



## Review Of Literature Related To Measurement Of Factor Productivities And Substitution Possibilities In Manufacturing Industries Of State Haryana (India)

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**Abstract:** The studies reviewed above are only the important ones in the vast sea of literature on productivity. Going through the vast strands of literature it can be easily concluded that there is no unanimity over the methodology employed in various studies for measuring productivity and the studies more or less confined that the economic reforms did not have a substantial effect on productivity growth. The characterization of production technology in our study is associated with the Translog Cost Function. Our study presents a method for interpreting the growth of Total Factor Productivity, directly linking the productivity growth to key parameters of a specific translog cost function. It is shown that productivity growth can be decomposed into effects due to: (a) technical change, (b) scale economies and (c) capacity utilization.

[Kumar, R. and Vikki. **Review Of Literature Related To Measurement Of Factor Productivities And Substitution Possibilities In Manufacturing Industries Of State Haryana (India)**. *Academ Arena* 2020;12(9):69-73]. ISSN 1553-992X (print); ISSN 2158-771X (online). <http://www.sciencepub.net/academia>. 6. doi:[10.7537/marsaaj120920.06](https://doi.org/10.7537/marsaaj120920.06).

**Keywords:** Review of literature, Industries, Manufacturing, Haryana

### Introduction:

After nearly three decades of import substitution, economic liberalization was initiated in India in the early 1980s and got intensified since the early 1990s. Various aspects of production and trade are primarily determined by government policy under the import substitution policy regime, whereas, market forces assume greater significance in a liberalized economy. Unlike what used to be the case during import substitution, investment activities in India are no longer governed by the national planning and by the objective of achieving balanced regional development. Instead, investment decisions are now made on economic considerations: it depends upon the returns that investors expect and the uncertainties around those returns.

The production function concept is very important for estimating, analyzing and planning purposes of the economic growth in the development of a country, and also useful to ascertain the extent to which the national production can be increased from a given resources. The value of production coefficients serves as the basis for determining the optimum patterns of output, and the concept of the production function.

There are many studies in the industrial manufacturing sector where the production function analysis was extensively used. In some studies, attempts were made to estimate parameters of the

various production functions and drawing relevant inference from them. In some studies, the concentration was on the capacity utilization, and comparison of the capacity utilization among the regions of individual industries. The production function has also shown the reason for wide fluctuations of the productivity in different regions in the industrial sector in the country of India.

The link between industrialization and development is intricate and has generated noteworthy discussions among economists. The vast body of literature on the evaluation of the industrialization process in a number of developing countries has noted two crucial features. First, the speed and scope of industrialization are notable mostly when compared with the underdevelopment and stagnation of the colonial past. Second, the process of industrialization has been uneven over time and across space, both within and between countries. This pattern of industrialization resulted in significant regional disparities within countries as well as across industries. Uneven industrial development across regions and different industries of the organized manufacturing sector is a consequence of several structural factors such as distance from the market or from capital, infrastructure development, accessibility to important raw materials, availability of capital and skilled

workers as well as of non-structural factors like political stimulus. Empirical evidence indicates that manufacturing is, by far, the sector in which most R & D (research and development) investment is undertaken. It is generally acknowledged that this type of investment has positive externalities that go far beyond the productivity gains achieved in the same sector, significantly contributing to productivity growth in other industries and thus fueling overall economic growth.

Economic reforms introduced in India in 1991 aimed to remove the stringent administrative procedures relating to the acquisition of a license to establish firms, create a single window system, abolish or reduce high tariff rates and opened up Indian firms to global trade activities. The liberalization, privatization and globalization aspects of economic reform are meant to enhance the performance and productivity of the economy in general and of the manufacturing sector in particular. Against this background, the present study analyses the performance of select industries of India's organized manufacturing sector and the State of Andhra Pradesh during the pre- and post-economic reform period. The analysis of the organized manufacturing sector's performance examines capital intensity, labour productivity and TFP at the national level and in the three regions (Telangana (Tel), Coastal Andhra (CA) and Rayalaseema (RS)) of Andhra Pradesh.

