PSE ISSN 0972-379X

Economic Analyst

(UGC Listed Journal No.63338)

Vol. XXXII 2017

Editor

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PUNJAB SCHOOL OF ECONOMICS
GURU NANAK DEV UNIVERSITY
AMRITSAR-143005 (INDIA)

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Published by Dr. Karanjeet Singh Kahlon, Registrar and Printed by Dr. Harvinder Singh Saini, Professor-in-charge, Publication Bureau, Guru Nanak Dev University, Amritsar.

ISSN 0972-379X

PSE
ECONOMIC ANALYST

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ANNUAL REFEREED JOURNAL (BLIND REFERRING)

CONTENTS

PSE ECONOMIC ANALYST, VOL. XXXII, 2017

ECONOMIC REFORMS AND MALMQUIST PRODUCTIVITY ANALYSIS OF INDIAN MANUFACTURING SECTOR

Dr. Fulwinder Pal Singh and*
*Dr. Parminder Singh***

Abstract

The present paper endeavors to analyze the TFP growth trends in Indian manufacturing sector at both aggregated and disaggregated inter-state levels. Using the Malmquist productivity index for panel dataset of sixteen major industrial state during 1979-80 to 2009-10, the study observed that manufacturing sector of India is growing at 9.1 percent per annum during the entire study period. Out of Sixteen Industrial states there are five states namely; Uttar Pradesh, Madhya Pradesh, Gujarat, Orissa and Rajasthan where double digit TFP growth has been noticed. The manufacturing sector of Uttar Pradesh is growing with highest TFP growth at the rate of 12.8 percent per annum followed by Madhya Pradesh with TFP growth of 11.8 percent per annum. The analysis of the sources of the TFP growth in Indian manufacturing sector reveals that both technical progress and technical change are equally contributing TFP growth in Indian manufacturing sector. It has also been observed that at all India level efficiency change is greater than technical progress.The analysis of the impact of economic reforms on TFP growth of Indian manufacturing sector reveals that TFP growth in Indian manufacturing sector has fallen from 9.4 percent per annum during pre-reform period to 7.1 percent per annum during post-reforms period. Hence, at aggregated levels impact of economic reforms is not in a desired direction as envisaged by the policy planners of India. However, at disaggregated interstate levels the analysis rectifies that except six states, a regress in productivity performance has been observed during post-reforms period in comparison to pre-reforms period.

Since July ,1991 the major economic reforms has been undertaking in India with the twin objective of increasing productivity and competitiveness of the Indian manufacturing sector. The economic reform

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process heralded the liberalisation of Indian industrial sector from various controls and regulations. Under this process the firms were exposed to international competition which forced them to introduce new methods of production, import quality inputs along with modern technology to improve their efficiency and productivity .The industrial growth driven mainly by input growth is inevitably subject to diminishing returns to scale and may not be sustainable in the long run. Therefore, the policy makers are now pursuing the industrial growth through improvement and productivity driven strategies that lay emphasis on enhancing total factor productivity growth rather than investment driven growth.

The Government of India fully realized the socio economic significance of the manufacturing sector and thus, initiated several policy measures for its development. As a result of theses policy measures, even after the policy support for more than four decades, the manufacturing sector of India remained technologically backward and less competitive. The major problems faced by this sector relate to low factor productivity, low capacity utilization and technical inefficiency. Rapidly changing business environment due to globalisation and liberalisation has increased the role of technology and scale economies in enhancing the competitive strength of manufacturing products. There has been a shift from ëpolicy regulationí to ëmarket orientationí all over the world through liberalisation of the state controls on economic transactions. Due to globalisation all the economies are becoming highly integrated which posed a significant challenges to the individual enterprises.

In this context an attempt has been made in this paper to analyse the impact of economic reform process on the technical progress and total factor productivity growth (TFGP) of Indian manufacturing sector at state level and to test the convergence hypothesis in indian manufacturing sector. The required data both at all India level and for 16 major states for the present study have been culled out from the various issues of Annual Survey of Industries (ASI) for the period 1979-80 to 2009-10. The choice of terminal year is governed by the availability of latest comparable data from the Central Statistical Organisation (CSO). To present the discussion in lucid way, the whole paper has been divided into four broad sections. Section-I presents non-parametric Malmquist productivity index (MPI) based on Data Envelopment Analysis (DEA) approach to compute TFPG rates. In the Section-II, the empirical results relating with the inter-state variations in TFP growth of Indian manufacturing sector have been discussed. Section-III deals with the test of convergence hypothesis in

Indian manufacturing sector, whereas, the final section concludes the discussion along with certain policy implications

Section ñ I

This section presents the methodology relating with the computation of TFP growth rates in Indian manufacturing sector at disaggregated levels. The conventional technique for estimating TFP is Solow residual method. But due to various limitations of solow residual methods in the present paper. The estimates of TFP growth have been obtained by using non-parametric Malmquist productivity index approach developed by fare et al.(1994)

Fare, et. al. (1994) avoid choosing an arbitrary benchmark technology by specifying their Malmquist productivity change index as the geometric mean of the indexes shown in equations (2) and (3). That is:

$$M_0(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D^t{}_0(x^{t+1}, y^{t+1})}{D^t{}_0(x^t, y^t)} \quad \frac{D_{t+10}(x_{t+1}, y_{t+1})}{D_{t+1}{}_0(x^t, y^t)} \quad \frac{1}{2} \qquad (1)$$

$$\frac{D^t{}_0(x^{t+1}, y^{t+1})}{M_0 D_{(x^t{}_0{}^+(1}x, y^t{}^+ y^1, {}^t x)^t, y^t)} = \frac{{}^t{}_0 \quad {}^{t+1} \quad {}^{t+1})}{{}^t \quad {}^t \quad {}^t)} \quad \cdot \frac{{}^t{}_0 \quad {}^{t+1} \quad {}^{t+1}}{{}^{t+1} \quad {}^{t+1} \quad {}^{t+1}} \quad \frac{{}^t{}_0 \quad {}^t \quad {}^t}{{}^{t+1} \quad {}^t \quad {}^t} \qquad (2)$$

Fare, et. al. (1994) give the following interpretation to the two terms on the right hand side of equation (2):

$$\text{Efficiency change} = \qquad (3)$$

$$\text{Technical change} = \frac{D^t{}_0(x^{t+1}, y^{t+1})}{D_{t+1}(x^{t+1}, y^{t+1})} \quad \frac{D^t{}_0(x^t, y^t)}{D_{t+1}(x^t, y^t)} \quad \frac{1}{2} \qquad (4)$$

Hence, the Malmquist productivity index they derive is simply the product of the change in relative efficiency that occurred between periodís t and t+1, and the change in technology that occurred between periods t and t+1

Section ñ II

This section presents an analysis of inter-temporal and interstate comparisons of TFP in the manufacturing sector of sixteen states in India during the period 1979-80 to 2009-10. Beside this, an attempt has also been made to evaluate the impact of industrial reforms and deregulatory policy regime on TFP growth. This has been captured by analyzing the variation in TFP growth rates during two distinct sub periods. Following, Goldar (2004), Ray (2002) and Kumar (2003), the entire study period has been bifurcated into two distinct sub-periods: (i) Pre-Reforms Period (1979-80 to 1990-91) (ii) Post-Reforms period (1991-92 to 2009-10). The TFP growth rates for the manufacturing sector at the state and all India levels for 1979-80 to 2009-10 have been estimated with the help of following formula:

$$TFPG_1 = (MALMINDEX_1 - 1) \cdot 100 \quad (5)$$

Where, $MALMINDEX_i$ is the Malmquist Productivity index for i^{th} state. The same procedure has been extended to compute the growth rates of component measures of Malmquist productivity index.

Table 1, 4 and 5 shows the component measures of Malmquist TFP index in the entire study period (1979-80 to 2009-10), pre-reforms period (1979-80 to 1990-91) and post-reforms period (1991-92 to 2009-10) respectively. From table 1, it can be observed that TFP growth of Indian manufacturing sector is 9.1 percent per annum during the entire study period. Out of sixteen industrial states there are five states namely; Uttar Pradesh, Madhya Pradesh, Gujrat, Orissa and Rajasthan where double digit TFP growth has been noticed. Manufacturing sector of Uttar Pradesh is growing with highest TFP growth at the rate of 12.8 percent per annum followed by Madhya Pradesh with TFP growth of 11.8 percent per annum. These growth rates for Gujarat, Orissa and Rajasthan are 11.7 percent, 11.2 percent and 10.8 percent respectively. Hence, these five states are significantly contributing TFP growth in manufacturing sector of India. Further, industrial states of Delhi, Maharashtra and Andhra Pradesh are operating with average annual growth rate of TFP above 9 percent per annum, however, another industrially developed states of West Bengal have been observed laggard of the sample with lowest TFP growth at the rate of 4.7 percent per annum.

The analysis of the sources of the TFP growth in Indian manufacturing sector reveals that both technical progress and technical change are equally contributing TFP growth in sector under consideration. Table 2 reveals that at all India level efficiency change is greater than

technical progress. Hence, during the entire study period efficiency change is a major source of TFP growth. However, there are exception in which technical progress is a deriving forces of productivity improvement, in the states like Bihar, Madhya Pradesh, Orissa, Rajasthan and West Bengal.

It is well known fact that manufacturing sector of a state is innovative in nature if it is identified technically efficient in a given year and also shifts its production frontier upward in succeeding years. Table 3 highlights that during entire study period state of Maharashtra has been observed most innovative state. Manufacturing sector of Maharashtra has shifted its frontier upward in thirteen year out of total study period of twenty nine years. Delhi shares second rank with Maharashtra given that it has shifted production frontier eight times. The manufacturing sector of Bihar ranked at 3rd place with five time frontier shift, moreover, in five state where dominance of technical progress has been observed. Innovations are found to be present only in two states namely; Bihar and Madhya Pradesh and among these two states Bihar dominate Madhya Pradesh.

To analyze the impact of economic reforms on TFP growth of Indian manufacturing sector the entire study period has been bifurcated into two sub periods namely pre-reforms period (1979-80 to 1990-91) and post-reforms period (1991-92 to 2009-10). Table 4 and 5 provides productivity growth summary of manufacturing sector of India at both aggregated and disaggregated levels. The comparison of productivity growth during two sub periods reveals that TFP growth in Indian manufacturing sector has fallen from 9.4 percent per annum during pre-reforms period to 7.1 percent per annum during post-reforms period. Hence, at aggregated levels impact of economic reforms is not in a desired direction as envisaged by the policy planners of India.

However, at disaggregated interstate level an improvement has also been observed at the productivity front among different states. These states are Andhra Pradesh, Gujrat, Haryana, Punjab and West Bengal. Along with these states a mild improvement has also been observed in Kerala where TFP growth has been observed accelerated from 5.4 percent per annum during pre-reforms period to 5.8 percent per annum during post-reforms period. Except these six states, regress in productivity performance has been observed during post-reforms period in comparison to pre-reforms period.

To analyze the factors causing TFP regress among Indian states the analysis of impact of economic reforms on sources of TFP has been performed. The analysis revealed that at all India level reduction in the

rate of technical progress from 6.9 percent per annum during pre-reform period to 1.8 percent per annum during post reform period, is the major factor responsible for productivity regress during the second sub period. However, at efficiency front an improvement has been noticed from 2.4 percent per annum during pre-reforms period to 5.2 percent per annum during the post reforms period.

The interstate analysis reveals that among all the states under evaluation a regress in the growth rate of technical progress has been observed during the post reforms in comparison to pre-reforms period. Whereas at efficiency front except four states namely; Assam, Bihar, Delhi and Orissa an efficiency improvement has been observed during the second sub period in comparison to first sub period. Even among these four states, the manufacturing sector of Orissa has witnessed mild reduction in the growth rate of efficiency from 3.2 percent per annum during pre-reform period to 3.1 percent per annum during post-reform period. Therefore, at efficiency front the impact of economic reforms has been observed positive whereas at technology front an adverse impact has been noticed.

