

## TOTAL FACTOR PRODUCTIVITY IN FOOD INDUSTRY OF PUNJAB

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### **Abstract**

*The present study is confined to manufacture of food products industry of organised manufacturing sectors of Punjab for the period of 1980-81 to 2002-03, at three digit level. Major source of data for the study is Annual Survey of Industries (ASI). Total factor productivity evidenced lower numerical value for food industry and all its disaggregate (except manufacturing of dairy product industry) in post-reform period as compared to pre-reform period. It implies fruits of liberalization period are not enjoyed by food industry.*

Agro-food industry occupies an important place in manufacturing sector of Punjab as it contributes 20 per cent in industrial employment and output each, hence backbone of organised manufacturing sector in Punjab (Sharma 2009). Growing volume of commercialized agriculture production leads to economies of scale in processing and distribution, which in turn induce increasing profitability and entry of new enterprises in the food industry (Chadha and Sahu, 2003). Industrial growth is dependent upon the expansion of productivity factor and the efficiency with which these factors are utilised. It may However, be emphasised here that the role of efficiency or productivity has been established as much more significant in the process of achieving a higher rate of growth as the factor accumulation. In fact in neo-classical growth theory it has been stressed that long-term growth is possible only through technical progress or improvements in productivity. This is because if growth is caused by factor accumulation only, it will stop when diminishing return set in after a point. Under such circumstances, an indepth analysis of food industry has been attempted to understand the total factor productivity.

### **Structural composition of Food Industry :**

NIC- 151 - Production, processing, preservation of meat, fish, fruit, vegetable oil and fats.

- NIC- 152 - Manufacture of dairy products.  
NIC- 153 - Manufacture of grain mill products, starch and starch products and prepared animal feed.  
NIC- 154 - Manufacture of other food products

### Scope, Data sources and Prices and Period of study

The scope of study is confined to manufacture of food products industry of organised manufacturing sectors of Punjab at three digit level. Major source of data for the study is Annual Survey of Industries (ASI). Various issues of annual survey of industries, [www.circonindia.com](http://www.circonindia.com) and statistical abstract of Punjab are used. For making price corrections in the reported data on value of output, gross value added, wholesale price index of manufacture of food industry has been used. Wholesale price index for transport and machinery has been used to adjust the data on fixed capital. Consumer price index has been used to deflate the emoluments. Every deflator has 1993-94 as a base year. This study covers the period of 1980-81 to 2002-03; it has also been divided into two phases, pre-reform period (1980-81 to 1990-91) and post-reform period (1991-92 to 2002-03) to capture the impact of change in policy regimes. Present study has been divided into three sections. In the first section methodology is given. In the second section total factor productivity and its growth rates are explored. In the last section concluding remarks and policy implications are given.

## SECTION I

### Methodology

We are fully aware of limitations of partial factor productivities, so a more comprehensive measure of productivity is the total factor productivity, which takes into account all factors of production is calculated with the help of translog index.

Translog Index can be calculated as under.

$$\frac{\Delta V_t}{V_t} = \log V_{t+1} - \log V_t = \Delta \log V_t$$

$$\frac{\Delta L_t}{L_t} = \log L_{t+1} - \log L_t = \Delta \log L_t$$

$$\frac{\Delta K_t}{K_t} = \log K_{t+1} - \log K_t = \Delta \log K_t$$

Where V is value added, L- labour employed K – capital

$$\bar{W} = \frac{1}{2}(W_{t+1} + W_t)$$

Where W = Wage =  $\frac{\text{Emoluments}}{\text{GrossValueAdded}}$

$$\bar{r}_t = (1 - \bar{w}_t),$$

$$\bar{r}_t = \frac{1}{2}(r_{t+1} + r_t)$$

Now

$$\frac{\Delta A}{A} = \frac{\Delta V_t}{V_t} - \left( \bar{w}_t \frac{\Delta L_t}{L_t} + \bar{r}_t \frac{\Delta K_t}{K_t} \right)$$

Translog Index of total factor productivity

The index for base year, A (0) is taken as 1 then the index for subsequent years is computed using the following equation

$$A_{t+1} = A_t \left( 1 + \frac{\Delta A_t}{A_t} \right)$$

## SECTION II

### Translog Index and Total Factor Productivity Growth: Food Industry

Translog index and total factor productivity (TFP) growth of food industry and at disaggregate level have been shown in table I. In food industry, trend growth rate of total factor productivity is significant (2.41 per cent per annum) and higher in pre-reform period as compared to post-reform period (0.98 per cent per annum). In post-reform period, although trend growth rate is low (0.98 per cent per annum) yet it is significant statistically. Here results vindicate our earlier exercise. In production, processing and preservation of meat, fish, fruit, vegetable, oils and fats (NIC-151), manufacture of grain mill products, starch and starch products (NIC- 153), and manufacture of other food products industry (NIC-154) trend growth rate of total factor productivity (TFP) is higher in pre-reform period as compared to post-reform period, where it turned to be negative. One possible reason may be that new economic policies and technology have adverse impact on food industry and also at disaggregate levels. Dairy product industry is only exception where growth rate of

total factor productivity is higher in post-reform period vis-a-vis pre-reform period. Growth rate of total factor productivity of food industry is higher than that of production, processing and preservation of meat, fish, fruit, vegetable, oil and fats (NIC-151), manufacture of dairy products (NIC-152) and manufacture of other food products industry (NIC-154) in pre-reform period. However, growth rate of total factor productivity of food industry is higher than that of production, processing and preservation of meat, fish, fruit, vegetable, oil and fats (NIC-151), manufacture of grain mill products, starch and starch products (NIC-153), and manufacture of other food products industry (NIC-154) in post-reform period.

