

# Total Factor Productivity in Manufacturing Industry for Delhi for Last Thirty Years

Anindya Bhattacharya

Assistant Professor, Department of Economics  
Netaji Mahavidyalaya, Hooghly, West Bengal  
*Email Id:* anindyabhattacharya2010@gmail.com

**Abstract.** This paper attempts to give an overview of the Total Factor Productivity Growth (TFPG) for the NCR or Delhi for the period from 1981-82 to 2011-12 for the manufacturing sector. Using the ASI time series data and Growth Accounting Approach the TFPG Index values are computed. The study reveals that for most of the major group or 2-digit level of manufacturing industries the respective TFPG values are declining over time. The results indicate that the lacklustre performance of the manufacturing sector equally holds in Delhi as it is already verified for the national level data of the sector through many other studies in recent time.

**Keywords:** TFPG, PIA, Manufacturing Sector

## Introduction

The stagnating performance of manufacturing sector of India is a chronic headache for the policy makers even today as the rate of growth of manufacturing sector in recent years is disappointingly low. Whereas the experts are optimistic about the overall performance of the economy and forecast a 5.6 per cent economic growth in FY 14-15, and higher in the following years (India Development Update 2014, World Bank Group) the actual statistics from manufacturing sector is gloomy. As far as year over year monthly data is concerned the growth rate of manufacturing sector is -0.8 in December 2012 and -1.8 in December 2013 and in the FY 2012-13 the sector has grown up by only 2.5 per cent of which intermediate goods industries perform worst indicating low future demand for intermediate goods (CSO 2013). The Ministry of Statistics and Programme Implementation in 2014 has given a very interesting data result showing without manufacturing GDP growth would have been higher in India. Service sector is acting as the engine factor for the economy and drawing significant portion of aggregate investment- domestic as well as foreign- that the manufacturing sector fails to attract. For last five years the share of investment in manufacturing sector is slowing down.

As far as region wise industrial activities are concerned the highest performing in the

economy are the states such as Maharashtra and Gujarat showing high industrial performance parameters as number of factories, factory size, industrial output and value added for last ten years. However, if the total area of those states along with their population size is considered they rank high. Whereas small states such as Goa, Daman and Diu, and Delhi are emerging as attractive destinations for industrial investment. As investment follows high-growth sectors it is reasonable to expect that even in these small agglomerations service sector outperforms manufacturing sector; or the proposition may at least not be fulfilled in these small patches of intensive economic activity. Especially, the case of Delhi now as a separate region, per se, the National Capital Region (NCR) draws attention and necessitates a review of the manufacturing sector. The socioeconomic indicators of NCR (comprises NCT-Delhi and sub-regions as part of Haryana, Rajasthan and Uttar Pradesh) suggest that this has high growth rate of population (47.02 per cent during 1991 -2001 Census period and 20.96 per cent during 2001-2011 Census period), high population density (11320 per sq.km according to 2011 Census) and falling annual exponential population growth rate (Delhi Statistical Handbook 2013, GONCT). Annual Survey of Industries (ASI) data shows growing number of factories, adding up of new industries and expansion of industrial base of the region since 1990s.

Our objective in this study is to see how the manufacturing sector in Delhi is performing in terms of total factor productivity (TFP). As TFPG measures the net growth of output (value added) over the growth of weighted inputs where the weights are the respective shares of inputs in output it is obvious that it takes into account the impact of the factors other than input growth as a source of output growth. In literature the index of TFPG is well accepted as a measure of change in technology. Therefore, measuring of TFPG of the various industries belonging to manufacturing sector is synonymous to estimate the change in technology during the period of study. This will help in understanding whether the huge inflows of FDI to the region in recent years –according to the GOI estimate (Annual Report 2012-13 DIPP, GOI) during Apr 2000-Apr 2010, i.e., in last ten years 21 per cent of total inflow has been received by the Delhi region – has any influence on the region’s manufacturing units.

Another importance of the exercise of obtaining TFPG values is that if these values are increasing over time it indicates growth of industrial infrastructure in the NCR. As to the policymakers the scheme of Industrial Corridor (Delhi Mumbai Industrial Corridor) is of prime interest this study may be expected to carry some benefit for those who are seeking to look into

the preparedness status of the region to pursue such extensive and long-run scheme as DMIC.

The outline of the paper is as follows. Section 2 gives space for brief literature review. Section 3 highlights the methodological issues. In Section 4 we sum up the calculations and the results. Section 5 concludes followed by a bibliographical note.

## **Review of Literature**

Review of existing literature on industry wise computation of total factor productivity is not new in the country whereas TFPG as a theoretical issue is being studied for last fifty since Diewert (1949). In Indian context state level factor productivity has also been studied by some authors. The most intuitive theoretical paper on factor productivity is by Jorgenson and Griliches (1966). Later in a very short review Jorgenson and Griliches (1971) on the topic it gives a precise and sharp discussion on Solow's use of Divisia Index and other issues so far dealt with. They mentioned about Denison's work (1962) on Divisia Index who used it as index of total factor input. Balakrishnan and Pushpangadan (1994) computed TFPG for Indian manufacturing industries (upto three-digit NIC) for the period 1970-71 to 1988-89 and pointed out that in contrast to the result of the earlier studies by Goldar (1986) and Ahluwalia (1991) that revealed a 'turnaround' of Indian manufacturing industries during 1980s, the strong evidence that the above result was not true. According to Balakrishnan and Pushpangadan (1994) if more appropriate method of double deflation would be used in place of single deflation method data show no evidence of 'turnaround'. However, in the later courses of studies by various investigators (Dholakia and Dholakia (1994) etc.) it was argued that double-deflation method is in no way superior to single deflation method due to having its own type of bias in the results. Fare, Grosskopf, Norris and Zhang (1994) computed the total factor productivity of growth for US for the period 1960-1991. However, no recent attempt (no old study as well) to study industry wise for the NCR could be traced by the author. The paper puts forward some basic descriptive analysis on the basis of computed industry wise TFPG values and depiction of the changing pattern of TFPG series over for the NCR or as is termed in ASI 'Delhi' in short and opens up the scope of further detail study by validating the TFPG series and variations in it through appropriate statistical technique.