The analysis of Table 6 and Table 7 reveals that trend of source dominance has totally been reversed during the post-reform period in comparison of pre-reform period. During pre-reform period except the manufacturing sector of Delhi, technical progress dominating efficiency change among remaining fifteen major manufacturing states. Whereas during second sub period technical progress dominates only in the state of Assam, Bihar and Orissa. Except these three states observed TFP improvement is efficiency dominating during the post reform period. The direct connotation of this evidence is that despite of increasing competition due to the industrial explorer to international market learning by doing process has been strengthen. The producer is aware about the fact that production efficiency will ensure its fitness in international market and will ensure its survival in the era of liberalization, if producer will not produce efficiently, he will be thrown out of the competition. In sum, efficiency change is of major concern during the reformed era to be competitive in the global market.

Table 8 highlights number of times a state caused an outward shift in the frontier during the pre and post-reform period. It can be seen from Table 8 that the number of innovative states has been doubled during the post-reform period. During pre-reform period there were only three states namely Bihar, Delhi and Maharashtra which shifted frontier outward. However, during post-reform period number has been doubled and three

more innovators namely; Gujrat, Haryana and Madhya Pradesh accompany the aforementioned three innovators of pre-reforms period. Hence, the reform process has also accelerated the innovation process which is generally efficiency oriented in nature.

TABLE 1
Productivity Index of Indian Manufacturing Sector in the Entire Period (1979-80 to 2009-10)

States	***TCH***	***ECH***	***Malmindex***
Andhra pradesh	1.031	1.058	1.090
Assam	1.033	1.033	1.067
Bihar	1.065	1.013	1.078
Delhi	1.023	1.072	1.096
Gujarat	1.052	1.062	1.117
Haryana	1.040	1.052	1.093
Karnataka	1.030	1.055	1.086
Kerala	1.022	1.044	1.067
Maharashtra	1.040	1.051	1.092
Madhya Pradesh	1.058	1.057	1.118
Orissa	1.067	1.042	1.112
Punjab	1.040	1.051	1.092
Rajasthan	1.055	1.051	1.108
Tamilnadu	1.034	1.036	1.071
Uttar Pradesh	1.047	1.077	1.128
West Bengal	1.032	1.015	1.047
All India*	1.042	1.048	1.091

Notes: i) TCH stands for technical change; ii) ECH stands for efficiency change; iii)MALMINDEX stands for Malmquist Total Factor Productivity change Index; and * refers to average of selected sixteen states.

Source: Authorís Calculations.

TABLE 2

Comparison Between Technical Efficiency Change and Technological Change (1979-80 to 2009-10).

States	***Tech.Ch.>Effi.Ch***
Andhra Pradesh	No
Assam	Equal
Bihar	Yes
Delhi	No
Gujarat	No
Haryana	No
Karnataka	No
Kerala	No
Maharashtra	No
Madhya Pradesh	Yes
Orissa	Yes
Punjab	No
Rajasthan	Yes
Tamilnadu	No
Uttar Pradesh	No
West Bengal	Yes
All India*	No

Note : * refers to the average of sixteen major states.

Source: Authorís Calculations.

TABLE 3

Number of Times a State Caused an Outward Shift in the Frontier

State	***Entire Period Frequency***
Andhra Pradesh	00
Assam	00
Bihar	05
Delhi	08
Gujarat	02
Haryana	02
Karnataka	00
Kerala	00
Maharashtra	13
Madhya Pradesh	01
Orissa	00
Punjab	00
Rajasthan	00
Tamilnadu	00
Uttar Pradesh	00
West Bengal	00

Source : Authorís Calculations.

TABLE 4

Productivity Index of Indian Manufacturing Sector in the Pre-reform Period (1979-80 to 1990-91)

States	*TCH*	*ECH*	*Malmindex*
Andhra pradesh	1.060	1.009	1.069
Assam	1.059	1.052	1.113
Bihar	1.090	1.028	1.120
Delhi	1.051	1.074	1.128
Gujarat	1.072	1.019	1.091
Haryana	1.075	0.999	1.073
Karnataka	1.051	1.034	1.086
Kerala	1.055	0.999	1.054
Maharashtra	1.064	1.028	1.093
Madhya Pradesh	1.088	1.054	1.146
Orissa	1.088	1.032	1.122
Punjab	1.073	0.994	1.066
Rajasthan	1.090	1.010	1.100
Tamilnadu	1.060	1.006	1.066
Uttar Pradesh	1.077	1.067	1.149
West Bengal	1.056	0.971	1.025
All India*	1.069	1.024	1.094

Notes: i)TCH stands for technical change; ii)ECH stands for efficiency change; iii)MALMINDEX stands for Malmquist Total Factor Productivity change Index; and

*refers to average of selected sixteen states.

Source: Authorís Calculations.

TABLE 5

Productivity Index of Indian Manufacturing Sector in the Post-reform Period (1991-92 to 2009-10)

States	*TCH*	*ECH*	*Malmindex*
Andhra Pradesh	1.006	1.081	1.087
Assam	1.009	0.995	1.004
Bihar	1.043	0.979	1.021
Delhi	0.998	1.051	1.048
Gujarat	1.035	1.081	1.118
Haryana	1.010	1.080	1.091
Karnataka	1.012	1.053	1.065
Kerala	0.994	1.065	1.058
Maharashtra	1.019	1.051	1.070
Madhya Pradesh	1.032	1.072	1.106
Orissa	1.048	1.031	1.080
Punjab	1.010	1.083	1.094
Rajasthan	1.024	1.068	1.093
Tamilnadu	1.012	1.041	1.053
Uttar Pradesh	1.021	1.067	1.107
West Bengal	1.011	1.034	1.045
All India*	1.018	1.052	1.071

Notes: i)TCH stands for technical change; ii)ECH stands for efficiency change; iii)MALMINDEX stands for Malmquist Total Factor Productivity change Index; and * refers to average of selected sixteen states.

Source: Authorís Calculations.

TABLE 6

Comparison Between Technical Efficiency Change and Technological Change in Pre-Reform Period

(1979-80 to 1990-91).

States	***Tech.Ch.>Effi.Ch***
Andhra Pradesh	Yes
Assam	Yes
Bihar	Yes
Delhi	No
Gujarat	Yes
Haryana	Yes
Karnataka	Yes
Kerala	Yes
Maharashtra	Yes
Madhya Pradesh	Yes
Orissa	Yes
Punjab	Yes
Rajasthan	Yes
Tamilnadu	Yes
Uttar Pradesh	Yes
West Bengal	Yes
All India*	Yes

Note: * refers to the average of sixteen major states.

Source: Authorís Calculations.

TABLE 7

Comparison Between Technical Efficiency Change and Technological Change in Post Reform Period

(1991-92 to 2009-10).

States	***Tech.Ch.>Effi.Ch***
Andhra Pradesh	No
Assam	Yes
Bihar	Yes
Delhi	No
Gujarat	No
Haryana	No
Karnataka	No
Kerala	No
Maharashtra	No
Madhya Pradesh	No
Orissa	Yes
Punjab	No
Rajasthan	No
Tamilnadu	No
Uttar Pradesh	No
West Bengal	No
All India*	No

Note: * refers to the average of sixteen major states.

Source: Authorís Calculations.

TABLE 8

Number of Times a State Caused an Outward Shift in the Frontier

State	*Pre-Reform Frequency*	*Post-Reform Frequency*
Andhra Pradesh	00	00
Assam	00	00
Bihar	03	02
Delhi	02	06
Gujarat	00	02
Haryana	00	02
Karnataka	00	00
Kerala	00	00
Maharashtra	08	05
Madhya Pradesh	00	01
Orissa	00	00
Punjab	00	00
Rajasthan	00	00
Tamilnadu	00	00
Uttar Pradesh	00	00
West Bengal	00	00

Source : Authorís Calculations.

Section ñ III

In the empirical literature on international productivity convergence, the catching-up hypothesis is one of the most important factors of the convergence process. According to this hypothesis, states should experience higher growth rates when they are initially located far below the production frontier. In other words, catching-up hypothesis implies a negative relationship between initial efficiency/productivity levels and subsequent efficiency/productivity growth rates. However, as noted by most of these traditional tests establish necessary but not sufficient conditions for convergence. In fact, if analysis of productivity rate dispersion is applied, it is not possible to determine whether the levels of productivity converge in long run. In order to investigate the convergence more deeply, it is necessary to compute the initial levels of the technical efficiency and technical efficiency change obtained by means of the DEA model.

There are three types of convergence, with cross-section data, convergence involves the investigation of relationship between growth rates and initial efficiency/productivity levels. Unconditional or absolute , convergence exists when regressing a growth measure, such as efficiency change, on initial efficiency gives a negative and significant coefficient. If other, conditioning variables are included, they should be jointly insignificant, for absolute convergence to hold. Conditional convergence will also require a negative coefficient on initial efficiency, after controlling for the effects of other explanatory variables, at least some of which prove to be significant.

However, a negative relationship between growth rates and initial efficiency/productivity does not guarantee a reduction in the dispersion of the log of TFP, because a negative relationship is only a necessary and not a sufficient condition for less dispersion. This is called Û convergence. The movement of the cross-section variance of TFP over time will reflect both the evolution of dispersion of the state-specific equilibrium and the rate of adjustment within each state. In this case, if steady states are assumed to differ, the third notion of convergence is whether each state is converging to its own steady-state equilibrium in the time series dimension of the data. The definition of convergence is whether effects of shocks persist and whether output levels tend to return to a long-run equilibrium. (Arora, 2005)

The above analysis of total factor productivity growth is though quite useful for regional policy perspectives yet does not answer the question: whether a convergence in productivity has taken place after the

adoption of economic reform package or not? In order to explore an answer of this question, we estimate following regression equations:

$$AECH_{1979\text{-}91} = \alpha_1 + \beta_1 Effi_{1979\text{-}80} + \varepsilon_1 \quad (6)$$

$$AECH_{1991\text{-}2010} = \alpha_2 + \beta_2 Effi_{1991\text{-}92} + \varepsilon_2 \quad (7)$$

$$AECH_{1979\text{-}2010} = \alpha_3 + \beta_3 Effi_{1979\text{-}80} + \varepsilon_3 \quad (8)$$

TABLE 9

β-Convergence Regression Results in Indian Manufacturing Sector

PRE-REFORM PERIOD (1979-80 TO 1990-91)

$AECH_{1979\text{-}1991}$ **= 1.062 0.112** $Ei_{1979\text{-}80}$

(30.17) (-3.62) R^2=0.60, F=8.45

POST-REFORM PERIOD (1990-91 TO 2009-10)

$AECH_{1991\text{-}2010}$ **= 1.51 0.075*** $Ei_{1991\text{-}92}$

(25.32) (-1.47) R^2=0.40, F=4.51

ENTIRE PERIOD (1979-80 TO 2009-10)

$AECH_{1979\text{-}2010}$ **= 1.03 0.052** $Ei_{1979\text{-}80}$

(29.97) (-1.38) R^2=0.55, F=3.45

Notes: i) Figures in the parentheses of type ( ) are the t-values; ii)* indicates that coefficient is significant at 5 percent level of significance.

Source: Authorís Calculations.

Where, *AECH* is Average Efficiency Change over the period 1979-80 and 1991-2010 respectively and *Effi* is the initial efficiency level in pre-reforms period (1980-81 to 1990-91) in equation 6 and post-reforms period (1991-92 to 2009-10) in equation 7, equation 8 is related with the entire study period.

The ·s and ,s are the regression coefficients and Âs are error terms. In the equations $Effi_{1980\text{-}81}$ and $Effi_{1991\text{-}92}$ have been utilized as the

ëcatch-up potentialsí to analyze the convergence in the efficiency/ productivity gaps. Our convergence or ëcatching-upí hypothesis states that states with low initial efficiency should experience high average efficiency change in the whole period i.e. inter-state differences in efficiency declines. Thus, a negative sign of regression coefficients of ,s would imply that the convergence in efficiency/productivity gaps is taking place. The estimated regression equations are given in Table 9.

Table 9 indicates that catching-up is significant in pre-reform period i.e., estimated value of ,1 is negative and significant at 5 percent level of significance. Therefore, we conclude, in pre-reforms period, states with low initial efficiency level experienced high efficiency change in period 1979-80 to 1990-91. On the other hand, in the post-reforms period estimated value of ,2 is negative indicating the negative relationship between initial efficiency (efficiency in year 1991-92) and efficiency change. However, the coefficient of ,2 turns out to be insignificant in the post-reforms period. Therefore, convergence is insignificant in post-reforms period. This result shows that reforms of 1991 do not improve the industrial efficiency and productivity of backward or low efficiency states. However, the protectionist pre-reform period was much better for the states in which they were converging to the efficiency of more efficient states.

