variation in sugar output is due to the variation in cane crushed.

Now we test the hypothesis i.e. there is no significant relationship between can crushed and sugar output by applying 't' test.

Since the calculated value of \( t = 4.173 \) is greater than the table value \( (t_{0.05} = 3.182) \), we reject a hypothesis, we conclude that there is significant relationship between cane crushed and sugar output.

So, sugar output will depend upon the quantity of cane crushed. If cane crushed is increased then sugar output is also increased accordingly and vice-versa.
### TABLE – 4.5

**TABLE SHOWING CANE CRUSHED TREND IN THE SALEM CO-OPERATIVE SUGAR MILLS LTD., MOHANUR**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cane crushed (Lakhs tonnes)</th>
<th>Trend values (lakhs tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-98</td>
<td>3.66</td>
<td>3.816</td>
</tr>
<tr>
<td>1998-99</td>
<td>4.18</td>
<td>4.034</td>
</tr>
<tr>
<td>1999-2000</td>
<td>5.07</td>
<td>4.2129</td>
</tr>
<tr>
<td>2000-01</td>
<td>4.52</td>
<td>4.486</td>
</tr>
<tr>
<td>2001-02</td>
<td>4.41</td>
<td>4.694</td>
</tr>
</tbody>
</table>

In the Salem Co-operative Sugar Mills Ltd., Mohanur cane crushed was increased from 3.66 lakhs tonnes in the 1997-98 to 4.18 lakhs tonnes in the year 1998-99. Further it was increased to 5.07 lakhs tonnes in the year 1999-2000. It was decreased from 5.07 lakhs tonnes in the year 1999-2000 to 4.52 lakhs tonnes in the year 2000-01. Again it also decreased from 4.52 lakhs tonnes in the year 2000-01 to 4.41 lakhs tonnes for the year 2001-02.
To study the movement of cane crushed a trend line is fitted by least square method.

The fitted linear trend is

\[ Yc = 3.816 + 0.184 \, t \]

The table shows a linear trend in the cane crushed from 1997 to 2002.

The estimated cane crushed for the year 2003 is 4.878. Mean square error of the fitted model is 0.378. Since it is very low and it indicates that the model perfectly fits the data.
### TABLE 4.6

**TABLE SHOWING THE SUGAR OUTPUT TREND IN THE SALEM CO-OPERATIVE SUGAR MILLS LTD., MOHANUR.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Sugar output (lakhs tones)</th>
<th>Trend values (lakhs tones)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-1998</td>
<td>3.816</td>
<td>3.17700</td>
</tr>
<tr>
<td>1998-1999</td>
<td>4.034</td>
<td>3.48218</td>
</tr>
<tr>
<td>1999-2000</td>
<td>4.2129</td>
<td>3.76883</td>
</tr>
<tr>
<td>2000-2001</td>
<td>4.486</td>
<td>4.18952</td>
</tr>
<tr>
<td>2001-2002</td>
<td>4.694</td>
<td>4.49580</td>
</tr>
</tbody>
</table>

The sugar output was 3.816 lakhs tonnes in 1997-98 which increased to 4.034 lakhs tonnes in the year 1998-99. From the year 1998-99 it was increased from 4.034 lakhs tonnes to 4.2129 lakhs tonnes in the year 1999-2000. It was again increased from 4.2129 lakhs tonnes in the year 1999-2000 4.486 lakhs tonnes in the year 2000-01.

Again it was increased from 4.486 lakhs tonnes in the year 2000-01 to 4.694 lakhs tonnes in the year 2001-02.

To study the changes in the sugar output, a straight line trend is fitted.
The fitted trend model is

\[ Yc = 2.989 + 0.305 \ t \]

The estimated sugar output for the year 2003 is 4.795 lakhs tonnes.

The mean square error of fitted model is 0.097. Since it is relatively very low, the model perfectly fits the data.

From this analysis, Sugar output in the Salem Co-operative Sugar Mills Ltd., Mohanur increased along with corresponding increase in the quantity of sugar cane crushed in the Salem Co-operative Sugar Mills Ltd., Mohanur.
Sugar Output Trend

\[
\begin{array}{|c|c|c|c|c|}
\hline
\hline
\text{Trend values (lakhs tonnes)} & - & - & - & - & 4.5 \\
\text{Sugar output (lakhs tonnes)} & 2 & 3 & 3.5 & 4 & 4.5 \\
\hline
\end{array}
\]

Sugar output (lakhs tonnes) — Trend values (lakhs tonnes)