## **Methodology**

### **3.1 Computation of Total Factor Productivity Growth (TFPG) Index**

This study applies an integrated growth accounting framework for computing total factor productivity level (TFP) over time for the existing manufacturing industries for the state selected. There are two basic approaches to measure TFPG – frontier and non-frontier approaches each which may be again dealt with Parametric and non-Parametric technique. As the growth accounting approach (GAA) to measure TFPG falls in the category of non-frontier non-parametric method. The latter approach has its own advantages and disadvantages. The major drawback is that the computed values are not liable to get validated by any statistical test. The advantage of non-parametric approach that is useful in current study is that in this no explicit assumption regarding parameter specification production function is required. This results in computation of TFPG values as ‘residual’ component. Apart from this, GAA assumes the manufacturing units are technically efficient and no estimate of efficiency gap between potential feasible output and corresponding actual output is obtained. Therefore, the residuals simply take into account of factors other than accumulation of labour and capital. This residual measure of TFPG indeed captures the impact of change in technology in terms of process update, changed organisational behaviour etc. (Solow 1957). In general, production in industry division  $i$  at time  $t$  is expressed by the production function as

$$Y_{it} = f(L_{it}, K_{it}, A_{it}) \quad (3.1)$$

where  $Y_{it}$  is output,  $L_{it}$  and  $K_{it}$  are labour and capital quantity used, respectively and  $A_{it}$  represents the state of technology in any industry at time  $t$ . Differentiating with respect to time we get

$$\begin{aligned} \dot{Y} &= \dot{A}f + A(f_k \cdot K \cdot \frac{\dot{K}}{K} + f_L \cdot L \cdot \frac{\dot{L}}{L}) \\ \text{Dividing through by } Y = Af, \\ \frac{\dot{Y}}{Y} &= \frac{\dot{A}}{A} + \left[ \frac{Af_k \cdot K}{Y} \right] \cdot \frac{\dot{K}}{K} + \left[ \frac{Af_L \cdot L}{Y} \right] \cdot \frac{\dot{L}}{L} \end{aligned} \quad (3.2)$$

where  $Af_k$  and  $Af_L$  represent the marginal products of capital and labour, respectively. The terms in the square brackets are the elasticities of Value Added with respect to the two factors, respectively.

Assuming that competitive equilibrium exists in the market that leads to the equality between output elasticities and income shares (say,  $s_K$  and  $s_L$ ) accordingly we may obtain

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \left( s_K \cdot \frac{\dot{K}}{K} + s_L \cdot \frac{\dot{L}}{L} \right) \quad (3.3)$$

The expression in the parentheses in (3.3) is the Divisia Index Number.

By changing sides

$$\frac{\dot{A}}{A} = \frac{\dot{Y}}{Y} - \left( s_K \cdot \frac{\dot{K}}{K} + s_L \cdot \frac{\dot{L}}{L} \right) \quad (3.4)$$

gives us the required expression of Total Factor Productivity Growth (TFPG) as is equal to the growth rate of output unexplained by the rate of growth of factors of production.

In our study the same procedures have been followed. In practical calculation of TFPG three sets of data extensions are of prime importance. As TFPG have been constructed for All Industries level only all calculations have been done for all India level.

(i) *Data on Output*: the data on Gross Value Added (GVA) has been collected from ASI reports for the period 1981-82 to 2011-12 for Delhi. These were deflated by using the corresponding Wholesale Price Index of that year. This gives us the real GVA.

(ii) *Data on labour*: ASI compiles three distinct measurements of labour employed-- 1. Man-hours worked. This is not a good measure for the purpose because the data on man-hours is just 'worked out' as proxy instead of 'counting' them. 2. Number of Workers: It gives us the number of workers engaged in the production process for rendering manual labour only. 3. Total Persons Engaged: This measure is comprehensive as it takes into account all workers, employees and any other person directly or indirectly engaged to the process. We use this data as the measure of labour.

(iii) *Capital Input*: the most crucial input variable in the context of productivity measurement is capital input. Both the specification and the measurement of capital stock are equally tough because capital goods have life more than one year, or say, has long life comprising of unpredictable number of years (Lutz 1961). In practice there are several methods for calculating the series of capital stock. However, the method that is generally used by the scholars in their

empirical works has been used here, too, is the method of Perpetual Inventory Accumulation (PIA) or variations of it [Goldsmith (1951), Usher (1980)].

The first point of discussion is how to arrive at the initial stock of capital. By definition that is the sum of all (available) investment done in the past along with an estimate of past depreciation. As in reality it is impossible to have such a historical data the value of the gross fixed capital stock at the benchmark period (i.e.,  $K_0$ ) is ‘assumed’ or ‘stylized’ that the value of finished equipment of a balanced age composition would be exactly half the value of equipment when it starts working[ Banerji(1975), Chaudhury (1977), Goldar(1986), and Sarmaand Rao(1990)]. Following the same ‘rule of thumb’we have doubled the book value of NCF of the beginning year 1981-82 to reach the GFCF as a measure of replacement value of fixed asset for the benchmark year 1981-82.

(ii) According to PIA method capital stock of the  $t^{\text{th}}$  period can be estimated as

$$K_t = K_0 + \sum_{t=1}^{t-1} \Delta K_t$$

where  $\Delta K_t = \frac{I_t + D_t}{P_t}$

where  $I_t$  is the Gross real investment in fixed capital during the year  $t$  and  $D_t$  is the Depreciation during the year  $t$ .  $P_t$  is the capital price index.

(iii) In current study  $I_t$  is the difference between the net fixed capital formation at the current period and that at the previous period. The NCF data is obtained from ASI. For constructing the capital price index the ratio of GFCF at Current Prices to GFCF at Constant Prices (available for all India level only) has been calculated and used.

(iv) The share of labour at Gross value added ( $s_L$ ) and that of capital ( $s_K$ ) are computed from total emoluments data compiled by ASI. As it is assumed  $s_L + s_K = 1$  once we get the  $s_L$  series we get the  $s_K$  series automatically.

(v) Once we have the data of Value Added, Labour, Capital and shares of inputs ( $s_L$  and  $s_K$ ) we take the logarithmic difference of VA, L, and K to get the series of TFPG as in equation (3.4).