Similarly, for the entire study period (1979-80 to 2009-10) it was found that estimated value of ,3 is negative but insignificant. Therefore, in entire study period convergence has been found to be almost missing i.e., the states do not significantly converge towards the efficiency of industrially efficient states. As described above that ,-convergence is necessary but not sufficient, therefore, Û-convergence has been examined by regressing cross sectional variance of efficiency over time. Considering following regression equation (9) to detect Û-convergence:

$$\sigma_t^2 = \alpha_4 + \beta_4 t + \varepsilon_t \qquad (9)$$

Where, σ_t^2 is cross sectional variance of efficiency i.e. variance of efficiency of 16 states, *t* is the time variable varies from 1,2,Ö.,31 are the parameters of regression and is white noise stochastic disturbance term. For the Û-convergence to exist estimated value of , should be negative and significant.

Table 10 indicates that in the pre-reforms period the estimated value of is negative but insignificant. Therefore, in pre-reforms period the variance of efficiency among states did not converge significantly. On the other hand in post-reforms period Indian states have experienced

divergence at the place of convergence because the fitted regression reveals the positive sign of in post-reform period and the value turns out to be significant. Thus, the empirical analysis showed that reform process has negative impact on Indian manufacturing sector.

TABLE 10

α-Convergence Regression Results in Indian Manufacturing Sector

PRE-REFORM PERIOD (1979-80 TO 1990-91)	
$\alpha 2_{t(1979\text{-}1991)} = 0.114$	$0.010t_{(1979\text{-}91)}$; t=1,2,ÖÖ,12
(2.674) (-1.395)	R^2=0.42, F=2.953
POST-REFORM PERIOD (1990-91 TO 2009-10)	
$\alpha 2_{t(1991\text{-}2010)} = 0.031$	$0.002*t_{(1991\text{-}2010)}$; t=1,2,ÖÖ,19
(6.467) (2.028)	R^2=0.401, F=5.919
ENTIRE PERIOD (1979-80 TO 2009-10)	
$\alpha 2_{t(1979\text{-}2010)} = 0.051$	$0.003t_{(1979\text{-}2010)}$; t=1,2,ÖÖ,31
(2.380) (-1.312)	R^2=0.510, F=1.475

Notes: i) Figures in the parentheses of type ( ) are the t-values; ii)* indicates that coefficient is significant at 5 percent level of significance.

Source: Authorís Calculations.

Section ñ IV

To check the growth robustness of Indian manufacturing sector the total factor productivity (TFP) growth have been analysed with the help of Malmquist productivity index (MPI). The use of MPI has been preferred over traditional non-frontier techniques given the property of MPI that it decomposes the TFP into two mutually exclusive and non-additive components namely, efficiency change (indicator of catching-up) and technological change (indicator of shift in production function). However,

the non-frontier techniques assume that all firms are different and thus, TFP is the outcome of frontier shift or technological change only.

The present paper endeavors to analyze the TFP growth trends in Indian manufacturing sector at both aggregated and disaggregated inter-state levels. Using the Malmquist productivity index for panel dataset of sixteen major industrial state during 1979-80 to 2009-10, the study observed that manufacturing sector of India is growing at 9.1 percent per annum during the entire study period. Out of Sixteen Industrial states there are five states namely; Uttar Pradesh, Madhya Pradesh, Gujarat, Orissa and Rajasthan where double digit TFP growth has been noticed. The manufacturing sector of Uttar Pradesh is growing with highest TFP growth at the rate of 12.8 percent per annum followed by Madhya Pradesh with TFP growth of 11.8 percent per annum. The analysis of the sources of the TFP growth in Indian manufacturing sector reveals that both technical progress and technical change are equally contributing TFP growth in Indian manufacturing sector. It has also been observed that at all India level efficiency change is greater than technical progress.

The analysis of the impact of economic reforms on TFP growth of Indian manufacturing sector reveals that TFP growth in Indian manufacturing sector has fallen from 9.4 percent per annum during pre-reform period to 7.1 percent per annum during post-reforms period. Hence, at aggregated levels impact of economic reforms is not in a desired direction as envisaged by the policy planners of India. However, at disaggregated interstate levels the analysis rectifies that except six states, a regress in productivity performance has been observed during post-reforms period in comparison to pre-reforms period.

To analyze the factors causing TFP regress among Indian states, an analysis of impact of economic reforms on sources of TFP has been performed. The analysis revealed that at all India level reduction in the rate of technical progress from 6.9 percent per annum during pre-reforms period to 1.8 percent per annum during post reforms period, is the major factor responsible for productivity regress during the post-reforms period. However, on efficiency front an improvement has been noticed from 2.4 percent per annum during pre-reforms period to 5.2 percent per annum during the post reforms period. The interstate analysis revealed that among all the states under consideration a regress in the growth rate of technical progress is a major source of sluggishness in productivity performance during the post-reforms period in comparison to the pre-reforms period.

The results also showed that in pre-reforms period, the variance of efficiency among states did not converge significantly whereas, in the post-reforms period Indian states experienced divergence in place of convergence. Thus, the policy framework needs to encourage R&D activity and build-in-house capability for product and process innovations to compete internationally in the reform era. On the other hand, the regress in technical progress can checked by importing the foreign technology and adapting it to suit the local requirements. This will serve the twin objectives of increasing productivity and competitiveness of Indian manufacturing sector during globalized regime.

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PSE ECONOMIC ANALYST, VOL. XXXII, 2017

ECONOMIC DEVELOPMENT AND INEQUALITY IN INDIA: AN INTER-STATE ANALYSIS

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Abstract

This paper evaluates the relative performance of Indian states on the issues of education, health, sanitation, nutrition and economic variables. The trend in regional inequality has been examined by estimating the coefficient of variation (C.V.) of the indicators across states. On the basis of the estimated coefficient of variation of the indicators, study found that regional disparities in education and health have been declining over the period of time, but there is a clear evidence of an increasing trend in the regional disparity in per capita income and proportion of population below poverty line. Based on these socio-economic variables, Composite Development Index for the year 2001 and 2011 has been constructed for 28 states by using the weights calculated from Principal Component Analysis. It was found that the ranks of 28 Indian states according to composite development index did not remain same in 2011 as compared to 2001. Bihar was the worst performing state followed by Orissa, Jharkhand, Uttar Pradesh and Chhattisgarh. On the other hand, Kerala was the best performing state in 2001 followed by Goa, Mizoram, Nagaland and Himachal Pradesh. Further in the year 2011, again Bihar remained the worst performing state followed by Jharkhand, Uttar Pradesh, Madhya Pradesh and Chhattisgarh. Goa was at the top in terms of composite development index, followed by Kerala, Mizoram, Sikkim and Himachal Pradesh for the year 2011. The study concludes that not much change has occurred in the ranks of the states, as the worst performing states in 2001 like Bihar, Orissa, Jharkhand, Uttar Pradesh and Chhattisgarh are at the bottom and best performing states remained at the top in 2011 as well. However, the regional disparities have declined over time as indicated by the coefficient of variation of the Composite Development Index which decreased during 2001- 2011.

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Introduction

Economic development is a matter of primary concern for almost every nation of the world including India. Economists view development as a means of improving standards of living and quality of life. ìDevelopment is about improving the well-being of people. Raising living standards and improving education, health and equality of opportunity are essential elements of economic Developmentî (World Bank 1992). Thus economic development is a multi-dimensional phenomenon involving major changes in the social structure, popular attitudes and national institutions as well as the acceleration of economic growth, the reduction of inequality and the eradication of poverty. The study of economic development has become a part and parcel of economic theory. Regional disparities in the level of economic growth experienced in India is a major challenge for policy makers and planners, as it produces serious threat to the socio-political harmony of the country. States have experienced different pace of economic growth, with some states showing fast progress and other languishing behind, although the national growth has been remarkable for the past two decades (Dholakia, 2003; Sach et al., 2002).

The present study has been undertaken to examine the trend in regional inequality and to analyze and compare the position of 28 Indian states on the basis of education, health, nutrition, sanitation and economic indicators, for which the Composite Development Index has been constructed for the year 2001 and 2011.

Database and Methodology

The aim of the present study is to evaluate the relative performance of Indian states on the issues of education, health, sanitation, nutrition and economic variables. The trend in regional inequality has been examined by estimating the coefficient of variation (CV) of the indicators across states. Based on below mentioned socio-economic variables, we have computed the Composite Development Index for which secondary data were needed. The data on education, health, sanitation, nutrition and economic variables for 28 Indian states were collected from various publications like National Human Development Report (2001), Indian Census 2011, Economic Survey 2012-13 and Data Book for the use of Deputy Chairman (Planning Commission 2012).

The analysis has been carried out for the year 2001 and 2011.

Selected Variables

Basically, 10 variables were used in the study for analysis and construction of Composite Development Index for the year 2001 and 2011. These variables are

i. Literacy Rate. (+)
ii. Female Literacy Rate. (+)
iii. Gross Enrolment Ratio. (+)
iv. Per Capita Net State Domestic Product at constant 2004-05 Prices. (+)
v. Proportion of Population below Poverty Line. (-)
vi. Infant Mortality Rate. (-)
vii. Percentage of Undernourished Children Proxied by Weight for Age Below -2SD (-)
viii. Percentage of Households with Access to Tap Water. (+)
ix. Percentage of Households with Access to Electricity. (+)
x. Percentage of Households without Access to Toilet Facility. (-)

The indicators used in the study were of two types i.e. either having positive or negative impact on the index and the same has been shown in brackets alongside the indicators. In view of type of an indicator (positive or negative), the best and worst cases were determined by considering all the observations.

In order to develop these indices weights were assigned to different indicators, which were derived through ëPrincipal Component Analysisí. The Principal Component Analysis used to determine the relative individual or group indicator weights is the inter-correlation between them, high weights being assigned to those having high contribution and vice-versa. The Principal Component Analysis (Factor Analysis) produces Components (Factors) in descending order of their importance and factor loadings, which explain the relative importance of different variables in explaining variance in the phenomenon. Another important feature of this technique is that it bypasses the problem of multi-collinearity. (Harman, 1967)

The selected variables are first normalized; the following formula was used to obtain normalized values:

$$Z_{ij} = 1 - \frac{\{\text{Best } x_i - \text{Observed } x_{ij}\}}{\{\text{Best } x_i - \text{Worst } x_i\}}$$

Normalized values always lie between 0 and 1. The relative weight for the variables is worked out as follows:

$W_i = F_{ik} \lambda_k$

Wi is weight of i^{th} variable

F_{ik} is factor loading of i^{th} variable and k^{th} factor which reflects the highest correlation between variable (X_i) and factor (F_k)

λ_k is variation explained by k^{th} factor

By using the normalized values of variables and their relative weights, Composite Development Index is calculated as under:

I_j is Index of j^{th} state

Z_{ij} is normalized value of i^{th} variable for j^{th} state

$\sum w_i$ is sum of the weights

Results and Discussion

Literacy rate is considered as one of the most important indicator of economic development. Literacy adds value to a personís life and plays a crucial role in his/her overall development. Indian government has adopted various policies and programmes to achieve 100 percent literacy. Despite considerable improvement in the literacy status, India is a home to the largest number of illiterate people in the world. The relative performance of Indian states on the basis of literacy rate has been given in table 1. A review on the performance of states in terms of literacy rate reveals that in India, at the national level, literacy rate increased from 64.84 percent in 2001 to 74.04 percent in 2011. Kerala remains the best performing state over the entire period, whereas Bihar, the worst performer (from 2001 to 2011) among the states. Although the literacy rate improved in all the states, still there were wide inter-state variations from 90.86 percent to 47 percent in 2001 and 93.91 percent to 63.82 percent in 2011. The best performing states like Kerala, Goa, Maharashtra and Tamil Nadu remains the best and the worst performing states like Bihar, Rajasthan and Uttar Pradesh remains the worst, but the inter-state variations have declined over the period as is revealed by the coefficient of variation. Coefficient of variation declined from 14.91 percent in 2001 to 10.17 percent in 2011 reveals that the poor states are catching up with the rich ones in terms of literacy rate.