### Review of literature

Among the post 1980 studies, the study of Ahluwalia (1991) is considered as a significant one. The main objective of the study was to calculate the growth rate of TFP in Indian manufacturing industries covering a period from 1964-65 to 1985-86. The study based on the Annual Survey of Industry (ASI) data, found a marked increase in the growth rate of TFP at 3.4 per cent per annum of Indian manufacturing. The estimates of translog production function using pooled cross-section and time series data also showed a marked improvement in the rate of TFP growth. She attributed this observed "turnaround" in productivity growth in Indian manufacturing in the 1980s to liberalization of economic policies.

In India numerous studies have been undertaken on the estimation of efficiency and productivity growth by various tools including growth accounting approach, econometric approach, etc. However, most of the studies have focused on data for specific manufacturing industries or aggregate manufacturing sector of India. Reddy and Rao (1962) used Solow index of TFP for the period 1946-57 and found a fall in TFP at the rate of 9.5 per cent.

Gujarati (1967) computed production function to assess the relative importance of capital, labour and

technology in explaining output growth of manufacturing sector of India for the period 1946-58. The analysis of the study, based on 28 industries data, found a 24 significant and favourable shift in the production function of eight industries.

Dadi and Hashim (1973) estimated the Cobb Douglas (C-D) Production Function for the large scale census sector of Indian Manufacturing sector over the two periods from 1946 to 1964 and from 1953 to 1964. The study revealed that coefficient of labour was not significantly different from zero in the first period, while those of both labour and capital were not significantly different from zero in the second period, although coefficient of time trend variable was positive and significant in both the periods. Mehta (1974) computed C-D and Constant Elasticity of Substitution (CES) production function approach for Indian sugar industry for the period 1953-65 and have used both CMI and ASI data for analytical purpose. The study observed a declining trend of TFP over the period of time and revealed constant returns to scale for the industry.

Barthwal (1975) attempted to analyze the various forms of production functions viz. Variable Elasticity of Substitution (VES), CES and C-D for Indian paper industry using ASI and CMI data for the period from 1948-65. The study revealed that C-D production function is consistent for Indian paper industry. Further, the author observed some evidences of constant returns to scale and further investigation revealed a negligible technological progress in Indian paper industry. The partial elasticities of capital and labour inputs were found to be of 0.64 and 0.36, respectively. Banerjee (1975) analyzed the relationship between capital intensity and productivity for the manufacturing sector as a whole and five individual industries i.e. cotton textile, jute textiles, sugar, paper and bicycle. Based on CMI and ASI data, analysis revealed that the performance of the manufacturing sector was sluggish over the period from 1946 to 1964. While labour productivity showed a marked upward trend but no evidence was found to indicate the presence of technical progress. It has been further highlighted in the study that elasticity of substitution between capital and labour seems to be unity in almost all the industries.

Ahluwalia (1985) used Solow and Translog indices of TFP for the 25 period from 1959 to 1980 and observed a total factor productivity growth to the tune of -0.6 per cent per annum. However, the study also reported a deceleration in TFP growth from -0.3 per cent during the first sub-period (1959 to 1965) to -0.7 per cent during the second sub period (1966 to 1980). She made an observation that productivity performance in the registered manufacturing sector did not appear to have deteriorated after 1965. Further, the

author observed positive trends in capital-output ratio for the manufacturing sector over the entire study span which was interpreted as evidence in favour of the declining efficiency in factor use.