(vi) Finally, the growth values are transformed into an Index equal to  $\exp[\text{cumulative TFPG values}] \times 100$ .

## **3.2 Data Sources and Use of Data**

### **3.2.1. Sources**

For the calculation of Total Factor Productivity Growth we required data on Gross Value Added (GVA as a measure of output), Total Number of Employees (as a measure of labour input), Net Fixed Capital Formation and Depreciation, Total Emoluments towards the Employees all of which have been collected from Annual Survey of Industries (ASI) reports (issues since 1981-82 to 2011-12) compiled by the Industrial Statistical Wing, CSO GOI. WPI data for deflating various time series that are compiled by the Ministry of Commerce and Industry are available from Handbook of Statistics on the Indian Economy 2012-13 issue. The capital price index has been worked out from GFCF at Current Prices and at Constant Prices as published by RBI (RBI Data Warehouse at <http://dbie.rbi.org.in>) for deflating the capital stock series calculated on the principle of Perpetual Inventory Accumulation (PIA).

### **3.2.2 Data Use**

ASI has complete time series (at current prices) since 1981-82 for the state of Delhi (NCT) along with that for other states. To keep systematic records of industry level data for each state as well as All-India level it follows the UNISIC (United Nations International Standard Industrial Classification). Following the changing industrial pattern over time U.N. Statistical Commission undertook a review and revision of ISIC in 1956, 1965 and again in 1979 leading to ISIC- 1958 (Rev.1), ISIC- 1968 (Rev. 2) and ISIC- 1990 (Rev. 3) systems so far. For practical reasons, the tabulation categories are called 'sections'(if one-digit), the two-digit categories 'divisions'(for India NIC for two-digit are known as major groups), the three-digit categories 'groups' and the four-digit categories 'classes'. In India CSO(Central Statistical Organisation) is responsible for setting up of statistical standards, took up the task of evolving a standard industrial classification in early 1960 and keep continuous efforts to collect industrial data to stay compatible with ISIC. The NIC - 1970 was followed to classify economic activities of the factories from ASI 1973-74 to ASI 1988-89. NIC - 1987 had been introduced and followed till ASI 1997-98. NIC 1998 was then followed from ASI 1998-99 to ASI 2003-04, NIC – 2004 introduced from ASI 2004-05 was followed till ASI 2007-2008. New series of classification i.e. NIC-2008 has been introduced from ASI 2008-09. All the factories in the ASI frame are accordingly classified in their appropriate industry groups on the basis of the value of the principal product manufactured by

them. This way a unit gets classified in one and only one industry group even though it might be manufacturing products belonging to different industries. To keep track with the changes in NIC in different time points appropriate adjustments have been made following Concordance tables as published from time to time.

As we intend to compute the TFPG for Delhi for period from 1981-82 to 2011-12 there we get NIC – 1970, NIC-1987, NIC-1998, NIC-2004 and NIC-2008. Necessary time series data have been thoroughly made compatible with NIC – 1970 as suggested by Concordance Tables (from NIC-1987 to NIC-1970, NIC-1998 to NIC-1987 so on) and have been tried with utmost precision to get desired conversion. According to NIC-1970, Delhi has 13 major groups of industries or 2-digit Division. In the current study we have taken them all in our purview and have intentionally discarded some newly emerging major groups for which data found only 2007-08 onwards and seemed to be inadequate right now. The list of 2-digit major groups (NIC-1970) of industries is being attached for convenience.

**Table 3.1: List of Two-digit Major Groups (NIC-1970) of Manufacturing Industries in Delhi**

Sl No.	Major Groups	Identification of the Industry
1	20-21	Manufacture of Food Products
2	22	Manufacture of Beverages, Tobacco and Tobacco Products
3	23+24+25	Manufacture of Textiles
4	26	Manufacture of Textile Products(including Wearing Apparel other than footwear)
5	27	Manufacture of Wood and Wood Products; Furniture and Fixture
6	28	Manufacture of Paper and Paper Products; Printing, Publishing and Allied Industries
7	30	Manufacture of Rubber, Plastics, Petroleum and Coal Products
8	31	Manufacture of Chemical and Chemical Products ( except Products of Petroleum and Coal)
9	32	Manufacture of Non-metallic Mineral Products
10	33	Basic Metal and Alloys Industries
11	34	Manufacture of Metal Products and Parts (except Machinery and Transport Equipment)
12	35-36	Manufacture of Machinery, Machine Tools and Parts; Electrical Machinery
13	37	Manufacture of Transport Equipment and Parts
14	38	Manufacture of Other Manufacturing Industries n.e.c.

Source: Annexure I, ASI Report 1981-82.

#### 4. Descriptive Results and Analysis

The set of TFPG Index values are represented in Table 4.1 gives us a compact view of the productivity performance of various industries in Delhi for last thirty years, i.e., from 1981-82 to 2011-12 of which 1981-82 is treated as the benchmark year of calculation. The table is arranged



in a manner so that row-wise it gives a set of TFPG Index values of different industries operating in Delhi that provides a relative performance vector in terms of net growth of value addition in a particular year and a column gives the performance of the industry over the years.

However, row wise comparison does not provide any clear picture of some period or sub-period for which the overall industrial cross-section showing any remarkable improvement or slowdown and hence the result is mixed. On the other hand, if column wise we proceed we see some interesting results important for individual industry in the run of time. For most of the industries the TFPG index is declining over the span of the thirty years mainly in 1990s till recent years. The major group of industries such as manufacture of Textile Products(NIC 26), Beverage and Tobacco Products (NIC: 22) is an industry with potential of raising high revenue), Chemical and Chemical Products (NIC:31), Machinery and Machine Parts (NIC: 35-36) are showing very low index values for most of the years of calculation with exceptions of few sporadic high index values having no steady upward movement. The industries that are showing some uptick in recent years are manufacture of Food Products (NIC: 20-21), and textiles (NIC: 23-25) which are mostly demand-led industries.