Results and Discussion

TABLE 1

Literacy Rate

State	***2001***	***2011***
Andhra Pradesh	60.47 (22)	67.66 (24)
Arunachal Pradesh	54.34 (26)	66.95 (27)
Assam	63.25 (19)	73.18 (19)
Bihar	47 (28)	63.82 (28)
Chhattisgarh	64.66 (17)	71.04 (20)
Goa	82.01 (3)	87.4(4)
Gujarat	69.14 (11)	79.31 (12)
Haryana	67.91 (14)	76.64 (15)
Himachal Pradesh	76.48 (5)	83.78 (5)
J and k	55.52 (25)	68.74 (23)
Jharkhand	53.56 (27)	67.63 (25)
Karnataka	66.64 (15)	75.6 (16)
Kerala	90.86 (1)	93.91 (1)
State	**2001**	**2011**
Madhya Pradesh	63.74 (18)	70.63 (21)
Maharashtra	76.88 (4)	82.91 (6)
Manipur	70.53 (9)	79.85 (10)
Meghalaya	62.56 (21)	75.48 (17)
Mizoram	88.8 (2)	91.58 (2)
Nagaland	66.59 (16)	80.11 (9)
Orissa	63.08 (20)	73.45 (18)
Punjab	69.65 (10)	76.68 (14)
Rajasthan	60.41 (23)	67.06 (26)
Sikkim	68.81 (12)	82.2(7)
Tamil Nadu	73.45 (6)	80.33 (8)
Tripura	73.19 (7)	87.75 (3)
Uttar Pradesh	56.27 (24)	69.72 (22)
Uttarakhand	71.62 (8)	79.63 (11)
West Bengal	68.64 (13)	77.08 (13)
India	64.84	74.04
CV (%)	**14.91**	**10.17**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation.

Source: Economic Survey 2012-13.

Variation

TABLE 2
Female Literacy Rate

State	***2001***	***2011***
Andhra Pradesh	51.17 (20)	59.74 (22)
Arunachal Pradesh	44.24 (24)	59.57 (23)
Assam	56.03 (18)	67.27 (17)
Bihar	33.57 (28)	53.33 (27)
Chhattisgarh	52.4 (19)	60.59 (20)
Goa	75.51 (3)	81.84 (4)
Gujarat	58.6 (15)	70.73 (14)
Haryana	56.31 (17)	66.77 (18)
Himachal Pradesh	68.08 (4)	76.6 (6)
J and k	41.82 (26)	58.01 (25)
Jharkhand	39.38 (27)	56.21 (26)
Karnataka	57.45 (16)	68.13 (16)
Kerala	87.86 (1)	91.98 (1)
Madhya Pradesh	50.28 (22)	60.02 (21)
Maharashtra	67.51 (5)	75.48 (8)
Manipur	59.7 (14)	73.17 (11)
Meghalaya	60.41 (11)	73.78 (10)
Mizoram	86.13 (2)	89.4 (2)
Nagaland	61.92 (9)	76.69 (5)
Orissa	50.97 (21)	64.36 (19)
Punjab	63.55 (8)	71.34 (12)
Rajasthan	44.34 (23)	52.66 (28)
Sikkim	61.46 (10)	76.43 (7)
Tamil Nadu	64.55 (7)	73.86 (9)
Tripura	65.41 (6)	83.15 (3)
Uttar Pradesh	42.98 (25)	59.26 (24)
Uttarakhand	60.26 (12)	70.7 (15)
West Bengal	60.22 (13)	71.16 (13)
India	54.16	65.46
CV (%)	**21.93**	**14.80**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation

Source: Census of India, 2011

The state-wise data reported in table 2 shows that the female literacy rate increased in all the states during the period 2001 to 2011. Female literacy rate, in India, at the national level, increased from 54.16 percent in 2001 to

65.46 percent during 2011. The coefficient of variation declined from 21.93 percent in 2001 to 14.80 in 2011 reveals that the trend of disparity has decreased over the period of time in terms of female literacy rate.

TABLE 3
Gross-Enrolment Ratio (6-13 Years)

State	***2001-02***	***2010-11***
Andhra Pradesh	82.47 (22)	92 (24)
Arunachal Pradesh	98.82 (5)	152 (3)
Assam	99.54 (4)	84 (28)
Bihar	59.69 (27)	102.9 (18)
Chhattisgarh	97.89 (7)	109.4 (12)
Goa	65.55 (26)	101 (19)
Gujarat	102.25 (2)	107.2 (14)
Haryana	72.53 (24)	90.5 (25)
Himachal Pradesh	91.02 (15)	111 (10)
Jammu & Kashmir	84.41 (21)	104.2 (16)
Jharkhand	68.63 (25)	121 (7)
Karnataka	97.53 (9)	99.3 (21)
Kerala	90.16 (16)	96.2 (23)
Madhya Pradesh	91.55 (14)	122.6 (6)
Maharashtra	101.5 (3)	100 (20)
Manipur	91.65 (13)	155 (1)
Meghalaya	94.26 (11)	153.6 (2)
Mizoram	105.21 (1)	150.7 (4)
Nagaland	89.72 (19)	85.4 (27)
Orissa	92.03 (12)	104.8 (15)
Punjab	72.55 (23)	103.1 (17)
Rajasthan	98.48 (6)	99.3 (21)
Sikkim	97.72 (8)	123.8 (5)
Tamil Nadu	95.73 (10)	112 (9)
Tripura	89.93 (18)	115.4 (8)
Uttar Pradesh	54.1 (28)	109.5 (11)
Uttarakhand	90.16 (16)	107.8 (13)
West Bengal	87.88 (20)	90.1 (26)
†India	82.35	104.3
CV (%)	**15.22**	**18.19**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation

Source: Economic Survey 2012-13.

Gross enrolment ratio (GER) is defined as the ratio of students enrolled in a particular level of education (regardless of the age) to the population of official school age for that level of education. The ratio may exceed 100 due to enrolment of children in the classes beyond the specified age group. The GER increased from 82.35 percent in 2001 to 104.3 percent during 2011 at All-India level. However, the inter-state variations at the upper primary level have increased, as the CV in GER increased from 15.22 percent in 2001 to 18.19 percent during 2011.

TABLE 4

Per Capita Net State Domestic Product at 2004-05 Prices

State	***2001-02***	***2010-11***
Andhra Pradesh	21776 (17)	40366 (12)
Arunachal Pradesh	23453 (14)	37417 (14)
Assam	14813 (25)	21406 (26)
Bihar	6777 (28)	13632 (28)
Chhattisgarh	22202 (16)	27156 (20)
Goa	60918 (1)	102844 (1)
Gujarat	24787 (13)	52708 (4)
Haryana	31191 (5)	59221 (3)
Himachal Pradesh	29468 (6)	47106 (8)
Jammu & Kashmir	19238 (20)	27607 (19)
Jharkhand	17978 (21)	21734 (25)
Karnataka	23327 (15)	39301 (13)
Kerala	25545 (12)	49873 (6)
Madhya Pradesh	14874 (24)	22382 (24)
Maharashtra	31821 (3)	62729 (2)
Manipur	16469 (23)	23298 (23)
Meghalaya	25568 (11)	35932 (17)
Mizoram	27285 (8)	36732 (16)
Nagaland	36541 (2)	40957 (11)
Orissa	13780 (26)	25708 (22)
Punjab	31631 (4)	44752 (9)
Rajasthan	16928 (22)	26436 (21)
Sikkim	28954 (7)	47655 (7)
Tamil Nadu	26876 (9)	51928 (5)
Tripura	21130 (18)	37216 (15)
Uttar Pradesh	12071 (27)	17349 (27)
Uttarakhand	25678 (10)	44723 (10)
West Bengal	20103 (19)	32228 (18)
India	20906	35993
CV (%)	**41.58**	**45.95**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation.

Source: CSO, www.mospi.nic.in.

Table 4 reveals a clear evidence of an increasing trend in the regional disparity in per capita income, as the coefficient of variation of per capita income has increased from 41.58 percent in 2001 to 45.95 percent during 2011. This suggests that poor states have failed to catch up with rich ones in terms of per capita income.

TABLE 5
Proportion of Population below Poverty Line

State	***2004-05***	***2009-10***
Andhra Pradesh	29.6 (11)	21.1 (14)
Arunachal Pradesh	31.4 (13)	25.9 (19)
Assam	34.4 (19)	37.9 (24)
Bihar	54.4 (27)	53.5 (28)
Chhattisgarh	49.4 (26)	48.7 (27)
Goa	24.9 (9)	8.7 (1)
Gujarat	31.6 (14)	23 (15)
Haryana	24.1 (8)	20.1 (11)
Himachal Pradesh	22.9 (7)	9.5 (3)
Jammu & Kashmir	13.1 (2)	9.4 (2)
Jharkhand	45.3 (24)	39.1 (25)
Karnataka	33.3 (16)	23.6 (16)
Kerala	19.6 (5)	12 (4)
Madhya Pradesh	48.6 (25)	36.7 (21)
Maharashtra	38.2 (21)	24.5 (17)
Manipur	37.9 (20)	47.1 (26)
Meghalaya	16.1 (4)	17.1 (7)
Mizoram	15.4 (3)	21.1 (13)
Nagaland	8.8 (1)	20.9 (12)
Orissa	57.2 (28)	37 (22)
Punjab	20.9 (6)	15.9 (6)
Rajasthan	34.4 (18)	24.8 (18)
Sikkim	30.9 (12)	13.1 (5)
Tamil Nadu	29.4 (10)	17.1 (7)
Tripura	40 (22)	17.4 (9)
Uttar Pradesh	40.9 (23)	37.7 (23)
Uttarakhand	32.7 (15)	18 (10)
West Bengal	34.2 (17)	26.7 (20)
India	37.2	29.8
CV (%)	**38.06**	**48.90**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation

Source: Data book for the use of Deputy Chairman, Planning Commission, 2012.

TABLE 6

Infant Mortality Rate

State	***2001***	***2011***
Andhra Pradesh	66 (21)	43 (19)
Arunachal Pradesh	39 (6)	32 (11)
Assam	74 (23)	55 (25)
Bihar	62 (20)	44 (20)
Chhattisgarh	77 (24)	48 (22)
Goa	19 (3)	11 (1)
Gujarat	60 (18)	41 (17)
Haryana	66 (21)	44 (20)
Himachal Pradesh	54 (15)	38 (15)
Jammu & Kashmir	48 (10)	41 (17)
Jharkhand	62 (20)	39 (16)
Karnataka	58 (17)	35 (13)
Kerala	11 (1)	12 (3)
Madhya Pradesh	86 (27)	59 (28)
Maharashtra	45 (9)	25 (6)
Manipur	20 (5)	11 (1)
Meghalaya	56 (16)	52 (24)
Mizoram	19 (3)	34 (12)
Nagaland	13 (2)	21 (4)
Orissa	91 (28)	57 (26)
Punjab	52 (14)	30 (9)
Rajasthan	80 (25)	52 (23)
Sikkim	42 (8)	26 (7)
Tamil Nadu	49 (12)	22 (5)
Tripura	39 (6)	29 (8)
Uttar Pradesh	83 (26)	57 (26)
Uttarakhand	48 (10)	36 (14)
West Bengal	51 (13)	32 (10)
†India	66	44
CV (%)	**42.07**	**38.04**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation,

Source: Economic Survey 2012-13.

Table 5 shows that for the year 2004-05, incidence of poverty was highest in Orissa (57.2 %), followed by Bihar (54.4 %), Chhattisgarh (49.4 %) Madhya Pradesh (48.6 %) and so on. On the other hand, the incidence of poverty was lowest in Nagaland (8.8%), followed by Jammu and Kashmir (13.1 %), Mizoram (15.4 %), Meghalaya (16.1 %) and Kerala (19.6 %). During 2009-10, the conditions in states like Bihar, Chhattisgarh, Orissa and Madhya Pradesh remain far from satisfactory, as these states still have poverty ratios more than national average. Furthermore, table shows that although the incidence of poverty in India, at the national level decreased from 37.2 percent in 2004-05 to 29.8 percent during 2009-10, still the inter-state variations have increased over time, as the CV increased from 38.06 percent in 2004-05 to 48.90 percent during 2009-10.

