Total Factor Productivity in Manufacturing Sector of Bihar: With a Special Reference to tobacco Industry

Ruchi Singh

Abstract: India has an impressive and progressive profile in the global tobacco industry and it is an important commercial crop grown here. India is the second-largest tobacco producer and exporter in the world. Total exports of manufactured and unmanufactured tobacco stood at US$ 934.23 million in 2017-18 and US$ 564.28 million between Apr-Oct 2018. Indian tobacco is exported to about 100 countries. The development of manufacturing sector of an economy is an indicator of the economic strength of that country by raising productivity, employment generation along with supporting various other sectors of the economy. This study covers the duration of 1998-99 to 2012-13. Depending upon the availability of data the latest years have been added. This study is proposed to cover the Tobacco industry in state Bihar indicated by Annual Survey of Industries. Malmquist, Torquist and Solow Index technique have been used to calculate TFP in tobacco industry of state Bihar, India. The productivity trend of tobacco industry in state Bihar had shown a steady growth pattern. TFP was maximum in year 2007-08 and was lowest in year 2006-07. TFP growth rate had shown a steady growth pattern from 2001-02 to 2005-06 and 2008-09 to 2011 with 2 major downfall in TFP during 2006-07 and 2012-13.

Keywords: Tobacco Industry, Manufacturing.

I. INTRODUCTION

Indian tobacco, introduced by the Portuguese in the 17th century, is appreciated worldwide for its rich, full-bodied flavour and smoothness. It is now an increasingly well-known as well as respected commodity in global tobacco markets and has found its way into cigarettes manufactured in several countries. India has an impressive and progressive profile in the global tobacco industry and it is an important commercial crop grown here. India is the second-largest tobacco producer and exporter in the world. Total exports of manufactured and unmanufactured tobacco stood at US$ 934.23 million in 2017-18 and US$ 564.28 million between Apr-Oct 2018. Indian tobacco is exported to about 100 countries. Unmanufactured tobacco accounted for 46 per cent share (in value) in tobacco exports between Apr-Jul 2018, followed by Flue-cured Virginia (FCV) at 34 per cent and tobacco products at 20 per cent. India exports unmanufactured tobacco primarily to Belgium, Korea, Nigeria, Egypt and Nepal. Western Europe is the key market for Indian tobacco exports.

The tobacco industry claims that it has a major contribution to economy with its employment generation in agriculture and manufacturing and revenues in the form of exports and taxes.

Bihar is located in the eastern part of India. The state is surrounded by Nepal in the north, West Bengal in the east, Uttar Pradesh in the west and Jharkhand in the south. GSDP (2011-12 to 2015-16) in Bihar was 7.6 percent, compared to 6.8 percent for the national economy. Consequently, the Per Capita Income in Bihar was about 35 percent of the national average in 2015-16, compared to about 33 percent a decade ago. The availability of Kendu leaves and cheap labour has helped make Bihar the country’s sixth largest tobacco producing state. Bidi manufacturing industries are located at Bihar Sarif (Nalanda district) and Janjha in Munger district. The tobacco industry claims that it has a major contribution to economy with its employment generation in agriculture and manufacturing and revenues in the form of exports and taxes.

With time, Industrialization has emerged as a composite term involving a large number of structural changes such as progressive changes in the production techniques, factor intensities, employment and output. Industrialization proved not only to be a way to improve national income but is also a means of introduction of improved modern technology and changing ways of life and finally the structure of the economy because of its self-reinforcing quality. Manufacturing sector of a country plays a vital role in the growth of an economy. The development of manufacturing sector of an economy is an indicator of the economic strength of that country by raising productivity, employment generation along with supporting various other sectors of the economy.

Government of India had set up a target to increase this contribution of manufacturing sector in India’s GDP to 25% by 2025.

Over last two decades, India has become one of the fastest growing economies on the globe and this growth in the performance is greatly aided by economic reforms. The striking aspect of India’s recent growth has been the dynamism of the service sector, while, in contrast, manufacturing has been less robust. Recently during last decade, several initiatives have been undertaken by Indian Government to boost up Indian manufacturing sector like National Manufacturing Policy (NMP) in the year 2011 with the objective of enhancing the share of manufacturing in GDP to 25% and creating 100 million jobs by 2022.

Government has put in
place a liberal policy on FDI, under which FDI up to 100%, is permitted, under the automatic route, in most sectors/activities. Significant changes have been made in the FDI policy regime in recent times, to ensure that India remains an increasingly attractive investment destination.

II. OBJECTIVES OF THE STUDY

The broad objectives of the present study are to examine and analyse the industrial productivity in Tobacco industry cross the various states. The basic objectives are as follows:
1. To calculate the industrial productivity index for selected Tobacco Industry in state Bihar using Kendrick, Tornquist and Solow techniques.
2. To examine the performance of the tobacco industry in selected state on the basis of productivity index
3. To identify the factors responsible for differences in Industrial Productivity (in Tobacco Industry) Index in the state Bihar.