**Table 4.1: TFP Index of Manufacturing Sector by 2-digit Industry Group in Delhi for the Period 1981-82 to 2011-12**

SerialNo.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
NIC	20-21	22	23-25	26	27	28	30	31	32	33	34	35-36	37	38
Year														
1981-82	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1982-83	126.80	58.94	209.26	116.97	196.71	103.65	100.66	122.44	108.65	138.40	98.49	60.37	103.87	131.72
1983-84	106.20	23.46	419.75	124.09	71.90	50.58	77.08	72.70	96.36	127.57	61.02	73.29	91.31	110.06
1984-85	247.77	31.54	191.94	163.37	90.20	64.72	70.54	50.20	111.47	105.57	48.60	39.27	73.99	105.17
1985-86	114.62	5.44	204.40	109.67	90.76	37.93	53.90	65.64	77.13	146.34	37.13	31.43	64.03	89.14
1986-87	65.82	27.72	273.26	123.66	100.50	45.74	63.57	16.00	80.93	84.20	33.77	25.41	61.82	91.89
1987-88	134.36	23.39	313.64	134.16	87.69	47.76	63.30	22.45	113.79	91.80	33.04	28.49	64.10	101.62
1988-89	62.53	8.10	701.10	114.24	90.38	47.65	71.69	16.16	106.22	95.10	30.07	30.63	61.69	93.90
1989-90	55.65	13.06	295.31	135.54	77.75	49.29	57.77	29.57	85.26	57.20	30.93	23.10	66.62	76.57
1990-91	68.64	32.62	280.14	172.60	76.97	40.34	66.47	30.01	267.09	120.49	32.57	28.15	60.86	77.16
1991-92	24.28	16.47	183.32	170.69	54.24	54.25	48.85	40.92	317.45	108.90	31.83	26.85	74.36	69.57
1992-93	57.44	25.77	213.32	132.19	47.39	46.31	43.03	25.99	152.71	124.79	28.56	28.70	58.72	76.30
1993-94	85.90	14.78	231.56	153.81	52.60	48.65	61.97	16.55	124.76	62.08	34.04	21.66	55.71	80.47
1994-95	89.05	18.28	212.55	286.22	56.06	46.60	33.92	25.01	118.98	32.52	30.19	39.88	45.68	69.57
1995-96	75.12	20.53	148.06	128.64	79.72	50.45	58.95	23.31	79.61	79.81	25.00	20.93	49.46	92.90
1996-97	138.55	29.41	166.74	104.75	95.34	16.11	53.88	17.59	73.89	83.44	50.12	30.10	42.08	50.88

1997-98	145.38	17.52	585.17	82.74	53.31	44.41	32.38	18.99	72.02	130.05	66.59	26.32	37.49	130.27
1998-99	202.46	8.89	808.53	121.19	65.29	49.89	40.29	13.90	45.92	58.51	41.42	21.33	52.36	175.72
1999-00	100.15	10.97	1311.34	96.06	32.55	35.76	24.01	82.86	58.26	56.33	32.15	24.72	60.00	76.51
2000-01	125.38	8.15	1094.29	70.64	25.12	46.68	23.21	13.21	48.78	37.37	44.29	16.44	53.14	72.71
2001-02	120.98	6.13	1197.19	63.89	35.98	35.21	15.96	22.70	57.25	30.46	40.45	23.93	40.63	124.11
2002-03	177.70	12.91	1241.38	55.23	18.34	53.46	26.23	27.92	48.08	26.22	40.52	20.00	46.16	95.75
2003-04	107.09	1.81	1455.62	43.82	12.43	35.07	16.16	20.04	80.81	48.40	39.41	14.36	47.25	68.36
2004-05	89.88	1.37	1042.90	39.99	20.31	54.92	17.83	21.84	40.38	33.08	33.59	18.50	49.99	83.42
2005-06	113.34	13.63	1184.93	45.21	38.90	44.10	21.67	23.97	37.84	47.35	35.64	11.88	40.33	78.44
2006-07	86.66	4.45	1386.48	35.35	43.32	45.95	23.46	32.73	41.02	41.62	51.60	17.19	37.80	83.44
2007-08	114.45	4.16	777.95	41.42	60.12	46.63	29.57	36.81	53.63	68.08	58.12	16.91	37.45	62.41
2008-09	99.70	5.57	701.67	44.11	15.35	24.07	25.72	24.03	62.55	151.16	40.01	13.53	31.98	45.59
2009-10	186.71	9.29	1023.66	46.92	73.21	27.70	50.93	22.24	62.95	75.72	27.34	13.10	49.63	44.68
2010-11	262.74	22.98	834.23	43.87	58.58	37.31	39.37	30.13	41.94	53.69	33.06	27.63	30.65	38.39
2011-12	319.64	4.48	731.10	32.39	94.94	24.24	22.36	16.90	81.36	72.91	33.09	15.51	73.21	59.02

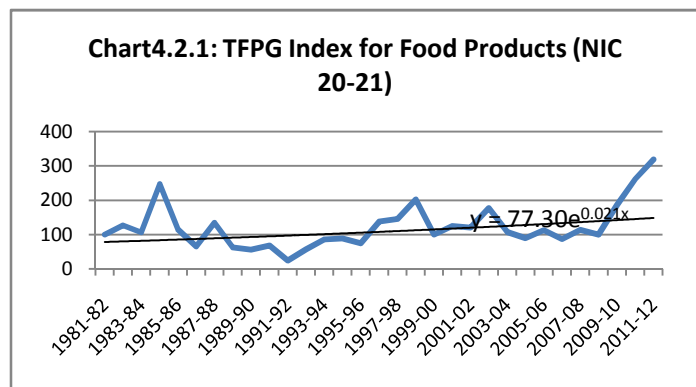
Source: Author’s own calculation based on ASI data series (1981-82 onwards)

## 4.2 Industry wise Representation of TFPG Index using Line Chart

There is a band of industries drawing attention (such as NIC: 22, NIC: 28, NIC: 31, NIC: 35-36, NIC: 37) because of their deteriorating performance since the very beginning of the period of study and continuing the falling trend overall as is clear from Table 4.1. The line diagrams presented in the next sub-section seem to depict better industry wise view of such results. In this sub-section the TFPG values calculated for each of the fourteen individual major industry group (2-digit industrial classification) as is summarised in Table 4.1 are presented with the help of line diagram so as to get an explicit view of the productivity performance of the industries running in the NCR for at least last thirty years.