State-wise infant mortality rates for the year 2001 and 2011 has been presented in table 6. IMR refers to the number of deaths in the first year of life per thousand live births. It reflects the probability of a child dying before attaining age one due to poor health of either the child or mother, or general poor healthcare. The table shows that the IMR at the all-India level declined from 66 per 1000 live births in 2001 to 44 in 2011. Although the IMR declined across all the states except Kerala, Mizoram and Nagaland during the period 2001 to 2011, still there have been wide variations in IMR across states. It varied from 11 (Kerala) to 91 (Orissa) in 2001 and from 11 (Manipur) to 59 (Madhya Pradesh) in 2011. However, there have been wide inter-state variations in infant mortality rate even though the variations have declined over the period of time, as the coefficient of variation in infant mortality rate declined from 42.07 percent in 2001 to 38.04 percent during 2011.

TABLE 7

Nutritional Status (Underweight) of Children

State	***1998-99***	***2011***
Andhra Pradesh	34.2 (14)	29.8 (11)
Arunachal Pradesh	21.5 (7)	29.6 (10)
Assam	35.3 (15)	35.8 (17)
Bihar	52.2 (27)	55 (27)
Chhattisgarh	53.2 (28)	47.8 (25)
Goa	21.3 (6)	21.4 (5)
Gujarat	41.6 (19)	41.3 (22)
Haryana	29.9 (12)	38.2 (20)
Himachal Pradesh	36.5 (17)	31.1 (12)
Jammu & Kashmir	29.2 (11)	24 (8)
Jharkhand	51.5 (26)	54.5 (26)
Karnataka	38.6 (18)	33.2 (15)
Kerala	21.7 (8)	21.2 (4)
Madhya Pradesh	50.8 (25)	57.9 (28)
Maharashtra	44.8 (20)	32.5 (14)
Manipur	20.1 (5)	19.5 (3)
Meghalaya	28.6 (10)	42.9 (24)
Mizoram	19.8 (4)	14.3 (1)
Nagaland	18.8 (3)	23.6 (7)
Orissa	50.3 (24)	39.4 (21)
Punjab	24.7 (9)	23.6 (6)
Rajasthan	46.7 (22)	36.9 (18)
Sikkim	15.5 (2)	17.3 (2)
Tamil Nadu	31.5 (13)	25.9 (9)
Tripura	12.1 (1)	35.2 (16)
Uttar Pradesh	48.1 (23)	41.5 (23)
Uttarakhand	36.3 (16)	31.6 (13)
West Bengal	45.3 (21)	37.6 (19)
India	42.7	40.4
CV (%)	**36.92**	**33.90**

Source: NFHS-3

Note:(1) Figures in parenthesis are ranks of the state.

(2) CV is the coefficient of variation.

(3) Nutritional status of children is represented by percentage of children under age 3 years classified as underweight. The index is expressed in standard deviation (SD) units from the median of the 2006 WHO International Reference Population.

Table 7 shows that the nutritional status of children measured in terms of weight-for-age (underweight) improved in India during the period 1998-99 to 2005-06 and the inter-state variations have also decreased over the period of time, as the CV in the nutritional status (underweight) of children decreased from 36.92 percent in 2001 to 33.90 percent during 2011.

Table 8 shows that the inter-state variations in percentage of households with access to tap water have also decreased over the period of time, as the CV decreased from 28.83 percent in 2001 to 22.36 percent during 2011. Similarly the CV of percentage of households with access to electricity (table 9) decreased from 38.13 percent in 2001 to 29.79 percent during 2011, reveals that the inter-state variations in population with access to electricity decreased over the period of time. However the increased CV (table 10) from 40.66 percent in 2001 to 54.68 percent in 2011, reveals that the inter-state variations have increased in terms of percentage of households without access to toilet facility.

TABLE 8

Population With Access to Tap Water

State	***2001***	***2011***
Andhra Pradesh	80.1 (11)	90.5 (9)
Arunachal Pradesh	77.5 (13)	78.6 (16)
Assam	58.8 (21)	69.9 (21)
Bihar	86.6 (6)	94 (3)
Chhattisgarh	70.5 (15)	86.3 (12)
Goa	70.1 (16)	85.7 (13)
Gujarat	84.1 (10)	90.3 (10)
Haryana	86.1 (7)	93.8 (4)
Himachal Pradesh	88.6 (2)	93.7 (5)
Jammu & Kashmir	65.2 (19)	76.8 (19)
Jharkhand	42.6 (24)	60.1 (24)
Karnataka	84.6 (9)	87.5 (11)
Kerala	23.4 (28)	33.5 (28)
Madhya Pradesh	68.4 (17)	78 (18)
Maharashtra	79.8 (12)	83.4 (15)
Manipur	37 (26)	45.4 (26)
Meghalaya	39 (25)	44.7 (27)
Mizoram	36 (27)	60.4 (23)
Nagaland	46.5 (23)	53.8 (25)
Orissa	64.2 (20)	75.3 (20)
Punjab	97.6 (1)	97.6 (1)
Rajasthan	68.2 (18)	78.1 (17)
Sikkim	70.7 (14)	85.3 (14)
Tamil Nadu	85.6 (8)	92.5 (6)
Tripura	52.5 (22)	67.5 (22)
Uttar Pradesh	87.8 (4)	95.1 (2)
Uttarakhand	86.7 (5)	92.2 (7)
West Bengal	88.5 (3)	92.2 (7)
India		
CV (%)	**28.83**	**22.36**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation

Source: Economic Survey 2012-13.

TABLE 9

Percentage of Households With Access to Electricity

State	***2001***	***2011***
Andhra Pradesh	67.2 (14)	92.2 (7)
Arunachal Pradesh	54.7 (18)	65.7 (21)
Assam	24.9 (26)	37 (26)
Bihar	10.3 (28)	16.4 (28)
Chhattisgarh	53.1 (20)	75.3 (16)
Goa	93.6 (2)	96.9 (1)
Gujarat	80.4 (6)	90.4 (10)
Haryana	82.9 (4)	90.5 (9)
Himachal Pradesh	94.8 (1)	96.8 (2)
Jammu & Kashmir	80.6 (5)	85.1 (12)
Jharkhand	24.3 (27)	45.8 (24)
Karnataka	78.5 (7)	90.6 (8)
Kerala	70.2 (11)	94.4 (4)
Madhya Pradesh	70 (12)	67.1 (19)
Maharashtra	77.5 (10)	83.9 (14)
Manipur	60 (17)	68.3 (18)
Meghalaya	42.7 (21)	60.9 (22)
Mizoram	69.6 (13)	84.2 (13)
Nagaland	63.6 (15)	81.6 (15)
Orissa	26.9 (25)	43 (25)
Punjab	91.9 (3)	96.6 (3)
Rajasthan	54.7 (19)	67 (20)
Sikkim	77.8 (9)	92.5 (6)
Tamil Nadu	78.2 (8)	93.4 (5)
Tripura	41.8 (22)	68.4 (17)
Uttar Pradesh	31.9 (24)	36.8 (27)
Uttarakhand	60.3 (16)	87 (11)
West Bengal	37.5 (23)	54.5 (23)
India	55.8	67.2
CV (%)	**38.13**	**29.79**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation

Source: Census of India 2011.

TABLE 10
Percentage of Households Without Access to Toilet Facility

States	*2001*	*2011*
Andhra Pradesh	67 (21)	50.4 (20)
Arunachal Pradesh	43.7 (10)	38 (14)
Assam	35.4 (6)	35.1 (12)
Bihar	80.8 (26)	76.9 (26)
Chhattisgarh	85.8 (28)	75.4 (25)
Goa	41.4 (8)	20.3 (6)
Gujarat	55.4 (14)	42.7 (16)
Haryana	55.5 (15)	31.4 (10)
Himachal Pradesh	66.6 (20)	30.9 (9)
Jammu & Kashmir	46.9 (11)	48.8 (18)
Jharkhand	80.3 (25)	78 (27)
Karnataka	62.5 (17)	48.8 (18)
Kerala	16 (2)	4.8 (1)
Madhya Pradesh	76 (24)	71.2 (24)
Maharashtra	64.9 (19)	46.9 (17)
Manipur	18 (3)	10.7 (3)
Meghalaya	48.8 (12)	37.1 (13)
Mizoram	11 (1)	8.1 (2)
Nagaland	29.4 (5)	23.5 (8)
Orissa	85.1 (27)	78 (27)
Punjab	43.2 (9)	20.7 (7)
Rajasthan	71 (23)	65 (23)
Sikkim	36.6 (7)	12.8 (4)
Tamil Nadu	64.8 (18)	51.7 (21)
Tripura	18.6 (4)	14 (5)
Uttar Pradesh	68.6 (22)	64.4 (22)
Uttarakhand	54.8 (13)	34.2 (11)
West Bengal	56.3 (16)	41.2 (15)
India	63.6	53.1
CV (%)	**40.66**	**54.69**

Note : Figures in parenthesis are ranks of the state; CV is the coefficient of variation

Source: Census of India 2011

Factor Analysis and Composite Development Index for 2001

Composite Development Index for the year 2001 has been constructed for 28 states on the basis of selected indicators by using the weights calculated from the ëPrincipal Componentsí. The result of factor analysis for the composite development index for the year 2001 is presented in table 11.

TABLE 11

Result of Factor Analysis for Composite Development Index (2001)

S. No.	*Variables*	*Factors Loading*			*Commu-nalities*	*Weights*	*Weight (in %)*
		F1	***F2***	***F3***			
1.	Per capita net state domestic product	.757	.398	-.051	.735	46.528	10.223
2.	Infant mortality rate	.831	-.323	.146	.816	51.076	11.222
3.	Percentage of house-holds without access to toilet facility	.755	-.573	.218	.947	46.405	10.196
4.	Percentage of house-holds with access to electricity	.729	.585	.026	.874	44.807	9.845
5.	Percentage of house-holds with access to drinking water	.551	.690	.289	.863	10.620	2.333
6.	Literacy rate	.831	-.069	-.524	.969	51.076	11.222
7.	Gross enrolment ratio	.906	.028	-.300	.912	55.686	12.235
8.	Female literacy rate	.868	-.155	-.419	.953	53.351	11.722
9.	Percentage of under-nourished children	.804	-.316	.393	.901	49.417	10.858
10.	Population below poverty line	.751	.020	.438	.757	46.159	10.142
	Percentage of variance explained	61.464	15.392	10.416			100
	Percentage of cumu-lative variance explained	61.464	76.856	87.272			

Table 11 shows the factor loading with three factors derived from the selected indicators. The three factors (F_1, F2 and F_3) taken together explain 87.27 percent inter-state variations in development indicators. Communalities for all the indicators varied between 73.5 to 96.9 percent, indicating that

three factors are sufficient to account for most of the variations in the selected indicators. First factor explains 61.46 percent variation in the variable set. Only population with access to drinking water indicator is important in second factor, which explains just 15.39 percent of variations in variable set. Remaining all other variables constituted the first factor.

Composite Development Index for the year 2001 was developed on the basis of selected 10 variables by using the weights calculated from the ëPrincipal Componentsí for 28 Indian states and is presented in table 12.

TABLE 12
Composite Development Index for the Year 2001

States	***Composite Development Index***	***Ranks***
Andhra Pradesh	0.3609	20
Arunachal Pradesh	0.4404	14
Assam	0.3445	21
Bihar	0.0560	28
Chhattisgarh	0.1907	24
Goa	0.8235	02
Gujarat	0.4602	13
Haryana	0.5159	12
Himachal Pradesh	0.6036	05
Jammu & Kashmir	0.4310	16
Jharkhand	0.1386	26
Karnataka	0.4289	17
Kerala	0.8306	01
Madhya Pradesh	0.2331	23
Maharashtra	0.5169	11
Manipur	0.5818	08
Meghalaya	0.4327	15
Mizoram	0.7852	03
Nagaland	0.6635	04
Orissa	0.1373	27
Punjab	0.6007	06
Rajasthan	0.2409	22
Sikkim	0.5999	07
Tamil Nadu	0.5316	10
Tripura	0.5773	09
Uttar Pradesh	0.1667	25
Uttarakhand	0.4203	18
West Bengal	0.3681	19

Table 12 shows that index varies within the range of 0.0560 to 0.8306 and it is clear from the ranking of the states that Kerala is at the top with highest value of composite development index (0.8306), followed by Goa (0.8235), Mizoram (0.7852) and Nagaland (0.6635). Table further shows that Bihar has the minimum value (0.0560) among the 28 states for which analysis has been undertaken and the other states having low index (but more than Bihar) is Orissa (0.1373), Jharkhand (0.1386), Uttar Pradesh (0.1667) and Chhattisgarh (0.1907).