DIFFERENT TYPES OF PRODUCTIVITY MEASURES

There exist several methods available with productivity analyst in calculating productivity estimates, with several choices of methods depending on the objectives to be analysed. Single factor productivity (SFP) defined as the ratio of a measure of output quantity to the quantity of a single input used. • Labour productivity (LP) defined as the ratio of a measure of output quantity to some measure of the quantity of labour used, such as total hours worked. • Multifactor productivity (MFP) defined as the ratio of a measure of output quantity to a measure of the quantity of a bundle of inputs often intended to approximate total input. • Total factor productivity (TFP) defined as the ratio of a measure of total output quantity to a measure of the quantity of total input. Total factor productivity measures the increase in total output which is not accounted by increases in total inputs. The TFP index is computed as the ratio of an index of aggregated output to an index of aggregate inputs and refers to the change in the productivity over time.

SOLOW PRODUCTION FUNCTION

One of the conventional techniques for estimating TFP is Solow residual method. It defines TFP growth as the residual of output growth after the contribution of labour and capital inputs have been subtracted from total output growth. Solow has assumed a Cobb-Douglas production function with constant returns to scale and competitive equilibrium also assumes that factor price is paid according to their marginal productivity. This index is the discrete version of continuous Divisia index.

The Divisia Tornquist index or Translog index of TFP is commonly used for computing the total output, total input and TFP indices can be specified as –

Total Output index:

$$TOI_t / TOI_{t-1} = \prod_j \left( Q_{jt} / Q_{jt-1} \right)^{(R_j + R_{j-1})/2}$$

Where,

$$TOI_t = \text{Total Output Index in period ‘}t’.$$  
$$TOI_{t-1} = \text{Total Output of Index in ‘}(t-1)’ \text{ period}.$$  
$$Q_{jt} = \text{GVA of ‘}j‘ \text{ industry in period ‘}t’.$$  
$$Q_{jt-1} = \text{GVA of ‘}j‘ \text{ industry in ‘}(t-1)’ \text{ period}.$$  
$$R_j = \text{Output share of ‘}j‘ \text{ industry in total revenue in ‘}t‘ \text{ period}.$$  
$$R_{j-1} = \text{output share of ‘}j‘ \text{ industry in total revenue in ‘}(t-1)’ \text{ period}.$$  

Total Input index:

$$TII_t / TII_{t-1} = \prod_j \left( X_{jt} / X_{jt-1} \right)^{(S_j + S_{j-1})/2}$$

Where,

$$TII_t = \text{Total Input Index in period ‘}t‘.$$  
$$TII_{t-1} = \text{Total input of Index in ‘}(t-1)‘ \text{ period}.$$  
$$X_{jt} = \text{quantity of ‘}i‘ \text{ input used in ‘}j‘ \text{ industry in period ‘}t‘.$$  
$$X_{jt-1} = \text{quantity of ‘}i‘ \text{ input used in ‘}j‘ \text{ industry in period ‘}(t-1)‘$$  
$$S_j = \text{share of ‘}i‘ \text{ input in GVA of ‘}j‘ \text{ industry in ‘}t‘ \text{ period}.$$  
$$S_{j-1} = \text{share of ‘}i‘ \text{ input in GVA of ‘}j‘ \text{ industry in ‘}(t-1)‘ \text{ period}.$$  

For the productivity measurement over a long period of time, chaining indexes for successive
time periods is preferable. With chain linking, an index is calculated for two successive periods, t and t−1, over the whole period 0 to T (sample from time t=0 to t=T) and the separate indexes are then multiplied together −

\[ TOI(t) = TOI(1) \times TOI(2) \times \cdots \times TOI(t-1) \]

\[ TPI(t) = TPI(1) \times TPI(2) \times \cdots \times TPI(t-1) \]

Finally, the TFP index is computed as −

\[ TFP_t = \frac{TOI_t}{TPI_t} \]

This procedure has the advantage that no single period plays a dominant role in determining share, weights and biases are likely to be reduced.

**KENDRICK INDEX OF TOTAL FACTOR PRODUCTIVITY GROWTH**

Kendrick Index of TFP (Total Factor Productivity) is an arithmetic measure where tangible factor inputs are an arithmetic average of labour and capital input. Kendrick index (1961) of total factor productivity is an arithmetic measure of rate of technological change, which was developed by Kendrick based on the linear production function, assuming infinite elasticity of substitution between the factors of production is defined as the ratio of value added in production to a weighted average (arithmetic mean) of the two factors of production. The total factor productivity index of Kendrick:

\[ Y = \alpha L + \beta K \]

Where,

- \( Y \) = Value of output in real terms.
- \( L \) = Labor in real terms
- \( K \) = Capital in real terms
- \( \alpha \) & \( \beta \) are +ve constants

Then the Kendrick index of TFP for the year ‘t’ may be written as

\[ \text{At} = \text{productivity index at time t} \]

\[ \text{yt} = \text{actual output at time t} \]

\[ \text{Lt} = \text{Labour used at time t}. \]

\[ \text{Kt} = \text{Capital stock used at time it}. \]

\[ W_o = \text{share of labor in the base year} \]

\[ r_o = \text{share of capital in the base year}. \]

\[ \frac{W_o + r_o}{2} \]

The assumptions underlying this index is constant returns to scale, perfect competition and payment to factors strictly according to their marginal product(i.e.) that total earning of labour and capital in the base year will exactly equal to the output of the year.

