APPENDIX NO. 7

Actual and estimated production of bidi in Murshidabad
district (1947-48 - 1974-75)

The production of bidis in Murshidabad district follows an exponential trend. So the production of bidis \( Y \) is related with the time \( t \) by the following equations:

\[
Y = a \cdot b^t, \quad \text{where } a \text{ and } b \text{ are constants taking logarithm of both sides we have, } \log Y = \log a + t \log b
\]

or \( Z = r + St \), where \( Z = \log Y \)

\[
\begin{align*}
  r &= \log a \quad \ldots \quad (i) \\
  S &= \log b \quad \ldots \quad (ii) \\
  t &= \text{time interval.}
\end{align*}
\]

The values of \( r \) and \( S \) of the above equation can be determined with help of the following equations:

\[
\begin{align*}
  \sum Z &= nr + S \sum t \quad \ldots \quad (iii) \\
  \sum Zt &= r \sum t + S \sum t^2 \quad \ldots \quad (iv)
\end{align*}
\]

<table>
<thead>
<tr>
<th>Years (n)</th>
<th>Actual number of bidis (Y) (in million)</th>
<th>log of ( Y = Z )</th>
<th>( t )</th>
<th>( Zt )</th>
<th>( t^2 )</th>
<th>Estimated number of bidies (in million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>3,600</td>
<td>9.55630</td>
<td>4</td>
<td>38.22520</td>
<td>6</td>
<td>3,611.582</td>
</tr>
<tr>
<td>1955-56</td>
<td>7,200</td>
<td>9.85733</td>
<td>9</td>
<td>88.71597</td>
<td>81</td>
<td>5,064.974</td>
</tr>
<tr>
<td>1960-61</td>
<td>7,500</td>
<td>9.87506</td>
<td>14</td>
<td>138.29084</td>
<td>196</td>
<td>7,100.873</td>
</tr>
<tr>
<td>1965-66</td>
<td>7,500</td>
<td>9.87506</td>
<td>19</td>
<td>187.62614</td>
<td>361</td>
<td>9,958.636</td>
</tr>
<tr>
<td>1969-70</td>
<td>10,800</td>
<td>10.03342</td>
<td>23</td>
<td>230.76866</td>
<td>529</td>
<td>13,053.531</td>
</tr>
<tr>
<td>1972-73</td>
<td>18,000</td>
<td>10.2527</td>
<td>26</td>
<td>266.63702</td>
<td>676</td>
<td>15,990.885</td>
</tr>
<tr>
<td>1973-74</td>
<td>21,600</td>
<td>10.33445</td>
<td>27</td>
<td>279.03015</td>
<td>729</td>
<td>17,110.468</td>
</tr>
<tr>
<td>1974-75</td>
<td>25,200</td>
<td>10.40440</td>
<td>28</td>
<td>291.23920</td>
<td>784</td>
<td>18,306.066</td>
</tr>
</tbody>
</table>

\( n = \text{number of years} = 9 \)

\[
\begin{align*}
  \sum Z &= 89.52274 \quad \sum t &= 151 \quad \sum Zt &= 1529.82763 \quad \sum t^2 &= 3373
\end{align*}
\]

Using the values of \( n, \sum Z, \sum t, \sum Zt \) and \( \sum t^2 \) in the equations (iii) and (iv), the values of \( r \) and \( S \) are found out. The constants \( a \) and \( b \) are evaluated from equations (i) and (ii).

\( r = 9.44; \quad S = 0.03; \quad a = 2,754,200,000; \quad b = 1.07. \)