Little et al. (1987) have estimated a three-input Translog production function for five Indian industries, namely, printing, machine tools, soap, shoes and metal casting. Using the production function from cross-sectional data on firms obtained from a survey of industrial enterprises in India (belonging to the five industries mentioned above). The sample size varied from 45 in the case of metal casting to 99 in the case of shoes. On the basis of multivariate regression technique, the Translog production function and the share equations for skilled and unskilled labour have been jointly estimated. In order to obtain nonsingularity of the system, authors have dropped the share equation for capital since one of the share equations has to be dropped. It has been assumed that the disturbance term in the production function and share equations are stochastically independent so that the technique of iterative multivariate regression would yield maximum likelihood estimates of the parameter on convergence. Among the post 1980s studies, Ahluwalia (1991) is considered to be an important one. The main objective of the study was to calculate the growth rate of TFP in Indian manufacturing industries at a detailed level of disaggregation. The estimates of translog production function using pooled cross-section and time series data also showed a marked improvement in the rate of TFP growth since 1982-83. She attributed the reason for this observed "turnaround" in productivity growth in Indian manufacturing in the 1980s to liberalization of economic policies.

Singh and Ajit (1993) studied the behaviour of production function in the manufacturing industries in India from 1974-1990. This study examined the sources of growth for various industries in the manufacturing sector in India using conventional production function (C-D, CES and Translog). The study found that C-D production function perform better than other production functions and the result of the study confirms the validity of decreasing returns to scales for most of the industries in the manufacturing sector.

Tarlok and Ajit (1995) examined the production function in the manufacturing industries in India for the period 1974-90 using CD, CES and Translog and a new production function introduced by Bairam (1989). The results showed that the agro-based industries had lost their shares in manufacturing output, fixed capital and employment during the period of 1974- 90. Similar trend was observed in case of engineering industries also. While the share of chemical industries in manufacturing output, fixed capital and employment

had shown improvements. There had been an increase in the use of capital relative to that of labour in most of the manufacturing industries. Capital productivity recorded marginal improvement in 1970s followed by a decline in 1980s. On the other hand, labour productivity had shown steady improvements during 1974-90. Among the production functions, the CD and Bairam production functions performed better than CES and Translog Production Function. The study further showed that the returns to scale and elasticities of output with respect to capital and labour derived from the CD production function were more or less similar to those derived from the other production function. And that manufacturing sector of India observed decreasing returns to scale for most of the industries.

On the same lines, Srivastava (1996) studied productivity growth in Indian industry for the period 1980 to 1989. Based on RBI data, the author estimated TFPG by using both growth accounting and production function approach. While growth accounting approach showed a significant decline in TFPG from -0.35 per cent per annum during 1980-84 to -2.37 per cent per annum during 1985-89. As against this, TFPG on the basis of production function approach showed a significant improvement during the study period. On the same lines, Beghel and Pendse (1997) made an attempt to analyse the productivity trends and statistical estimation of production function and technical change in the aggregate manufacturing sector in India. The ASI data have been utilized for computing Solow and Kendrick indices of TFP growth along with partial factor productivity indices of labour, capital and raw material and econometric estimation of Cobb-Douglas, CES and VES production functions. The analysis revealed that the Indian manufacturing sector has not experienced technological change which was evident from the growth rate of TFP growth indices as well as parameters of time variable in the production functions. The excessive doses of capital have not resulted in technological progress in the Indian manufacturing sector as the capital intensity is found to be increasing all the time. The study suggested that there is a need to promote R & D efforts in the manufacturing sector of India so that it may survive in the emerging era of globalization and liberalization.

Further, Neogi and Ghosh (1998) analyzed the impact of economic reforms on the performance of four selected industry groups for a period of 1989-94. The study indicated that productivity growth and efficiency level of the selected industries have not improved in the post liberalization era. There has been a significant deceleration on TFP front in all the industries except chemical industry in the post reforms era. One another study by Pal (2002), which is based on analysis of productivity trends in the organized

manufacturing sector in India over the time period 1970-71 to 1987-88, has also estimated the contributions of TFPG and the growth of employment of combined inputs towards the growth of output. The findings concluded that the total factor productivity or the residual plays a vital role in the growth of the registered manufacturing sector of India. 28 According to the study the substantial growth of total factor productivity for the registered manufacturing sector of India during the 70s and 80s witnessed a significant technical progress. The study suggested that the reason for such a significant technical progress is diversification of Indian industry.