Factor Analysis and Composite Development Index for 2011

The composite development index for the year 2011 has been constructed for 28 states based on the sampled variables by using the weights calculated from the ëPrincipal Componentsí and the result of factor analysis for the composite development index is presented in table 13.

TABLE 13

Result of Factor analysis for Composite Development Index (2011)

S. No.	*Variables*	*Factors Loading*			*Commu-nalities*	*Weights*	*Weight (in %)*
		F_1	F_2	F_3			
1.	Per capita net state domestic product	.757	-.527	-.347	.971	45.659	11.699
2.	Infant mortality rate	.757	-.527	-.347	.971	45.659	11.699
3.	Percentage of house-holds without access to toilet facility	.794	.467	-.111	.860	47.892	12.27
4.	Percentage of house-holds with access to electricity	.842	-.164	.346	.856	50.787	13.01
5.	Percentage of households with access to drinking water	.787	-.408	.344	.903	47.469	12.16
6.	Literacy rate	.834	.357	-.315	.923	50.304	12.89
7.	Gross enrolment ratio	.526	.213	.569	.645	6.193	1.587
8.	Female literacy rate	.816	.425	-.330	.955	49.219	12.61
9.	Percentage of under-nourished children	.781	.301	.140	.720	47.107	12.06
10.	Population below poverty line	.824	-.128	.214	.742	49.701	12.73
	Percentage of variance explained	60.317	14.259	10.884			100
	Percentage of cumu-lative variance explained	60.317	74.576	85.46			

Table 13 shows the factor loadings related to three factors derived from the selected indicators. The three factors (F_1, F_2 and F_3) taken together explain 85.46 percent inter-state variations in development indicators. Communalities for all the indicators varied between 64.5 to 97.1 percent. First factor (F_1) explain 60.32 percent variations in the variable set. All the indicators except gross enrolment ratio constitute the first factor (F_1). Gross enrolment ratio constitutes the third factor (F_3) which explains 10.88 percent of variation.

The weights calculated for the selected 10 indicators from ëPrincipal Componentí for 28 Indian states have been used to develop the Composite Development Index and is presented in table 14 along with ranking of the different states.

TABLE 14

Composite Development Index for the Year 2011

States	***Composite Development Index***	***Ranks***
Andhra Pradesh	0.499	16
Arunachal Pradesh	0.459	19
Assam	0.311	22
Bihar	0.029	28
Chhattisgarh	0.250	24
Goa	0.892	01
Gujarat	0.577	12
Haryana	0.599	11
Himachal Pradesh	0.718	05
Jammu & Kashmir	0.504	15
Jharkhand	0.159	27
Karnataka	0.534	14
Kerala	0.781	02
Madhya Pradesh	0.245	25
Maharashtra	0.628	07
Manipur	0.499	17
Meghalaya	0.476	18
Mizoram	0.747	03
Nagaland	0.603	10
Orissa	0.259	23
Punjab	0.549	13
Rajasthan	0.327	21
Sikkim	0.744	04
Tamil Nadu	0.653	06
Tripura	0.609	09
Uttar Pradesh	0.230	26
Uttarakhand	0.609	08
West Bengal	0.422	20

Table 14 shows that index varies within range of 0.029 to 0.892 and it is clear from the ranking of the states that Goa is at the top with highest value of index (0.892) followed by Kerala (0.781), Mizoram (0.747), Sikkim (0.744) and Himachal Pradesh (0.718).

Table further shows that Bihar is at the bottom with 0.029 value of index. Other states having low value of index, but more than Bihar are Jharkhand (0.159), Uttar Pradesh (0.230), Madhya Pradesh (0.245) and Chhattisgarh (0.250).

TABLE 15
Ranks of the States for 2001 and 2011

	2001		***2011***	
States	***Index***	***Rank***	***Index***	***Rank***
Andhra Pradesh	0.3609	20	0.499	16
Arunachal Pradesh	0.4404	14	0.459	19
Assam	0.3445	21	0.311	22
Bihar	0.0560	28	0.029	28
Chhattisgarh	0.1907	24	0.250	24
Goa	0.8235	02	0.892	01
Gujarat	0.4602	13	0.577	12
Haryana	0.5159	12	0.599	11
Himachal Pradesh	0.6036	05	0.718	05
Jammu & Kashmir	0.4310	16	0.504	15
Jharkhand	0.1386	26	0.159	27
Karnataka	0.4289	17	0.534	14
Kerala	0.8306	01	0.781	02
Madhya Pradesh	0.2331	23	0.245	25
Maharashtra	0.5169	11	0.628	07
Manipur	0.5818	08	0.499	17
Meghalaya	0.4327	15	0.476	18
Mizoram	0.7852	03	0.747	03
Nagaland	0.6635	04	0.603	10
Orissa	0.1373	27	0.259	23
Punjab	0.6007	06	0.549	13
Rajasthan	0.2409	22	0.327	21
Sikkim	0.5999	07	0.744	04
Tamil Nadu	0.5316	10	0.653	06
Tripura	0.5773	09	0.609	09
Uttar Pradesh	0.1667	25	0.230	26
Uttarakhand	0.4203	18	0.609	08
West Bengal	0.3681	19	0.422	20
CV (%)	**46.82**		**41.80**	

Table 15 shows the position of states based on different indicators used for the computation of composite development index for 2001 and 2011. It was found that the ranks of 28 Indian states according to composite development index did not remain same in 2011 as compared to 2001. Table shows that for the year 2001, Bihar was the worst performing state followed by Orissa, Jharkhand, Uttar Pradesh and Chhattisgarh. On the other hand Kerala was the best performing state in 2001 followed by Goa, Mizoram, Nagaland and Himachal Pradesh. Further in the year 2011, again Bihar remained the worst performing state followed by Jharkhand, Uttar Pradesh, Madhya Pradesh and Chhattisgarh. Goa was at the top in terms of composite development index, further, Kerala occupied 2nd rank followed by Mizoram (3rd rank), Sikkim (4th rank) and Himachal Pradesh with 5th rank for the year 2011. Furthermore, table shows that only few states like Himachal Pradesh, Mizoram, Tripura (best performers), Bihar and Chhattisgarh (worst performers) maintained their relative positions between 2001 and 2011. On the whole, while Andhra Pradesh, Maharashtra, Orissa, Sikkim, Tamil Nadu and Uttarakhand improved their Composite development index significantly. Andhra Pradesh, Maharashtra, Orissa and Tamil Nadu improved its ranking by 4 positions from 20 to 16, 11 to 7, 27 to 23 and 10 to 6 respectively, while Uttarakhand showed a significant improvement by shifting from 18th to 8th rank during 2011. However, the regional disparities have declined over time as indicated by the coefficient of variation of the Composite Development Index which decreased during 2001- 2011.

Conclusion

This paper evaluates the relative performance of Indian states on the issues of education, health, sanitation, nutrition and economic variables. The trend in regional inequality has been examined by estimating the coefficient of variation (CV) of the indicators across states. A review on the performance of states in terms of literacy rate reveals that in India, at the national level, literacy rate increased over the period of time. The best performing states like Kerala, Goa, Maharashtra and Tamil Nadu remains the best and the worst performing states like Bihar, Rajasthan and Uttar Pradesh remains the worst, but the inter-state variations have declined over the period, revealing that the poor states are catching up with the

rich ones in terms of overall literacy and female literacy rate. Furthermore, study reveals a clear evidence of an increasing trend in the regional disparity in per capita income. This suggests that poor states have failed to catch up with rich ones in terms of per capita income. So, overall study found that regional disparities in education and health have been declining over the period of time, but there is a clear evidence of an increasing trend in the regional disparity in per capita income and proportion of population below poverty line. Based on these socio-economic variables, Composite Development Index for the year 2001 and 2011 has been constructed for 28 states by using the weights calculated from Principal Component Analysis. It was found that the ranks of 28 Indian states according to composite development index did not remain same in 2011 as compared to 2001. Bihar was the worst performing state followed by Orissa, Jharkhand, Uttar Pradesh and Chhattisgarh. On the other hand, Kerala was the best performing state in 2001 followed by Goa, Mizoram, Nagaland and Himachal Pradesh. Further in the year 2011, again Bihar remained the worst performing state followed by Jharkhand, Uttar Pradesh, Madhya Pradesh and Chhattisgarh. Goa was at the top in terms of composite development index, followed by Kerala, Mizoram, Sikkim and Himachal Pradesh for the year 2011. The study concludes that not much change has occurred in the ranks of the states, as the worst performing states in 2001 like Bihar, Orissa, Jharkhand, Uttar Pradesh and Chhattisgarh are at the bottom and best performing states remained at the top in 2011 as well. However, the regional disparities have declined over time as indicated by the coefficient of variation of the Composite Development Index which decreased during 2001- 2011.

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PSE ECONOMIC ANALYST, VOL. XXXII, 2017

GROWTH PERFORMANCE AND SUSTAINABILITY OF INDIAN SMALL SCALE INDUSTRIAL SECTOR- A COMAPRISON OF PRE AND POST REFORM PERIOD

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Abstract

In the present paper an attempt has been made to examine the growth performance and sustainability of Indian small scale industrial sector during the period 1980-81 to 2013-14 which has further been divided into two sub-periods namely, pre reform period (1980-81 to 1990-91) and post reform period (1991-92 to 2013-14). For the purpose of the study the data has been culled from various Annual Reports of MSME, Government of India and Reserve Bank of India Bulletins. To study the growth performance of Indian small scale industrial sector five important variables were selected viz, number of units, employment, investment, production and exports. The results showed that the economic reforms of 1991 has a significant impact on Indian small scale industrial sector. The analysis of forecasting with the help of ARIMA model divulge that by year 2020 all the selected variables of Indian small scale industrial sector will follow the path of sustainability. In this context, various measures such as availability of working capital, soft loans for purchase of modern machinery, training facilities for owners, marketing assistance for exports, setting up of research and development centers especially for MSME along with technological up gradation is required for the sustainability of Indian small scale industrial sector in the post reform period.

Introduction

The small scale industries in India share considerable growth prospects for the nationís economic development which is evident from factors such as increased production, employment creation and export growth. With regard to reforms, Indian economy is witnessing enhanced performance

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growth in the small scale industrial sector wherein new opportunities as well as challenges are also put forth for the sector. Some reasons are attributed for the increased performance growth of small scale industrial sector through economic reforms which are as follows: flexibility, innovations and dynamism of reform policies which had in turn enhanced production, market penetration and management capabilities of the small scale industrial sector. With the initiation of the economic reforms in India which took place in the year 1991, major changes occurred in the macroeconomic policies of the nation which were based on a planned set of policies that existed from 1950-51 to 1990-91. The economic reforms of India has been catalysing the entire nationís economy thereby transforming the nation to be one among the fastest growing emerging nations in the world; however before the reforms, there were critical inefficiencies which hindered the growth of the nation in almost all sectors (Saikia, 2012). The Indian small scale industrial sector does not face only the beneficial effects of economic reforms but also there are challenges with the liberalisation policies which may drastically affect the growth performance of this sector. With more competitors in the market and the involvement of foreign players, Indian small scale industrial sector find themselves in a highly competitive environment. With these inferences, there exists a need to examine the growth performance of Indian small scale industrial sector before and after economic reforms so as to identify the growth prospects of the nation.

In the present paper an attempt has been made to examine the growth performance and sustainability of Indian small scale industrial sector before and after economic reforms.For this purpose, the important variables affecting the Indiansmall scale industrial sector viz. employment, investment, the number of small scale industrial units, production and exports were considered for the period 1980-81 to 2013-14. To study the growth performance of selected variables in the Indian small scale industrial sector, the overall period was divided into two sub periods namely, pre reform period (1980-81 to 1990-91) and post reform period (1991-92 to 2013-14). The data has been culled from various Annual Reports of MSME, Government of India and Reserve Bank of India Bulletins. To fulfill the aforementioned objective the paper has been divided into three sections. In the first section, the growth performance of the Indian small scale industrial sector during the entire study period (1980-81 to 2013-14)

and for two sub periods namely, pre-reforms period (1980-81 to 1990-91) and post-reforms period (1991-92 to 2013-14) have been examined, whereas the sustainability of Indian small scale industrial sector for the selected variables have been evaluated with the help of ARIMA model in the second section. The last section concludes the discussion along with some policy implications.

