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Research paper

Total Factor Productivity Estimation in Manufacturing Sector of Odisha

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Abstract

Manufacturing sector aimed at an efficient and technologically developed industry with a view to boosting country's level of competitiveness through a rise in productivity. Thus, productivity explains the relationship between production and means of production. Growth of efficiency in manufacturing sector has been assessed on the basis of Total Factor Productivity (TFP) index. In this paper, an attempt has been made to estimate the TFP of manufacturing sector of Odisha over the decades. The findings of the study revealed that the productivity index is more than 100 for most of the years indicating the growth in the manufacturing sector. The TFP index reached the highest level i.e. about 200 in the year 2004-05.

Keywords: *Manufacturing sector: Total Factor Productivity: Kendrick Index: Growth: Performances*

1. Introduction

The state of Odisha is bestowed with minerals and its production. The major mineral deposits are iron ore, coal and bauxite which make Odisha one of the largest mineral bearing state in India. Out of the total mineral reserves of the country, the state is having 16.92 per cent of mineral reserves. Odisha is having about 95 per cent of Chromites reserves, 92 per cent of Nickel, 76.67 percent of Graphite, 55 per cent of Iron ore, 33.91 per cent of Manganese and 24.48 per cent of Coal of the total deposits in India. (Economic Survey of Odisha, 2011-12). The year 1980 must be seen as a watershed because it marked the beginning of a new era in the history of industrialization in Odisha.

Industrial productivity growth is considered as a source or cause of high levels of output and hence, a major contributor to growth. Therefore, productivity analysis has remained an important theme of analytical enquiry all along. The author Fabricant (1964) defined productivity as the power to produce economic growth in respect of goods and services. The fast growth in industrial productivity was an essential element in the development and structural transformation of the developed economies (Duraisamy, 2000)

In short, productivity indices are the barometer of benchmark of economy's industrial development over the years. Generally, there are two types of productivity measures such as (a) Partial productivity and (b) Total Factor Productivity (TFP). Partial productivity analysis is made either in terms of single or total input in relation to output. However, the concept of average partial productivity ratio represents only the average efficiency of the single factor involved in the production function (NPC, 1976). On the other hand, TFP refers to the change in effectiveness of production attributable to all factors and therefore it is more meaningful for comprehensive economic policy.

2. Research Objective

To calculate the Total Factor Productivity Index (TFPI) of manufacturing sector

3. Data Source

The study is based on secondary data which were collected from various issues of Annual Survey of industries (ASI) of government of Odisha from the year 1995-96 to 2008-09. The year 2008-09 has been taken as the terminal year because of non-availability of ASI data for subsequent years.

4. Methodology

Normally, there are three approaches being used for the measurement of TFP, viz., Parametric approach, Accounting approach and Non-parametric approach. In India, majority of the research study on productivity is relying on the accounting approach. In this approach the data requirement is minimal and the calculation procedures are easy. So this method become very popular for calculation of TFP index.

With this backdrop, the TFP index developed by Kendrick (J. W. Kendrick, 1961) has been used to estimate the TFP for registered manufacturing sector for the State. This index is a mathematical measure of rate of technological change which is based on linear production function. It assumes elasticity of substitution between the factors of production.

Kendrick index is defined as follows:

Kendrick Index = $TFP_k = V_t / (w_0L_t + r_0K_t)$

Where,

V_t = Indices of real valued added

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K_t = Indices of real fixed capital
L_t = Indices of Labour
w_0 = Three years average of labour share in value added starting from the base year
r_0 = Three years average of capital share in value added starting from the base year
The Kendrick Index is based on a linear production function and it assumes constant returns to scale under situation of perfect competition.

5. Analysis

The total factor productivity (TFP) indices of registered manufacturing sector based on Kendrick index, have been estimated for Odisha and presented in Table 1 and the TFP trend in Figures 1.

Table 1: Total factor productivity indices of registered manufacturing units in Odisha: 1995-96 to 2008-09 (Kendrick index)

Year	*Odisha*
1995-96	100
1996-97	61.72
1997-98	53.73
1998-99	88.37
1999-00	137.28
2000-01	105.41
2001-02	108.38
2002-03	108.27
2003-04	129.56
2004-05	197.74
2005-06	142.39
2006-07	159.67
2007-08	161.27
2008-09	169.10

Source: Annual survey of industries (ASI), government of Odisha (various issues)

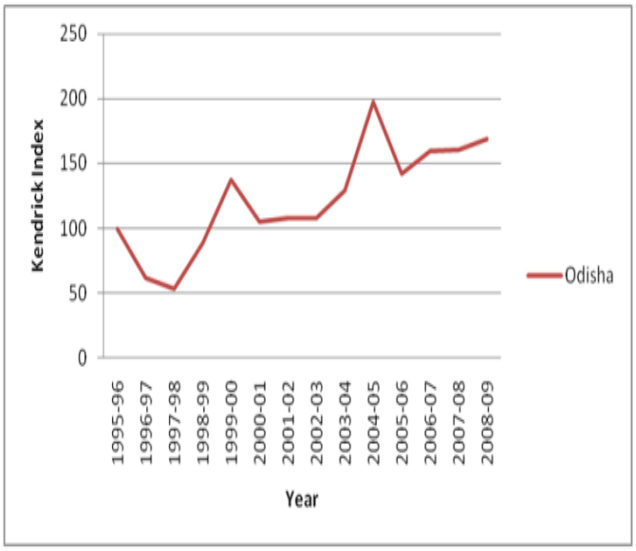


Figure-1: Total factor productivity trend of registered manufacturing units in Odisha: 1995-96 to 2008-09

6. Results and Discussion

In Odisha, TFP index was positive all through the years. The index remained above 100 for 10 years and below 100 for three years, i.e. 196-97, 1997-98 and 198-99. The TFP index reached the highest level of 197.74 in the year 2004-05.
The above analysis of TFP for the registered manufacturing sector of Odisha shows that the performance of industries in the State is progressing except few years in the past but lots of measures still the government of Odisha has to take in future to reach at the remarkable achievement in manufacturing sector.

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Annexure

Annexure -1:

Principal characteristics of registered factories in Odisha:1995-96 to 2008-09					
Year	**No. of registered factories**	**Capital invested (rs. In lakh)**	**Employment generated**	**Net value added by manufacturer (rs. In lakh)**	**Emolument to employees (rs. In '00')**
1995-96	**1541**	***1465265***	**186538**	**259089**	**8326984**
1996-97	**1540**	***2065034***	**177860**	**222434**	**10003606**
1997-98	**1466**	***2322075***	**178925**	**217108**	**9653473**
1998-99	**1540**	***1271172***	**140087**	**197550**	**9478242**
1999-00	**1615**	***1065678***	**147452**	**259586**	**8366721**
2000-01	**1665**	***1272151***	**128662**	**235168**	**11538794**
2001-02	**1709**	***1347642***	**116434**	**254925**	**12187439**
2002-03	**1683**	**1242005**	**120367**	**235501**	**13251321**
2003-04	**1687**	***1701272***	**125166**	**383154**	**16391452**
2004-05	**1749**	***1753410***	**145747**	**604542**	**15984361**
2005-06	**1862**	***2554074***	**144554**	**628749**	**17297754**
2006-07	**1906**	***3275867***	**162558**	**902270**	**20919692**
2007-08	**1823**	***4875424***	**184886**	**1351150**	**30080127**
2008-09	**1796**	***5739392***	**213534**	**1667406**	**37339007**
Source: Annual survey of industries (ASI), government of Odisha (various issues)					