CHAPTER - IV

LOCATION OF SUGAR INDUSTRY IN MAHARASHTRA

4.1) Introduction:

There are various factors which lead to the location of a particular industry in a particular geographical area. A number of regional economists have developed theories of location (reviewed in Chapter-I), prominent among them, being A. Losch (1954); A. Weber (1929); E.M. Hoover (1936); W. Isard (1956) and W.H. Dean (1938) etc. All these theories lead to one general principle, that is, the comparative cost technique, which also has roots in International Trade Theory. On the basis of the available data, we shall make an attempt to study the location of sugar industry in Maharashtra, at different points of time. For


analytical purposes, various location measures have been applied to arrive at definite conclusions. The analysis is made taking into account the 3 zones in the State of Maharashtra, i.e. (i) South (ii) Central and (iii) North Eastern.

4.2) The Location Quotient (L.Q.):

Location quotient is a device for comparing a region’s percentage share of a particular activity with its percentage share of some basic aggregate. In the early 1940’s, the U.S. National Resources Planning Board had computed for every state its location quotient with respect to each manufacturing activity. For any given manufacturing activity, L.Q. therefore, presented for each state, a coefficient which was computed as a ratio (a)/(b), where -

a) = The State's share of the national total of employment in a given manufacturing industry,
b) = The State's share of all manufacturing,

such location quotients have been extensively used by

6 Florence and other location analysis.

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The location quotient for industry 'i' in a given region is, therefore,

\[ \text{L.Q.} = \frac{S_i}{N_i} \], where \( \frac{S}{N} \) (1)

\( S_i \) = Number of persons employed in manufacturing industry in a given region.

\( S \) = Number of persons employed in all manufacturing industries in the same given region.

\( N_i \) = Number of persons employed in manufacturing industry 'i' in the whole state.

\( N \) = Number of persons employed in all manufacturing industry in the whole state.

Let us apply this formula to the sugar industry in Maharashtra.

4.3) Location, Concentration and Dispersal of Sugar Industry:

Table 4.1 gives information about the total and regionwise employment in sugar industry for two points of time i.e. Maharashtra, 1975-76 and 1989-90. Similarly, the same table shows information relating to the employment for the year 1989-90. Figures in brackets show the proportion of employment in sugar industry in each region and also the proportion of
employment in each region, of the total employment in all manufacturing industries. With the help of this basic data, we have prepared two tables, 4.2 and 4.3.

**TABLE 4.1**

Basic data relating to Employment in sugar industry and all manufacturing industries for the years 1975-76 and 1989-90.

<table>
<thead>
<tr>
<th>Regions</th>
<th>Total Employment in All Industries</th>
<th>Total Employment in Sugar industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td>36161</td>
<td>62415</td>
</tr>
<tr>
<td></td>
<td>(11.5%)</td>
<td>(11.6%)</td>
</tr>
<tr>
<td>Central</td>
<td>161316</td>
<td>259562</td>
</tr>
<tr>
<td></td>
<td>(51.4%)</td>
<td>(48.2%)</td>
</tr>
<tr>
<td>North East</td>
<td>116273</td>
<td>216009</td>
</tr>
<tr>
<td></td>
<td>(37.1%)</td>
<td>(40.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>313750</td>
<td>537986</td>
</tr>
<tr>
<td></td>
<td>(100.0%)</td>
<td>(100.0%)</td>
</tr>
</tbody>
</table>

* Excludes Greater Bombay and Konkan which do not come under the 3 regions under study.