Manjappa and Mahesha (2008) examined the total factor productivity growth in the Indian manufacturing sector. The estimation are based on ratio form of C-D production function on the panel data of 10 manufacturing industries by classifying them into capital intensive and labour intensive industries for the period 1994 to 2004. The findings highlighted that four out of five capital intensive industries have shown productivity growth during the study period, while the one of the industries has recorded no change. On the other hand, a declining trend is noticed for three labour intensive industries and negative but insignificant in case of other two. Further, investigation revealed that capital intensive industries are doing better than labour intensive industries during the post reforms period. The study, further, found that there is a need to adapt new technology and flow of FDI towards capital intensive industries. On the same lines, Virmani and Hashim (2009) used a CES production function to estimate the determinants of factor employment, their shares and output growth during 1973-74 to 2001-02. The main findings highlights that wages play important role than that of technology in determining the employment of labour. According to the study, to enhance the employment opportunities, it is quite essential to make technology labour inductive, as the wage rate is found to be smaller than the marginal product of labour. The findings, further, reveal that capital in post reforms period till the beginning of the 2000s has been slightly underemployed. The growth in output was 82 per cent due to capital, 12 per cent due to labour and 6 per cent is due to productivity. This low performance of productivity could be attributed to heavy decline in capacity utilization following the 1990s reforms as a result of time lag between investment and output growth. The study concluded with the note that there is a need to bring adequate reforms 29 in labour laws for the sustainable growth of output besides exploring the employment opportunities. However, there are some studies which have tried to analyze the structure and performance of industrial sector of India.

Turning to the trends in productivity in the post reforms period some estimates have shown that

productivity of Indian manufacturing sector was lower as compared to 1980s (Trivedi et al., 2000). Besides, the estimates of productivity growth for aggregate (registered) manufacturing and for various two-digit industries clearly indicate the fall in rate of growth of TFP in 1990s as compared to 1980s (Goldar,2000).

Further, Misra (2006) focused on the impact of India's economic reforms on industrial structure and productivity of manufacturing industry in India over the period of 1980-81 to 2001-02. The discussion is based on the ASI data and covers both the two-digit and three digit levels of industries. The study has shown very low performance of Indian manufacturing sector and the reason attributed for such a bad performance is various policies followed under reforms regime.

Sen and Dasgupta (2006) explored the economic status of labour in the organized sector of India in the post reform era. The study has made an attempt to identify the employment conditions of labour by linking them with the growth of the respective industries. Categorizing the industry on the basis of high and low growth rate, the study reflected that employment growth has generally lagged behind output growth, in both the category of industries. Instability of employment has been prominent in industries with negative growth rates. Even the high output growth industries have failed to make any significant impact on generating employment opportunities as compared to low growth industries. On the other hand, there has been a rise in the capital labour ratio in certain industries which lead to displacement of labour in the globalization period. The study concluded with the note that process of structural changes in the economy has benefitted labour very less.

On the similar lines, the study by Das (2010) has analyzed the changing structure and performance of the Indian registered manufacturing sector from 1980-2004. With 30 the help of trend growth rates and structural ratios, the findings highlighted that during the later post reforms period i.e. during 2000-2001 to 2003-04, there has been an industrial slow down. As against this, the performance of the manufacturing sector was at its best during 1990s. The study also found that growth of employment has increased in the post liberalization period whereas for wages it has declined.

In recent years the studies on technical efficiency measurement in the manufacturing sector has attracted more attention of the researchers. Papahristodoulou (1997) examined the technical efficiency of 121 different kinds of vehicles manufactured by different enterprises from different countries. The results based on DEA indicated that manufacturing of small cars are more efficient than the larger ones. Parameswaran

(2002) analyzed the impact of economic reforms on technical efficiency of selected industries in India by using the firm level data since 1991. The results depicted that all the industries registered a high rate of technical progress in the post reforms period along with a decline in the rate of technical efficiency.

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9/24/2020