TOTAL FACTOR PRODUCTIVITY IN STEEL COMPANIES

TECHNIQUE OF MEASUREMENT:

Generally, the total factor productivity compares total output to a weighted composition of inputs, usually labour and capital.\(^1\) However, there are various methodological issues in the concept of total factor productivity or multifactor productivity. Yet, the concept has been widely in the measurement of industrial productivity because of the fact that partial productivity does not represent either the contribution or the share of the input in question. It is important to note that the performance of any one single input is no independent from other factors. As labour output ratio is dependent among others, on the capital intensity and technology in use, it is possible that under logical assumptions, the share or contribution of any one single factor could be determined from partial productivity measures. However, simple productivity indices cannot speak about their own performance and provide limited scope for interpretation and application. Thus our

study has not been relying only on partial productivity measures but and attempt has been made here to measure the total factor productivity.

**METHOD OF MEASUREMENT:-**

**Kendrick Approach²:**

This is a common measure of total factor productivity (TFP) based on arithmetic indices.

It has been used by Schmookler, Abramovitz, Davis, and others.

It is based on the linear production function.

(i) \( Y = a_L .L + a_K .K \)

Where \( a_L \) = Ratio of labour input to the value of output

\( a_K \) = Ratio of capital input to the value of output

It defines the productivity index \( A \) as-

\[
A = \frac{Y}{W_0 .L + r_0 .K}
\]

Where, zero subscript indicates base year.

In equation (1) A is average productivity of arithmetic combination of L and K with factor prices in the base year as weights. Thus, we can define productivity as-

\[ (3) \quad \frac{Y}{Y_0} = \frac{A(W_0 \cdot L + r_0 \cdot K)}{Y_0} \]

\[ = A \left( \frac{W_0 \cdot L_0}{Y_0} \frac{L}{L_0} + \frac{r_0 \cdot K_0}{Y_0} \frac{K}{K_0} \right) \]

\[ = A \left( \frac{L_0}{Y_0} \alpha_0 + \frac{K_0}{Y_0} \beta_0 \right) \]

or

\[ (4) \quad A = \frac{Y/Y_0}{\left( \frac{L_0}{Y_0} \alpha_0 + \frac{K_0}{Y_0} \beta_0 \right)} \]

Where \( \alpha_0 = \frac{W_0 \cdot L_0}{Y_0} \)

\( \beta_0 = \frac{r_0 \cdot K_0}{Y_0} \)

While this method is quite widely used, it involves arbitrariness with respect to the choice of base year.

Besides the assumption of linear production, function is hard to justify specially when the gravity of various factors involved is sought to be worked out. In such cases, a non-linear method like the Cobb Douglas Production Function (CDPF) is far more dependable.
PRODUCTIVITY TRENDS:-

In this section an attempt has been made to measure, analyse and compare, total factor productivity in public sector steel company SAIL and private sector steel company TISCO.

1990-91, the TFP of SAIL and TISCO was 100 because the index of gross value added at constant price, the index of employees and the index of capital were 100, that's why TFP was 100 for the period of 1990-91.

In 1991-92, TFP of SAIL became 93.443 from 100 in 1990-91, with a decrease of 6.55 percent. While, there was an improvement in the TFP of TISCO. It became 106.765 with a growth rate of 6.76 percent of TFP for the period 1991-92.

In 1992-93, there was again a downfall in the TFP of SAIL. It became 85.184 from 93.443 in the period 1991-92, with the negative growth of 8.83 percent. On the other hand, the condition of TISCO use became worse. The TFP of TISCO became 77.336 from 106.765 in 1991-92, with a decrease of 27.56 percent for the period of 1992-93.

1993-94, in this period, the TFP of SAIL became 74.051 with a decrease of 13.06 percent. While, the TFP of TISCO became 71.551 with a decrease of 7.47 percent for the year 1993-94, 1994-95, the TFP of SAIL became 73.269 with
a small decrease of 1.05 percent. But on the other hand there was considerable improvement in the TFP of TISCO, it became 83.391 from 71.551 in 1993-94, with the growth rate of 16.54 percent.

1995-96, the TFP of SAIL was declined again, to 68.785 from 73.269 in last year with the negative growth rate of 6.12 percent. However, in private sector steel company namely TISCO there was a significant improvement in TFP, it became 120.030 with the heavy rate of growth of 43.93 percent. The highest rate of growth of the TFP in our study.

1996-97, in this period the TFP of SAIL became 55.606 from 68.785 in 1995-96 with negative growth rate of 19.15 percent, while in TISCO there was also a decline in the TFP. For the period of 1996-97 the TFP of TISCO was, became 119.756 with a slight decrease with a negative growth rate of 0.22 percent for the period of 1996-97.

1997-98, in this period, the TFP of SAIL became 50.730 with a negative growth rate of 8.77 percent while the TFP of TISCO became 106.514 for the same period with a negative growth rate of 11.05 percent for the period 1997-98.

1998-99, in this period the TFP of SAIL was 37.260 with a negative growth of 26.55 percent. While for the same
period the TFP of TISCO was 76.206 with a negative growth rate at 28.45 percent for the period of 1998-99.

**1999-2000**, in this period the TFP of SAIL became 37.190 with a slight decrease at the rate of .18 percent. While the TFP of TISCO was, became 106.433 with a positive growth rate of 39.66 percent for the same period 1999-2000.

**2000-01**, this year was a golden year for SAIL, because in this year the TFP of SAIL became 40.548 with a positive growth rate of 9.03 percent, but there was no improvement in the TFP of TISCO. The TFP of TISCO became 75.908 with a negative growth rate of 28.67 percent for the period of 2000-01.

**2001-02**, for this year, the TFP of SAIL became very low; it became 31.766 with a negative growth rate of 21.66 percent. However, on TISCO there was a reform in the condition of TISCO. The TFP of TISCO became 81.668 in the year 2001-02 with a improvement of 7.58 percent in the same period of time.

**2002-03**, in this year, there was a tremendous improvement in both the sectors, public and private. The TFP of SAIL (public sector) became 36.986 with a positive growth of 16.43 percent. On the other hand, the TFP of TISCO
(Private Sector) became 100.056 with a positive growth of 22.51 percent for the period of 2002-03.

2003-04, in this year, the picture was same as it was in fast year. The TFP of SAIL and TISCO were rising. The TFP of SAIL for the period 2003-04 became 48.819, with a handsome positive growth rate of 31.99 percent. On the other hand, the TFP of the TISCO became 109.496 with a positive growth rate of 9.43 percent for the year 2003-04.