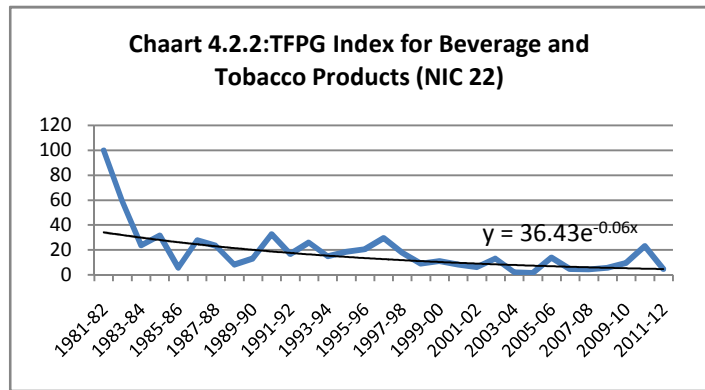
### 4.2.1. TFPG Index Series for the Manufacture of Food Products Industries in Delhi

The industry manufacturing food products (NIC 20-21) is one of the few industries the TFPG values of which are moving upward for long stretches of years and in recent years (since 2009-10) the industry is seen generating rising values of TFPG.

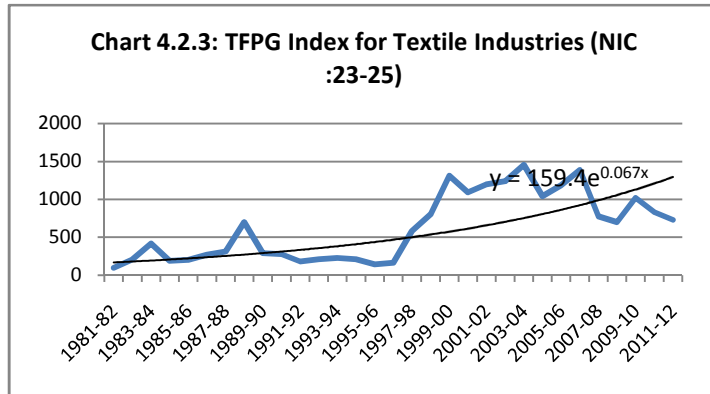


#### 4.2.2. TFPG Index Series for the Manufacture of Beverage and Tobacco Industries in Delhi

Chart 4.2.2. shows the line diagram of the TFPG value for the period for the Beverage, Tobacco and Tobacco Products industries that is seen to be a poorly performing manufacture group (NIC 22) all along. The annual exponential growth rate of the TFPG values is also negative (-0.06 per cent).



#### 4.2.3. TFPG Index Series for the Manufacture of Textile Industries in Delhi



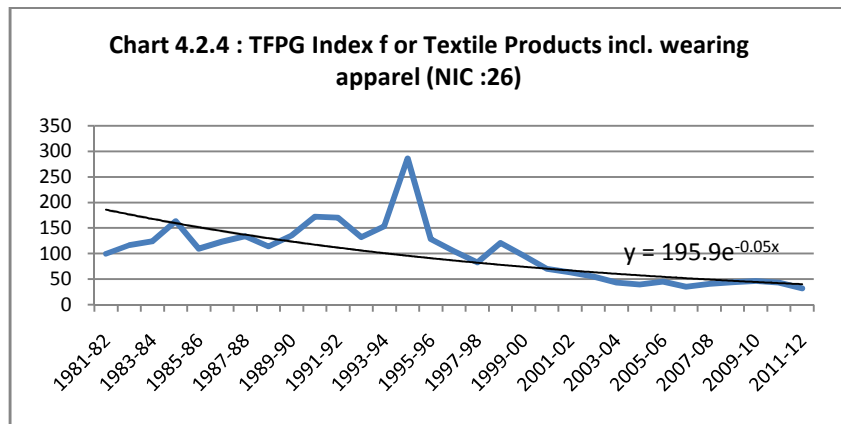
For the beginning of the years (from 1981-82 to 1990-91) the survey data for textile industry in the economy appeared under three two-digit IC (Industry Classification) divisions NIC-23(Cotton Textiles), 24(Wool, Silk and other man-made fibre textiles) and 25 (Jute, Hemp and other

vegetable fibre textiles). However, due to the fact that for the years these rendered so thin values from all the states in the economy producing those various textile components that from the year 1991-92 the data for three separate heads are merged under the single head of Manufacture of textile industries (NIC 23-25). The textiles industry as a whole is performing very satisfactory manner during eighties and nineties in Delhi area and Chart 4.2.3. depicts this clearly.

#### 4.2.4. TFPG Index Series for the Manufacture of Textile Products Industries in Delhi

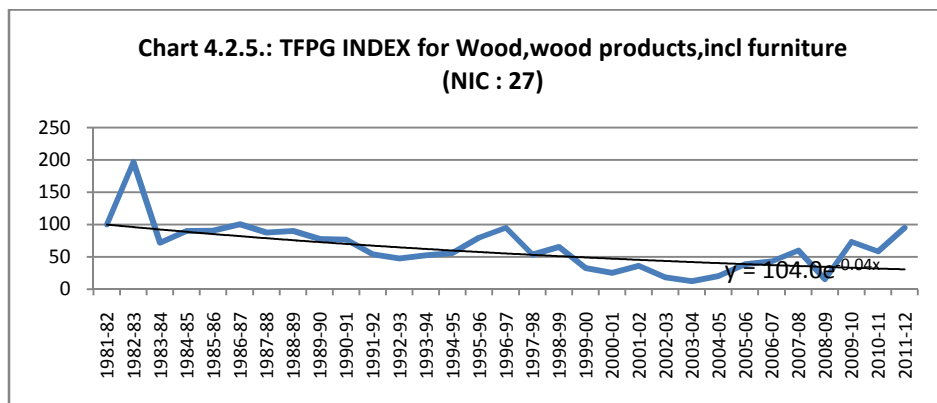
Unlike the level of performance of textile industries the textile products industries that include the production of wearing apparel (NIC: 26) is seen to have added low value to its output over the years, mainly, since 1997-98. Though IC has changed industry components in the year and follows NIC-1987 as the newly coded henceforth this particular industry has not undergone any omission of any of its component industries the performance of sector dropped down

significantly since late nineties. The often cited cause of rising input cost of the textile products manufacturing in the last decade might explain a part thereof.