Manufacturing of dairy product industry is only an exception whose growth rate of total factor productivity is quite significant (4.65 per cent per annum) and higher than that of food industry during post-reform period. Manufacturing of dairy product industry (NIC-152) recorded highest significant growth rate of total factor productivity (4.65 per cent per annum) as compared to other sub-groups and food industry.

Growth rate of total factor productivity was higher in pre-reform period but declined in post-reform period, on the pattern of state level (Kumar, 2005) and national level studies [Srivastava (2000), Balakrishna et. al. (2000) , Trivedi et. al (2000) ,Goldar (2000,2002), Goldar and Kumari (2003), Das (2003), Banga (2003)]. So, either the market did not favour the manufacturing sector of Punjab or in the globalised competitive scenario it failed to fetch higher prices, or could not keep its costs low. Punjab had to depend on other states for raw material and other intermediate products for its chemical based and metal-based industries. This forces it to bear additional transportation costs. The question of why the total factor productivity growth in the manufacturing industries declined in 1990s, assumes significance, as it was an important objective of reforms. To make Indian industries competitive in international markets and enhancing the productivity growth constituted a means to that end. There could be several possible inferences. First, the failure of total factor productivity growth to accelerate with economic liberalisation is perhaps indicative of harmful lag effects of previous interventionist regime. Second, since there was a spurt in investment activity in 1990s in response to economic reforms, there could be an immediate adverse effect due to gestation lags. Another possible reason is that the discretionary controls on domestic and

foreign dimensions of manufacturing sector are largely responsible for the lower growth rate of total factor productivity.

**TABLE -I**  
**Translog Index and Growth Rates of Total Factor Productivity of**  
**Food Industry and Its Sub-Groups**

YEAR	Production, processing and preservation of fruit, fish, vegetable, meat etc.	Manufacture of dairy products	Manufacture of starch & starch products	Manufacture of other food products	Food industry
1980-81	1	1	1	1	1
1981-82	1.08	1.20	1.12	1.078	1.13
1982-83	1.29	1.38	1.11	1.283	1.27
1983-84	0.99	1.29	1.25	1.595	1.33
1984-85	0.99	1.43	1.13	1.55	1.31
1985-86	1.28	1.36	1.22	1.43	1.35
1986-87	1.23	1.14	1.23	1.21	1.25
1987-88	0.93	1.16	1.32	1.21	1.27
1988-89	1.23	1.30	1.36	1.33	1.40

1989-90	1.26	1.22	1.41	1.23	1.39
1990-91	1.27	1.48	1.23	1.11	1.38
1991-92	1.11	1.56	1.38	1.27	1.46
1992-93	0.99	1.26	1.40	1.35	1.40
1993-94	0.98	1.31	1.42	1.63	1.49
1994-95	0.93	1.21	1.26	1.59	1.39
1995-96	0.96	1.15	1.30	1.48	1.38
1996-97	0.79	1.32	1.41	1.25	1.37
1997-98	0.75	1.42	1.40	1.29	1.40
1998-99	0.66	1.73	1.28	1.22	1.36
1999-2000	0.75	1.78	1.51	1.35	1.54
2000-01	0.88	2.08	1.40	1.24	1.62
2001-02	0.91	2.09	1.31	1.21	1.61
2002-03	0.96	1.90	1.22	1.11	1.53

Trend Growth Rate (TGR)					per
cent per annum					
1980-81 to 1990-91	1.61 (1.38)	1.29 (1.89)	2.53* (4.48)	0.37 (0.25)	2.41* (3.66)
1991-92 to 2002-03	-1.88 (-1.65)	4.65* (4.08)	-0.40 (-0.85)	-2.0* (-2.57)	0.98** (2.11)
1980-81 to 2002-03	-1.71* (-3.71)	2.10* (4.78)	0.95* (3.95)	0.06 (0.16)	1.29* (6.35)

Note: Figures within Brackets are the t- ratios

\* 1% level of significance.

\*\* 5 % level of significance

### SECTION III

#### Concluding Remarks and Policy Implications

Growth rate of total factor productivity is positive and significant for the Manufacturing of Food products industry (except manufacture of dairy product industry) in pre-reform period ; however, this momentum could not be maintained in post-reform period, where growth rate either declined or turned to negative. Food industry that has the potential to develop could not grow to their capacity, owing to laxity of government. Total factor productivity evidenced lower numerical value for food industry and all its disaggregate (except manufacturing of dairy product industry) in post-reform period as compared to pre-reform period. It implies fruits of liberalization period are not enjoyed by food industry. More government expenditure should spent on research and development of improvement of total factor productivity. Large sized units, which must based on local raw mateial and must

have local market, must be set up with latest technological know-how's. There should be special economic zone for the industry to meet the export quality level.

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