Section I

The present section attempts to examine the growth performance of Indian small scale industrial sector with regard to economic reforms. The growth rate is not a single measure; rather it encompasses the growth of Indian small scale industrial sector with respect to developments in capital investment, improvements in employment, and improvement in production. Though it is generally hypothesised that Indian small scale industrial sector possess profound benefits from economic reforms but there are certain challenges which are faced by this sector.The small scale industrial sector comes on the second number after the agriculture in absorption of maximum labour as the Indian small scale industry sector is more labour intensive. Thus it becomes a matter of great interest when we talk about the small scale industry feature of creating employment. Keeping in view the matter of unemployment in the country the development of small scale industry would be of great concern. The growth performance of number of small scale industry units and employment havebeen presented in Table 1. It has been observed that total small scale units increased tremendously from a mere 8.7 lakhs in 1980-81 to 67.9 lakhs in 1990-91 and to 488.6 lakhs in 2013-14, thereby recording an overall growth rate of 13.55 percent. It has also been observed in the table that due to the deregulatory policy the rate of growth of total small scale industrial units in pre reform period was 10.73 percent which has increased to 14.66 percent in the post reform period. The rise in the growth rates of the number of units may be partly be attributed to the emergence of high competition environment and the liberal entry of multinationals with the exemption of import duties with low tariff rates.

TABLE 1

Growth of Units and Employment in Indian Small Scale Industrial Sector

(in lakhs)

Years	*Number of Units*	*Employment*
1980-81	8.7	71
1981-82	9.6	75
1982-83	10.6	79
1983-84	11.6	84.2
1984-85	12.4	90
1985-86	13.5	96
1986-87	14.6	101.4
1987-88	15.8	107
1988-89	17.1	113
1989-90	18.2	119.6
1990-91	67.9	125.3
1991-92	70.6	129.8
1992-93	73.5	134.1
1993-94	76.5	139.4
1994-95	79.6	146.6
1995-96	82.8	152.6
1996-97	86.2	160.0
1997-98	89.7	167.2
1998-99	93.4	171.6
1999-00	97.2	178.5
2000-01	101.1	185.6
2001-02	105.2	192.2
2002-03	109.5	199.7
2003-04	114	206.8
2004-05	118.6	214.3
2005-06	123.4	294.9
2006-07	361.8	595.7
2007-08	377.4	626.3
2008-09	393.7	659.4
2009-10	410.8	695.4
2010-11	428.7	732.2
2011-12	447.6	509.4
2012-13	467.5	534.7
2013-14	488.6	560.8

Years	*Number of Units*	*Employment*
Pre reform CAGR (1980-81 to 1990-91)	10.73	8.97
Post reform CAGR (1991-92 to 2013-14)	14.66	5.97
Overall CAGR (1980-81 to 2013-14)	13.55	7.13

CAGR : Compound Annual Growth Rate

Source : Authorís Calculations

The employment opportunity in the small scale industrial sector is the second largest after the agriculture sector. ìIt would be clear from the fact that while employment in the factory sector as a whole (large scale, medium scale and small scale) increased by only 2.21 percent per annum over the period 1972 to 1987-88, employment in small scale sector grew at the rate of 5.45 percent per annum . In future rural non farm sector can play a crucial role in the further creation of employment opportunities in the rural areas.î (Goldar, 1993).It has also been observed in table, that the employment in the small scale industrial sector in 1980-81 was 71 lakh as the number of employed in 1990-91 were 125.3 lakh. The number of employed worker in 2013-14 were 560.8 lakh. These number indicate that the small scale industry grew at 8.97 percent during the pre reform period. Whereas the number of workers have increased from 125.3 lakh to 560.8 lakh this shows that the growth rate of employment in post reform period was 5.97 percent. The growth rate of employment opportunity for the overall study period is 7.13 percent. Thus it can be concluded thatreform process has augmented the employment generation process in small scale industrial sector. Therefore small scale industrial sector needs to gear up to achieve the targets of the twelfth five year plans.

The investment, value of production in current and constant prices and exports are framed in Table 2. The results of the investment shows that the compound annual growth rate in the Indian small scale industrial sector during the pre-reforms period was witnessing consistent increase. The investments made by Indian small scale industrial sector during the pre-reforms period had an average growth rate of 10.01 per cent; however economic reforms indeed increased the rate of capital investment growth phenomenally wherein the growth rate increased from 13.56 percent from 1991-92 to 2013-14. The growth rate of investment for the overall

study period has accounted to be 16.7 percent. The reforms has a great significance in the investment as in 1990-91 the amount invested was Rs.19302 crores which further increased drastically to Rs. 100351 crores. The reason for this jump in the values was reforms due to which the small scale had to invest so as to produce more and more to compete with the global market standards. On the production front also small scale industrial sector plays a vital role as its share in gross industrial value added is more than 40 percent. The table provides the information about growth rates of production of this sector for the same period both at constant and current prices.

TABLE 2

Growth Rates of Investment, Production and Exports in Indian Small Scale Industrial Sector

(Rs. Crores)

Years	*Investment*	*Production at constant price*	*Production at current price*	*Exports*
1980-81	5850	72200	28100	1600
1981-82	6280	78300	32600	2100
1982-83	6800	84700	35000	2000
1983-84	7360	93500	41600	2200
1984-85	8380	104600	50500	2500
1985-86	9585	118100	61200	2800
1986-87	10881	133600	72300	3600
1987-88	12610	150500	87300	4400
1988-89	15279	169900	106400	5500
1989-90	18196	189900	132300	7600
1990-91	19302	84728	78802	9664
1991-92	100351	87355	80615	13883
1992-93	109623	92246	84413	17784
1993-94	115795	98796	98796	25307
1994-95	123790	108774	122154	29068
1995-96	125750	121175	147712	36470
1996-97	130560	134892	167805	39248

(Rs. Crores)

Years	*Investment*	*Production at constant price*	*Production at current price*	*Exports*
1997-98	133242	146263	187217	44442
1998-99	135482	157525	210454	48979
1999-00	139982	170379	233760	54200
2000-01	146845	184401	261297	69797
2001-02	154349	282270	282270	71244
2002-03	162317	306771	314850	86013
2003-04	170219	336344	364547	97644
2004-05	178699	372938	429796	124417
2005-06	188113	418884	497842	150242
2006-07	500758	1198818	135145	182538
2007-08	558190	1322777	1435179	202017
2008-09	621753	1375589	1524235	257767
2009-10	693835	1488352	1619356	391159
2010-11	773487	1653622	1721553	507739
2011-12	486434.4	1788584	1834332	630105
2012-13	514881.9	1809979	-	697318
2013-14	543930.1	-	-	803941
Pre reform CAGR (1980-81 to 1990-91)	10.01	18.15	14.85	19.38
Post reform CAGR (1991-92 to 2013-14)	13.56	7.18	15.59	18.77
Overall CAGR (1980-81 to 2013-14)	16.70	10.32	11.91	21.24

CAGR : Compound Annual Growth Rate

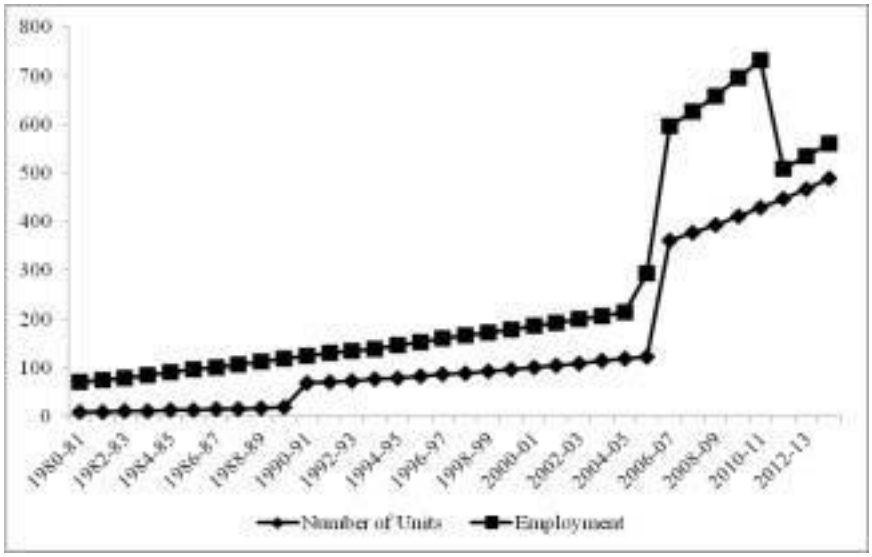
Source : Authorís Calculations

It has been observed that production of small scale industrial sector at constant prices rose to 1809979 Rs.crore in 2012-13 from 72200 Rs. Crore in 1980-81 thereby registering the compound annual growth rate of 10.32 percent of the entire period(1980-81 to 2013-14). It has been found

that the growth rate in the pre reform period was 18.15 percent which declined to 7.18 percent in the post reform period. However, the production at current prices rose from 28100 Rs. Crores in 1980-81 to 1834332 Rs. Crore in 2011-12, with the compound annual growth rate of 11.91 percent for the entire period, which is quite remarkable. The growth rate of production at current prices for the ore reform period was 14.85 and post reform period was 15.59 percent. Thus the high growth of production at current prices could be attributed due to two reasons. First, the figures of current prices conceal the inflationary rise in the prices of production. Second, dizzy growth has been observed due to the changes in the definition of the small scale undertakings from time to time.

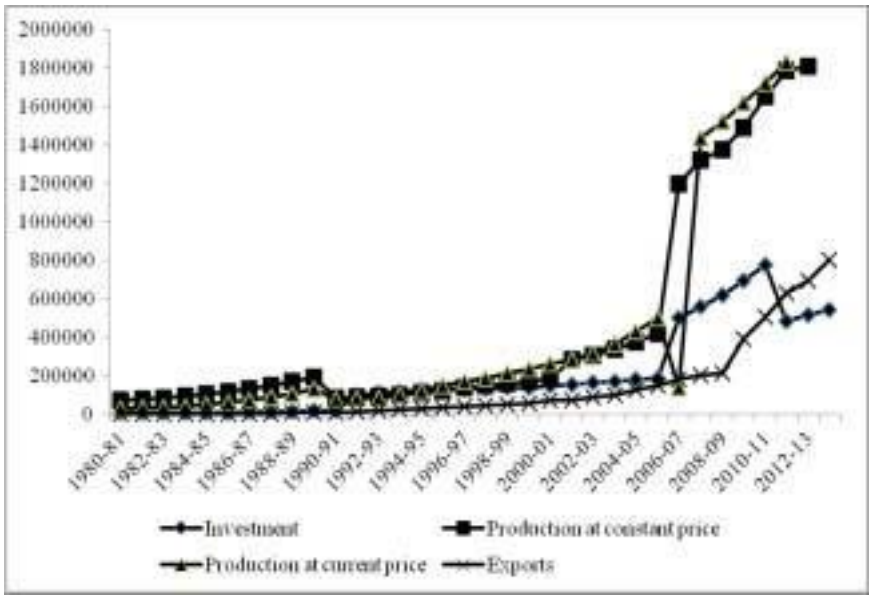
The Indian small scale industrial sector plays a major role in Indiaís exports. Table 2 showed that the overall compound annual growth rate of exports was 21.24 percent during 1980-81 to 2013-14 where as this rate was 19.38 percent and 18.77 percent during pre and post reform period respectively. This fall of nearly one percent could be attributed to the liberalisation policies adopted by the country. The comparison of the two period i.e., pre reform and post reform shows that the reforms has failed to dent a mark on the growth of exports. Thus this decline could be attributed to the deregulation policy regime. Also the share of exports in pre and post reforms period has remained almost same. But now India is facing a cut throat competition from the other countries. The Indian market is facing a tough competition from the countries like China and other Asian countries as the competition is at a bottleneck. Therefore, government must participate actively in order to gear up the small scale industry so as to fight against the competition imposed by WTO trade policies.The above discussion has also been summarized in fig 1 and 2.