#### 4.2.5. TFPG Index Series for the Manufacture of Wood and Wood Products Industries in Delhi

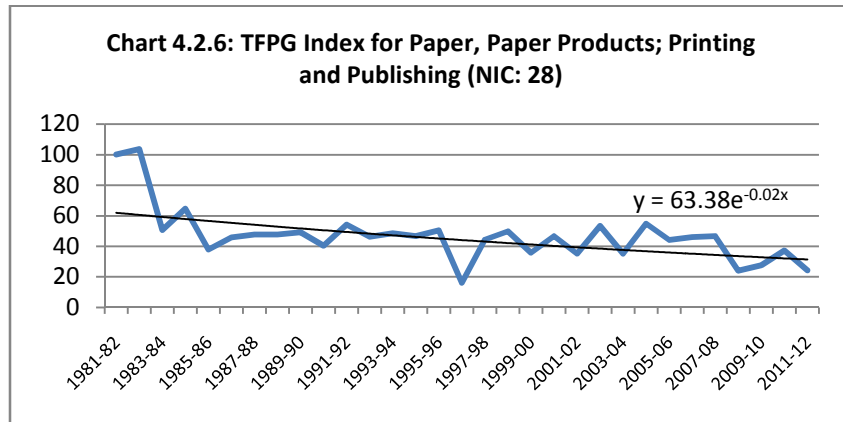
The TFPG index for the Manufacture of Wood and Wood Products industries including the wooden furniture industries (NIC: 27) as presented in Chart 4.2.5 gives us a clear view of the performance in terms of net value addition to output. This industry is seen to adding to its TFPG index for the recent years (since 2004-05) intuitively because of the adequate growth of the furniture industries being a part of the industry which expanded significantly and since NIC-2008 Industrial Classification is recognised as a separate two-digit major group.



#### 4.2.6. TFPG Index Series for the Manufacture of Paper and Paper Products and Printing and Publishing Industries in Delhi

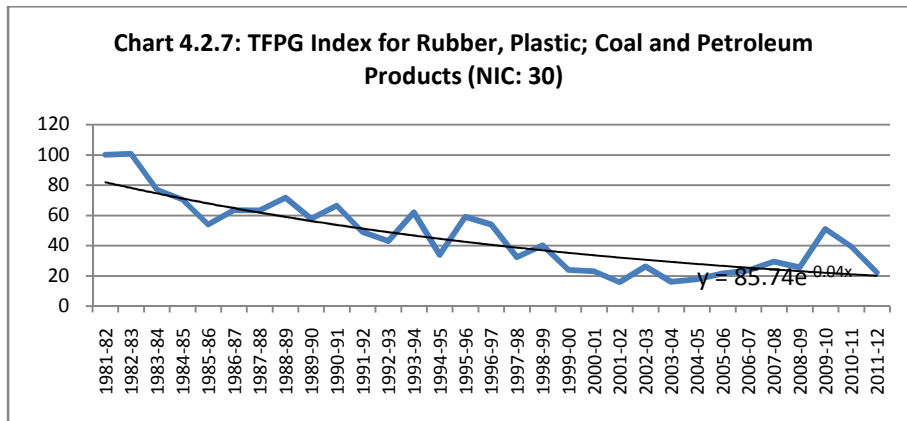
The Manufacture of Paper, Paper Products, Printing and Publishing and Allied Industries' performance in value addition to output is remarkably dissatisfactory. For the entire period of the study as is obvious from Chart 4.2.6. the TFPG values never show any upward stretch in

consistent manner thus indicating a worrying condition and intrinsic structural or locational drawback may be easily perceived and appropriate remedial should therefore be sought for.



#### 4.2.7. TFPG Index Series for the Manufacture of Rubber, Plastic, Petroleum and Coal Products Industries in Delhi

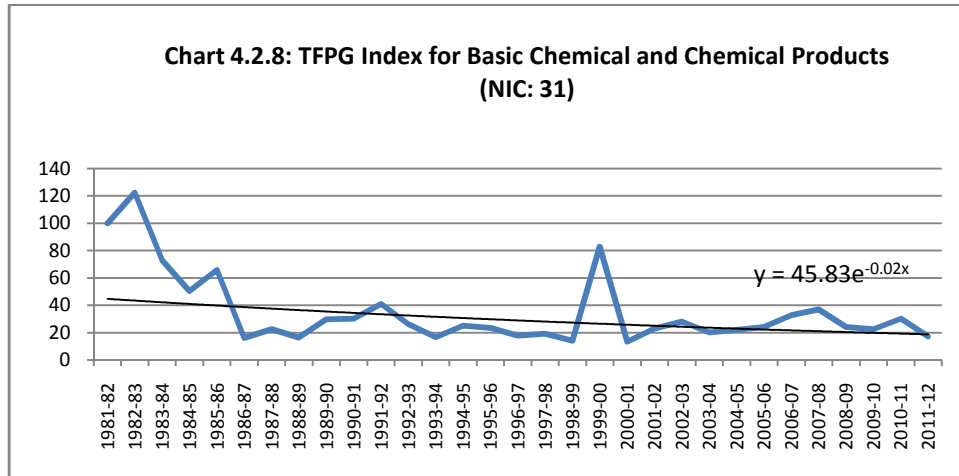
The manufacture of rubber, plastics, and petroleum and coal products (NIC: 30) belongs to the category of chemical industries but from the very early years of industrial classification occupies a separate two-digit code of division implying the major role played by the industry in country level. However, as the line diagram in Chart 4.2.7 shows in Delhi the industry is not faring in satisfactory manner and from the initial period of study 1981-82 the TFPG values depict downward trend till recent years.