By applying the formula (1) of location quotient to the percentage of employment in sugar and all manufacturing industries, for the year 1975-76, we have estimated the values of the location quotient as follows: (1975-76) See table 4.2.
### TABLE - 4.2

Computation of coefficient of localization (1975-76)

<table>
<thead>
<tr>
<th>Items</th>
<th>Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>South</td>
</tr>
<tr>
<td>Percent of Employment of sugar industry in given region</td>
<td>31.4</td>
</tr>
<tr>
<td>Percent of Employment of all manufacturing ind. employment in given reg.</td>
<td>11.5</td>
</tr>
<tr>
<td>Difference (row-1 - row-2)</td>
<td>19.9</td>
</tr>
<tr>
<td>L. Q. (row-1 / row-2)</td>
<td>2.70</td>
</tr>
</tbody>
</table>

Coefficient of localization = 19.9/100 = 0.199

1) South Region = 2.70
2) Central Region = 0.96
3) North East Region = 0.45

Similarly, by the same procedure, the location quotients for the year 1989-90, have been estimated for the same 3 regions as follows:

1) South Region = 2.44
2) Central Region = 0.78
3) North-East Region = 0.84
TABLE - 4.3

Computation of coefficient of localization (1989-90)

<table>
<thead>
<tr>
<th>Items</th>
<th>Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>South</td>
</tr>
<tr>
<td>_percent of Employment of sugar industry in given region</td>
<td>28.3</td>
</tr>
<tr>
<td>percent of Employment of all manufacturing ind. employment in given reg.</td>
<td>11.6</td>
</tr>
<tr>
<td>Difference (row-1 - row-2)</td>
<td>16.7</td>
</tr>
<tr>
<td>L.D. (Row-1 / Row-2)</td>
<td>2.44</td>
</tr>
</tbody>
</table>

Coefficient of localization = 16.7/100 = 0.167

4.4) Economic Interpretation of the results:

From table No.4.2 and 4.3, we have estimated the values of coefficient of localization as follows:

1) As a first step, we have to calculate the difference between % figures shown in row 1 and row 2. For example in Table 4.2, the % difference in South Region is shown as (31.4 - 11.5) = 19.9 or in Central Region it is (51.2 - 51.4) = -0.2 or in North East Region it is (17.4 - 37.1) = -19.7.

2) The location quotient is estimated by dividing % of employment in sugar industry by the % of employment in all manufacturing industries in each
region. The values of location quotients are shown in the table 4.2 i.e. 2.70 for south, 0.99 for central and 0.45 for the North East region. In 1975-76, sugar industry is relatively highly concentrated in the south region, when compared to central and North East regions.

3) Table No.4.3 shows the same procedure followed for the estimation of location quotients for the same 3 regions for the year 1989-90. The values of the location quotients are as follows:

<table>
<thead>
<tr>
<th>Region</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>South region</td>
<td>2.44</td>
</tr>
<tr>
<td>Central region</td>
<td>0.78</td>
</tr>
<tr>
<td>North East region</td>
<td>0.84</td>
</tr>
</tbody>
</table>

4) When we compare the values of location quotients of each region for the two different periods, 1975-76 and 1989-90, we find that, in South Zone, there is decline in concentration of sugar industry, during the period 1975-76 to 1989-90, the value has declined from 2.70 to 2.44.

5) Similarly, the value of location quotient has gone down from 0.996 in 1975-76 to 0.78 in 1989-90, in the Central Zone also.

6) On the contrary, the value of location quotient has improved in North East region, from 0.45 in
1975-76 to 0.84 in 1989-90. This proves that, sugar industry has dispersed rapidly to North East region of the state. This is an important conclusion of this study.

4.5) Coefficient of localization:

The coefficient of localization is a useful tool to understand the change over time, of the spatial pattern of employment or population. Table No.4.2 and 4.3 show the values of coefficient of localization of sugar industry for the years 1975-76 and 1989-90. It can be calculated as follows:

1) We have calculated the difference between row-1 and row-2 in both the tables 4.2 and 4.3.

2) By adding all positive or negative differences and dividing the sum by 100, we get the value of coefficient of localization.

a) Coefficient of localization (C.L.) for 1975-76 is-
   \[ C.L. = \frac{19.9}{100} = .199, \text{ and} \]

b) Coefficient of localization for 1989-90 is-
   \[ C.L. = \frac{16.7}{100} = .167 \]

This clearly shows that due to the dispersal of sugar industry in North East region of the state, the co-efficient of localization has declined from 0.199 in 1975-76 to only 0.167 in 1989-90.
The limits of the values of the coefficient are 0 and 1. If the given industry under study (sugar) is distributed exactly in the same ratio as the base magnitude, the value of the coefficient would be zero. In contrast, if the entire sugar industry is concentrated in one small region the value of the coefficient would approach unity or 1.