**4.3 DATA SOURCES AND CONSTRUCTION OF VARIABLES**

This study covers the duration of 1998-99 to 2012-13. This study is proposed to cover the Tobacco industry in Bihar indicated by Annual Survey of Industries. Annual Survey of Industries (ASI), published by the Central Statistical Organization (CSO) of India considers only registered manufacturing sectors. By using appropriate price index series, the nominal values have been converted to the real values, at 2011-12 constant prices. The ASI is the only publicly available source for data on output, employment, compensation, capital stocks, etc.

As National Industrial Classification has been changed by ASI, NIC adjustments had been carried out to make the data comparable. A huge literature is available indicating that there exist a number of studies on these issues but on state based study, this is a new attempt to be performed scientifically.

**4.5 NATIONAL INDUSTRIAL CLASSIFICATION (NIC)**

The researcher has used Volume 1 of ASI, which contains the summary result of registered factory sector at various classification levels. The ASI classifies the manufacturing activities on the basis of National Industrial Classification (NIC) Schedules. The data has been taken for tobacco manufacturing industry from two digit category. NIC had defined manufacturing in the Section- C from Division 10 to Division 37.

<table>
<thead>
<tr>
<th>Year</th>
<th>Torquist</th>
<th>Kendrick</th>
<th>Solow</th>
</tr>
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<tbody>
<tr>
<td>1999-2000</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>2000-2001</td>
<td>194.6344</td>
<td>193.2179</td>
<td>193.0555</td>
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<tr>
<td>2001-2002</td>
<td>193.3603</td>
<td>192.1642</td>
<td>191.6694</td>
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<td>2002-2003</td>
<td>197.7698</td>
<td>197.7466</td>
<td>196.4364</td>
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<tr>
<td>2003-2004</td>
<td>180.6337</td>
<td>187.0503</td>
<td>186.0484</td>
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<td>2004-2005</td>
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<td>155.0231</td>
<td>162.116</td>
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<td>2006-2007</td>
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<td>2007-2008</td>
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<td>265.5698</td>
<td>255.5296</td>
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<tr>
<td>2009-2010</td>
<td>245.1828</td>
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<td>2010-2011</td>
<td>215.1643</td>
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<tr>
<td>2011-2012</td>
<td>204.9772</td>
<td>215.0577</td>
<td>218.4326</td>
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</table>

Source- Author’s own calculation based on ASI data.
Source- Author’s own calculation based on ASI data

Findings & Suggestions

On the basis of the observations and analysis conducted in the study, it has been clear that the productivity trend of tobacco industry in state Bihar had shown a steady growth pattern. TFP was maximum in year 2007-08 and was lowest in year 2006-07. TFP growth rate had shown a consistency from 2001-02 to 2005-06 and 2008-09 to 2011. It can also be concluded that TFP growth in tobacco industry has shown a consistent growth pattern with 2 major downfalls in 2006-07 and 2012-13. The state has a large base of cost-effective industrial labour, making it an ideal destination for a wide range of industries. Bihar is one of the strongest agricultural states. The percentage of population employed in agricultural production in Bihar is around 80 per cent. The state has planned initiatives for the development of other sectors such as education and tourism and also provides incentives for information technology and renewable energy. The 10th Bihar Economic Survey Report- 2015-16 (ESR) has termed the growth performance of the Bihar economy as “steady” in the recent decade. The Gross State Domestic Product (GSDP) of Bihar grew at a CAGR of 11.99 per cent between 2011-12 and 2017-18. Bihar’s per capita GSDP increased from US$ 490.62 in 2011-12 to US$ 655.42 in 2017-18 at CAGR of 10.25 per cent. In Bihar, the bidi industry is relatively more important from the tax collection view as Collection of Sales Tax in 2015-16 was rupees 200 cr.

III. SUGGESTIONS

The growth of industrial productivity is directly related to manpower used in the industry but as per the feature of Indian economy the manpower is mostly unskilled type of nature. It is true that skilled as well as unskilled both type of manpower is absorbed by this sector but if skilled manpower is increased, it can contribute to the productivity of industry positively. Also, many of the industries in India employs the best technologies but its implementation and proper ways of using a technology is much more important than how to obtain the technology. Therefore, it is the training programmes/workshops that can contribute to much larger extent so that production as well as productivity must increase up to the significant level.

Government should also invest on infrastructural development, expanding the capital stock size, encouraging and enhancing business investment, proper tax and welfare reforms implementation must be initiated hence increasing the incomes from people working more productively. Improvements need to be made in education, improving the quality of health care hence reducing the sickness, facilitating inward migration of skilled labour hence improving the quality of the labour force. As Human Resources is one of the most important component in the industrial sector that can be equipped with not only skilled and technologies but also with the knowledge capital. These steps can be taken up at state level as well as at industrial level both.

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