#### 4.2.8. TFPG Index Series for the Basic Chemical and Chemical Products Industries in Delhi

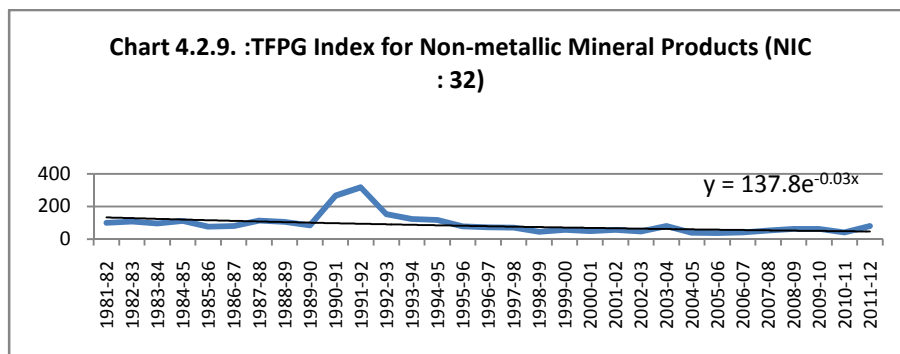
Though a very basic industry itself by nature having significant contribution in generating value addition in some other states the Basic Chemical and Chemical Products industries (NIC:

31) has little to add over the years when TFPG values are obtained for the industry for Delhi. The industry is facing chronic stagnation since the very first half of 1980s and call for deeper analysis of its problems regarding effective demand and infrastructural gap.



#### 4.2.9. TFPG Index Series for the Manufacture of Non-metallic Mineral Products in Delhi

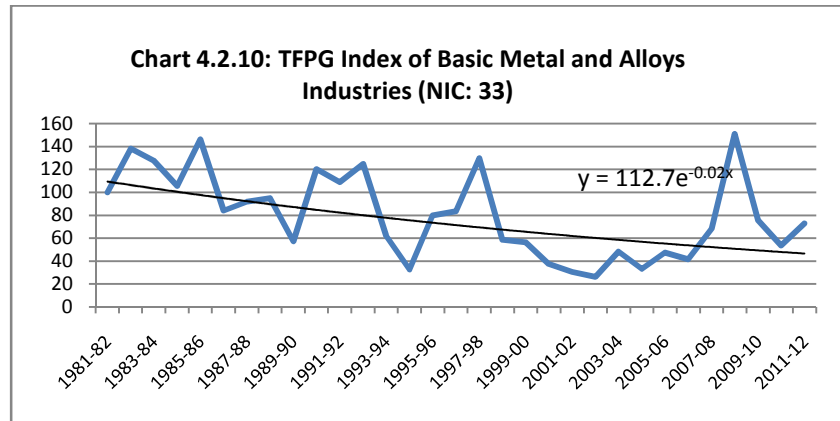
The Manufacture of Non-metallic Mineral Products (NIC: 32) in Delhi shows disappointing flat TFPG figures and seriously indicating the infrastructure gap faced by the manufacturing units concerned.



Though during a short span period from 1988-89 to 1993-94 there is an upward trend in the TFPG index values the trend is temporary and fades away soon after 1993-94. It seems that the industry needs problem specific intervention by the concerned authority so to improve the performance in terms of value addition at potential level.

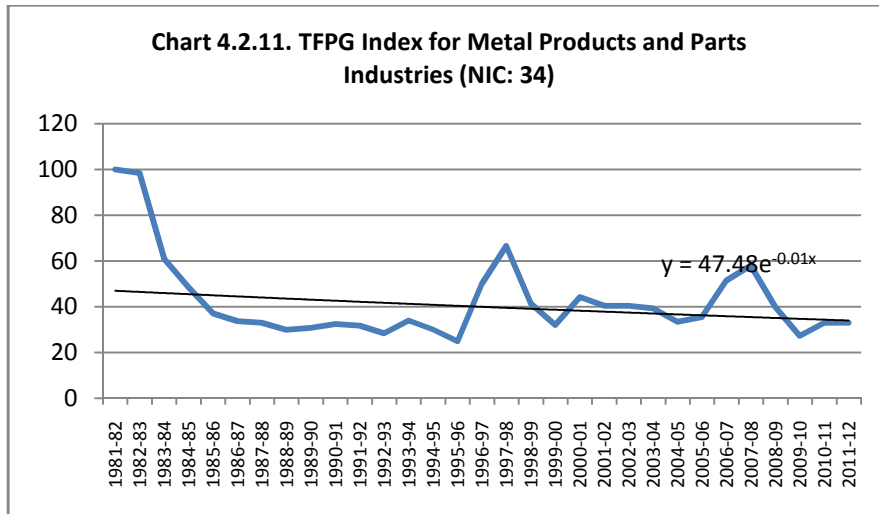
#### 4.2.10. TFPG Index Series for the Manufacture of Basic Metal and Alloys Industries in Delhi

The TFPG index values for the Manufacture of Basic Metallic Products (NIC: 33) shows peculiar upward and downward movements in TFPG values. Since 1981-82 upto the second half of the 1990s the industry depicts three major upturns followed by substantial drops in the following years. During 1998-99 and 2007-08 the industry faces a long stretch of low TFPG values followed by a peak around the year 2009 and again followed by lowered values of the index in recent years.



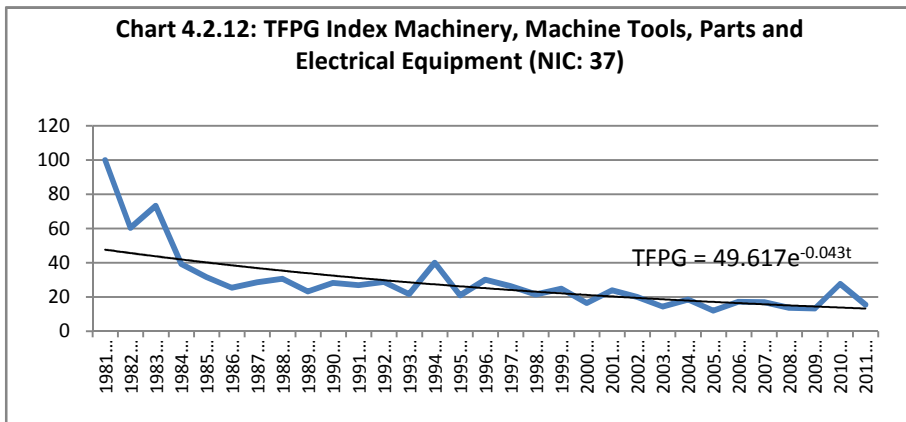
#### 4.2.11. TFPG Index Series for the Manufacture of Basic Metal Products and Alloys Industries in Delhi

The picture of Manufacture of Metal Products and Parts except Machinery and Transport equipment Industries (NIC: 34) is also as gloomy as many others operating in Delhi for last thirty years. Starting from the year of 1981-82 the TFPG is falling for the entire period excepting few time points where the TFPG point is marginally higher than the previous period value and the values immediately in the consecutive years. Therefore, this industry, too, is lagging behind in terms of productivity performance.