Actually, the value of the coefficient may lie in between these two extreme limits (0 & 1). In our study the value was observed to be 0.199 in the year 1975-76, indicating that, there is not much concentration of sugar industry in a particular region, when the entire state is taken into account. However, when account is taken on regional basis, then the South Region has high concentration of sugar industry, than the Central and North East Regions.

The value of coefficient of localization in the year 1989-90, has further declined from 0.199 to 0.167, indicating a rapid dispersal of sugar industry in Maharashtra as a whole. It is clear from regional values stated earlier that, in this process of dispersal, the North East region has benefited to a great extent.
Let us now study the extent of dispersal or concentration with the help of localization curves, drawn for the years 1975-76 and 1989-90, in the next section.

4.6) The localization curve:

A tool superior in many ways to the coefficient of localization, is the localization curve, which was developed by E.M. Hoover. The localization curve is constructed from a set of regional percentage figures by plotting on the vertical axis a cumulative percentage figures for the given industry's employment and on the horizontal axis the corresponding cumulative percentage figure for the base magnitude. The following procedure is followed to construct the localization curve for sugar industry in Maharashtra, utilizing the data given in table No.4.2 and 4.3.

a) Ranking regions by location quotients along the relevant row.

b) Plotting regions by rank on a cumulative percentage basis.

For example, in Table 4.3, South Region has highest value of location quotient (2.44), hence first two points (28.3%) on vertical axis and (11.6) on the horizontal axis are plotted on the graph), or point A.
LOCALIZATION CURVE - SUGAR INDUSTRY
The next highest value of location quotient is that of the North East Region (0.84). Hence, the second point B, can be plotted by taking cumulative % of both variables or (29.3 + 37.8) 66.1% for sugar industry and (11.6 + 48.2) 59.8% for all industry. Similarly, the third point C can be plotted on the graph by adding % to both variable. This gives us what is known as "localization curve" as shown in the diagram (See Graph 4.a).

By following similar procedure, we have plotted the location curve for the year 1975-76, using data given in Table No.4.2.

Conclusion:

By observing the position of the two localization curves i.e. points A, B, C indicate the degree of concentration of sugar industry in Maharashtra in the year 1975-76. The localization curve, (Points A, B, C) has moved closer to the diagonal O-C, in the year 1989-90. This indicates dispersal or reduction in concentration of sugar industry in Maharashtra during the period, 1975-76 to 1989-90. The area between the two localization curves, shows the extent of reduction in concentration of sugar industry in Maharashtra.

We shall now make an attempt to study the growth of sugar industry in Maharashtra with the help of the technique called the Relative Growth Chart.
4.7) Relative Growth Chart:

Relative growth chart is a graphic representation that depicts the industry's redistribution over a period of time.

To draw a relative growth chart of the sugar industry in Maharashtra and the redistribution among the three zones during the growth process, we shall consider two variables namely, employment in the sugar industry and population in the three regions for the period 1975-76 to 1989-90.

Fig. 4.2 gives the relative growth chart of the sugar industry over the period 1975-90. On the vertical axis we shall measure the employment in the sugar industry in the year 1990 as % of employment in 1975. Similarly, on the horizontal axis we shall measure the population in 1990 as a % of population in 1975. Thus we shall plot the growth of employment and population simultaneously to obtain a redistribution of the industry with an additional variable – population.

The employment and population in the state and 3 regions for the year 1975 and 1990 are given in the Table 4.4.

B. E.M. Hoover, J.L. Fisher have developed this technique.
The Relative Growth Chart

Population in 1987-90 As % of PPI in 1975-76

Employment in 1975-76 As % of Employment in 1975-76

E

M

S

C

P

P'
TABLE 4.4

Population and Employment in Sugar industry (1975-90)

<table>
<thead>
<tr>
<th>Region</th>
<th>Population 1975</th>
<th>Population 1990</th>
<th>Pop1.90 as % of Pop1.75</th>
<th>Employment 1975</th>
<th>Employment 1990</th>
<th>Empl.1.90 as % of Empl.1.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td>48.35</td>
<td>60.35</td>
<td>124.8</td>
<td>18167</td>
<td>24429</td>
<td>134.5</td>
</tr>
<tr>
<td></td>
<td>(11.1)</td>
<td>(10.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td>117.41</td>
<td>163.14</td>
<td>138.9</td>
<td>29640</td>
<td>32607</td>
<td>110.0</td>
</tr>
<tr>
<td></td>
<td>(26.9)</td>
<td>(28.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>270.57</td>
<td>340.11</td>
<td>125.7</td>
<td>10050</td>
<td>29318</td>
<td>291.7</td>
</tr>
<tr>
<td></td>
<td>(62.0)</td>
<td>(60.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total* 436.33 563.60 129.2 57857 86354 149.3

* Total is obtained for three regions. Excludes Greater Bombay and Konkan area for employment & population.

** Figures in bracket indicate percentages to total population.

The co-ordinates of a point in the graph 4.2 are determined by percentage changes in the industry's employment and population for the given state/region.

Thus, percentage change in employment (129.2) and percentage change in the population (149.3) for Maharashtra are denoted by the Point M. The diagonal passing through origin and the point M has a slope equal to the ratio of the two percentages measured on the two axes. This slope thus denotes the percentage change in Maharashtra's per capita employment in the sugar industry.
Similarly, the point $S$, $C$ and $NE$ denoted the relative positions of South Central and North East zone respectively. The comparative analysis of these points with respect to the diagonal OM will enable us to draw a picture of the overall trend in the state and the relative positions of the three regions as compared to the aggregate trend in the state.

If a point representing a particular region, lies above and to the left of the diagonal OM, we can say that the per capita change in the employment in that region is greater than than the per capita change in the sugar industry employment for Maharashtra State as a whole. Fig. 4.2 illustrates that only North East zone has experienced a higher per capita change in sugar industry employment as compared to the per capita change at the level. The point representing South and Central Zones, both lie below the diagonal.

Amongst the South and Central Zones, Central Zone experienced higher growth of population than the employment growth. Whereas, even if South zone was located below the diagonal, it was closer to the diagonal, denoting that the experience of South zone was not very much different from the aggregate trend in Maharashtra.
To facilitate further analysis, we shall draw vertical and horizontal lines through point M, onto the X axis and Y axis MP & ME and extend the lines further. This will enable a visual comparison of the regional rates of population growth and employment growth with the corresponding rates for Maharashtra.

If the regions follow more or less the same growth pattern as the state, the points representing the regions would be scattered along the diagonal OM. This phenomenon in short, describes a situation where although the redistribution has occurred, the percapita employment and so the importance that region has not changed much.

Similarly, if the points are scattered along the horizontal axis, it means that the percapita employment has gone down, population growth has been much pronounced.

However, if there has been situation of major regional redistribution of industry and not much change in the relative position of the regions with respect to the population, the points would be located around the vertical axis.
From Table 4.4 we can see that the relative positions of the three regions with respect to population have not changed much during the period under study. On the other hand the relative positions with respect to employment have changed sharply in favour of North Eastern region which led to a major redistribution of the sugar industry employment during this period. Thus the points that represent the relative positions of the three regions are located around the vertical axis PP'. The point representing the North East region is located high above the diagonal GM and also closer to the axis PP' which signified on redistribution of the sugar industry strongly in favour of the North East zone. This confirms our earlier conclusion.

In the next chapter, we shall discuss the shift in the location pattern with the help of shift in the distribution of installed capacity of sugar industry in the three zones of the state.