#### 4.2.12 TFPG Index Series for the Manufacture of Machinery, Machine Tools, Parts and Electrical Equipment in Delhi

The Manufacture of Machinery, Machine tools and Parts and Electrical machinery (NIC: 35-36) which serves consumer as well as production process and rightly belongs to basic investment goods manufacturing category is desperately looking for some solutions to the problem of continuously declining trend of the TFPG index values that makes the industry stagnant right from the beginning of our study period.

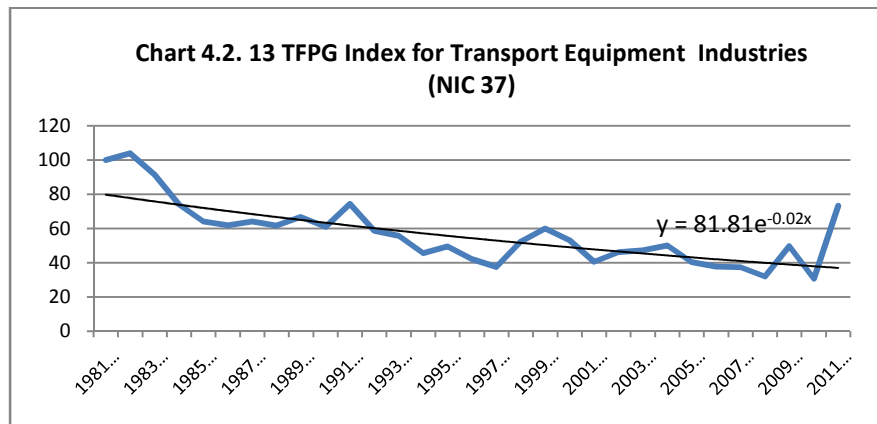


#### 4.2.13. TFPG Index Series for the Manufacture of Transport Equipment in Delhi

The Transport Equipment industry (NIC: 37) is also a vital industry that adds value to the products which facilitate the growth of transport and communication. The overall performance of the industry in Delhi is mixed; mixed in the sense that the TFPG index moves up and down

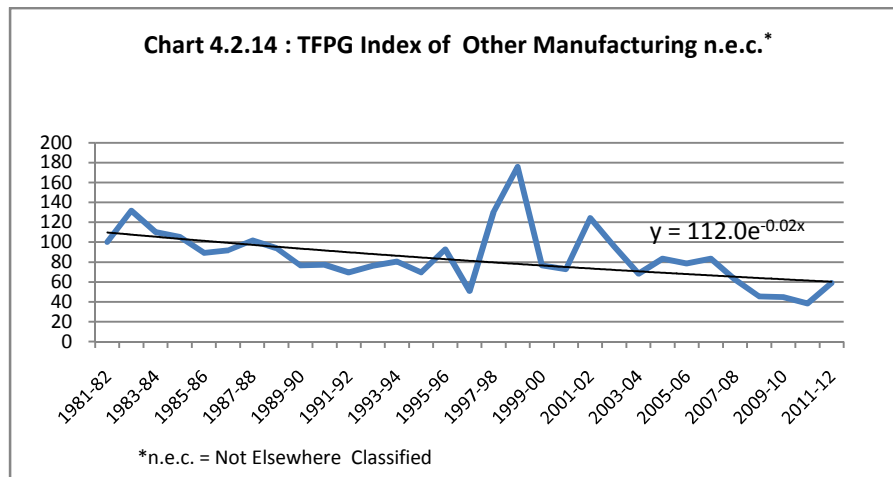


during short course within the entire thirty-year period. At the end, however, the series takes a favourable upward turn that should be maintained in the years to come.



#### 4.2.14 TFPG Index Series for the Other Manufacturing industries n.e.c.\* in Delhi

The TFPG index for Other Manufacturing industries for any state as well as for Delhi can be well expected to generate a random series. That comes out in computation here, too. It generates a randomly behaving series depending on the changing definitions of industries from time to time.



From the above line diagrams the reader might have a set of sketch of the industry wise performance of the manufacturing sector in the NCR for a long period of time without going into much methodological detail.

## 5. Conclusion

In the foregoing pages small attempt , rather too simple attempt is made to have an overview

of the industry wise total factor productivity growth scenario for the last thirty years (1981-82 to 2011-12) in the NCR or Delhi. The conclusions are simple, too.

- Fourteen major industrial groups in manufacturing sector are operating for the last thirty-year period irrespective of their performance levels. For a geographically small area as the NCR compared the same of other large Indian states is no less achievement.
- Most of the industries running are important either from consumers' the point of view or that from producers' and their output serves at least partially the local domestic demand for consumer items or intermediate goods.
- Majority of the industries have been successfully expanded their base in terms of increasing number of factories, accumulation of basic inputs such as labour and capital as suggested by ASI data.
- However, as long as the growth of TFP is concerned most of the manufacturing industries (ten out of fourteen existing major industry group) show grim values. Of them are included the beverage and tobacco products manufacturing industry, the basic chemical and chemical products manufacturing industry, the machinery, machine tools and parts; and electrical machinery producing industry which are believed to play significant role in developing the overall industrial base of any region and serving at least local consumers.

The above mentioned failure of manufacturing sector in the NCR points to the possibilities of factors affecting the backdrop of those failing industries that either there is supply side crunch nibbling out the value added to output of such industries or there is insufficient demand for those products.

Again, it also indicates that the manufacturing industries do not receive a sufficient share of huge FDI inflows to the region for last twenty years. As FDI acts as a vehicle of foreign technology to the receiving production unit, the impact of such foreign investment must be captured in the growing values of TFPG. But for majority of industries the series is falling over time. As the region is looking ahead for broader scheme of industrialisation such as DMIC the problems that are already keeping the pace of growth for manufacturing sector down should be addressed carefully so that they do not hinder the prospect of growth in future industrial production.

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