Figure 1: Growth of Units and Employment in Indian Small Scale Industrial Sector



Source : Authorís Calculations

Figure 2: Growth Rates of Investment, Production and Exports in Indian Small Scale Industrial Sector



Source : Authorís Calculation

Section II

In the present section the forecasting of various indicators of performance viz. employment, capital investment, production and exports of small scale sector for the year of 2015-16 to 2020-21 on the basis of 1980-81 to 2013-14 data has been given. For this purpose ARIMA model has been used to forecast the various indicators of performance. The growth performance of Indian small scale industrial sector is based on the impact of globalisation revealed various aspects of growth and challenges that require examination of the ways to achieve economic growth. However, with respect to understanding the sustainable growth in the Indian small scalesector, the following calculations are made to forecast sustainable growth options in the Indian small scale industrial sector. Thus Table 3 and 4represents the forecasting of various selected variables. The results of the analysis show that there is a sustainable growth pattern seen in all the variables. In terms of number of units the forecasting has shown that the number of units in 2020 will go upto 575.9 lakh. In terms of the exports of the small scale industrial sector the value of exports by 2020 will be 57.82 Rs. Crore. Similarly, the employment of Indian small scale industry has been predicted to be 651.43 lakh as the value in year 2013-14 was 560.8 lakh. The other three variables namely investment , production and exports have also shown an improvement for the analysis of forecasting till the year 2020. Thus we may conclude that in order to walk on the path of sustainability the values of ARIMA model show an increasing trend.

TABLE 3

Forecasting the Number of Units and Employment in the Indian Small Scale Industrial Sector

(in lakhs)

Years	*Number of Units*	*Employment*
2015-16	503.2	577.04
2016-17	517.7	592.05
2017-18	532.3	606.91
2018-19	546.8	621.75
2019-20	561.3	636.59
2020-21	575.9	651.43

Source : Authorís Calculations

TABLE 4

Forecasting the Investment, Production and Exports in Indian Small Scale Industrial Sector

(Rs. Crores)

Years	*Investment*	*Production at constant price*	*Production at current price*	*Exports*
2015-16	560075.69	1911350	1996050	805759
2016-17	576384.28	1965010	2054647	904321
2017-18	592690.87	2018761	2112683	917380
2018-19	608997.31	2072523	2170890	932143
2019-20	625303.96	2126280	2229050	948324
2020-21	641610.81	2180047	2287221	990170

Source : Authorís Calculations

Section III

The present section concludes the discussion along with policy implications. The examination of the growth performance of Indian small scale industrial sector revealed several advantages as well as drawbacks of economic reforms. For example, it was identified that the employee growth rate witnessed a decrease in the growth rate in number of employees with the economic reforms came into existence in 1990-91. The small scale sector of India is found to provide better employment opportunities. The number of small scale units in India have increased in 1990-91 which is a good start for the nationís economic growth. However, production growth decreased phenomenally during the same year. . It has also been observed that due to the deregulatory policy the rate of growth of total small scale industrial units in pre reform period was 10.73 percent which has increased to 14.66 percent in the post reform period. This could be associated with the fact that with new investments made, India small scale industrial sector would have not able to produce high outputs whereas the same improved in the latter years. There were severe variations in the outputs produced by Indian small scale industrial sector, Export growth also witnessed variations throughout the post-reforms period which is associated with the fact that price competitiveness and world export demand would have affected export growth in the post-reforms period. The exports of small scale industrial sector has shown a remarkable growth during the pre reform period at 19.38 percent. The growth of the exports in the post reform period was relatively lower than the pre reforms,

it accounted to be 18.77 percent. Employment growth in the Indian small scale industries declined in post-reform period from the year 1990-91 till 1992-1993; however, new job opportunities emerged in 1993-94 with many employees moving from traditional jobs to work in Indian small scale industrial sector. The number of employed worker in 2013-14 were 560.8 lakh. These number indicate that the small scale industry grew at 8.97 percent during the pre reform period. Whereas the number of workers have increased from 125.3 lakh to 560.8 lakh this shows that the growth rate of employment in post reform period was 5.97 percent. The growth rate of employment opportunity for the overall study period is 7.13 percent. This decline could be associated with the fact that economic reform brought technological advancements which paved way for equipment that could take the job of human beings. However, capital investments after the reform period improved which is associated with the open liberal policies which led new companies from foreign nations to establish business in India. Capital investments made by Indian small scale industrial sector during the pre-reforms period had an average growth rate of 10.01 per cent; however economic reforms indeed increased the rate of capital investment growth phenomenally wherein the growth rate increased from 13.56 percent from 1991-92 to 2013-14.

It is deemed that the small scale sector in the Indian sub-continent has performed extremely well in order to achieve diverse growth. Some of the advantages of the small scale industrials sector are its less capital intensive and high labour absorption nature which lead the industry to create employment opportunities as well as increase of rural industries. The small scale sector plays a major role towards building a strong national economy. Indian economy cannot completely rely on agriculture as its only scope of development; it should embrace an industrial perspective for which small scale industry could be the only option. The agriculture sector is identified as the largest contributor to GDP of India; however, the nation cannot particularly depend on agriculture. The labour employment does not result beneficial through agriculture; however, focusing on the small scale sector for improving employment rate and economic growth could be the only option to achieve better economic results. However, the government of India has initiated a number of steps for the protection and support of small scale enterprises. In this context, various measures such as availability of working capital, soft loans for purchase of modern machinery, training facilities for owners, marketing assistance for exports, setting up of research and development centers especially for MSME along with technological up gradation is required for the sustainability of Indian small scale industrial sector in the post reform period.

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PSE ECONOMIC ANALYST, VOL. XXXII, 2017

PERSPECTIVES ON SOFTWARE TECHNOLOGY PARKS OF INDIA FOR SUSTAINABLE DEVELOPMENT IN PUNJAB

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Abstract

ìSustainable Development is a development strategy that manages all assets, natural resources, and human resources, as well as financial and physical assets, for increasing long-term wealth and well-beingî.Investment in Science, Technology and Innovations performs as a significant base of economic growth and sustainable development. Software Technology Parks have been acknowledged as a congregation of solutions that are intimately linked with sustainable development in low and medium income countries. It is considered as an essential component for edifying infrastructure and generating opportunities and also acts as a funnel for policy makers in achieving the errands for sustainable development.The paper provides an assessment of the inventive activities in the state.

The Study reveals that, though capital is labour displacing and the productivity of capital contributes significantly to the export turnover, yet labour productivity grew positively during study period and reflects labour-intensive nature of the sector but still the sector in the economy did not show ample potential to generate employment.Hence the analysis recommends the concerted drive for technical skills.

Punjab since its re-organization in 1966 remained primarily an agricultural economy and manufacturing failed to generate employment, because of traditional and low value added manufacturing industries. The state failed to a large extent to transform its agriculture services and employment as a source of capital formation in industrial sector. The state has taken step towards concerted policy to transform the manufacturing

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sector into a robust engine for growth and to absorb the educated semi-skilled labour by investing in innovation. An investment in innovation and technology leads to increase in productivity which further leads to economic growth and higher standard of living.Technological innovation has been considered indispensable for steady improvement in products and creating new innovations (National Manufacturing Competitiveness council, 2006).Generally, technology and innovations perform as a significant function of economic growth and sustainable development to promote manufacturing in Technology Parks, which will give new level to manufacturing sector in creating educated employment in the economy (Chadha, 2003). Here technology parks are considered as an essential component for edifying infrastructure and generating employment opportunities and also acts as funnel for policy makers in achieving the objective for sustainable development (Chadha & Kaur, 2012). Such parks urge new enterprises, and also create an environment for national and international firms to interact with each other and exchange knowledge and technology for mutual benefits.

Technology Parks stimulate backward and forward linkages among the firms and create a new level for entrepreneurship and integrate innovation and investors, for economic development by diversifying the traditional industrialization to modern technology and knowledge based industries. Technology Parks are the best institutional mechanism that promotes technology intensive, knowledge based SMEís with enormous potential to grow and also construct growth path for other sectors (Unido, 2012).In order to provide infrastructure to attract foreign direct investment and also to encourage domestic entrepreneurs with the ambition to generate business opportunities in thrust areas and derive benefits in global software and electronic markets, government introduced the concept of technology parks in the country by establishing Software Technology Parks of India (STPI).Thus building STP has been recognized essential for the accomplishment of objectives and also for the international stature, that can promote state to reap benefits from technological advancements and augment their industrious capacity. The Purpose of the paper is to emphasize the role and status of Software Technology Parks of India for sustainable development in Punjab. The paper provides an assessment of the inventive activities in the state.

Section I demonstrates the evolution of Software Technology Parks of India and explore the schemes for promoting STPI in the state, Section

II explains the status and growthtrends of Software Technology Parks of India for period 2005-06 to 2013-14 and Section III exhibits problems faced by STPI and throw policy implications and recommendation to achieve substantial growth of software industry through STPI in the state.

Data and Methodology

Keeping in view the objective of the present study, Reports of Software Technology Parks of India, have been used as the secondary sources along with information generated through a survey of IT-Technology Park in Punjab. The study covers the period from 1998-99 to 2013-14.To estimate the growth in variables overtime, trend growth rate has been estimated using semi-log linear relationship.In order to study the pattern, compound growth rates have been used.For doing so, we estimate the exponential relation:

$$Y_t = a\, b^t\, e^{u\,t}$$

Transforming the equation in linear form:

$$\log Y_t = \log a + t \log b + u_t$$

$\log Y_t$ = value of dependent variable,whose growth rate is to be computed.

t = trend/time variable.

u = stochastic disturbance term a & b are constant.

From the estimated value of regression co-efficient ëbí the compound growth rate was calculated as follows:

r = antilog (b-1) *100

Where,

r = compound growth rate, b = estimated value of the ordinary least square (OLS).

Further the capital-labour ratio, capital productivity and labour-productivity have estimated as:

Capital Labour Ratio=Capital Investment/Labour Employed

Labour Productivity= Gross Value Added/Labour Employed

Capital Productivity=Gross Value Added/Capital Investment

Section I: Evolution of Software Technology Parks of India (STPI) in Punjab

According to International Association of Science Parks ìTechnology

Park is an organization managed by specialized professionals, whose main aim is to increase the wealth of its community by businesses and knowledge-based institutions. To enable these goals to be met, a technology park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and market; it facilitates the creation and growth of innovation based companies through incubation and spin-off processes; and provides other value added services together with high quality space and facilitiesî. Technology Parks is a platform for promoting technology-intensive industries, a measure for generating high quality job opportunities and an initiative for providing high quality facilities and services for high technology industries.

Benefits of Technology Parks

Technology Parks has following benefits for the economic growth of the country:

** Creating world-class physical facilities and pre-emptive support services for attracting national and multi-national companies that nurture the growth of knowledge-based, technology ñ intensive industries

** Establishing and encouraging the new technology based firms and stimulate the growth of existing firms by expanding and dispersing the technology.

** Increase the growth potential and encourage competitiveness among the SMEís by facilitating with various incentives and services for generating technology innovation and employment.

** Technology Parks develop management strategies that enhance the linkages between tenants and firms, research institutions and universities.

Evolution of Technology Parks

The phenomenon of technology parks was originally setup with the aim to increase profitability by commercializing the university research and expanding entrepreneurship in the country. The idea became increasingly important and coexists with science, and with the collaboration of American companies and universities; in 1950 the first science park ìThe Stanford Research Parkî in California (Silicon Valley of USA) generated a wave in the economy. Taking inspiration from Silicon Valley, four other projects including Research Triangle Park came into existence. With the time, an effective role of Technology Park has proved to be

successful in attaining attention of other countries(Vila and Pages, 2008).

In present era, many developing countries like China, Singapore, India and France are moving towards the development of technology parks by expanding their innovative and technical potential. Technology Parks are not only helpful in regional development, creating job opportunities, knowledge-based growth of technology sector but also have capability to encourage global competitiveness. Such Parks provided a model that encourage the collaboration of private and public sector and also successful in attracting foreign investment and highñtechnology growth of the economy.

Origin of Technology Parks in India

During 1990ís, following the economic liberalization policy, the Government of India took a step to regulate the industrial trade and promote the foreign investment in the country and gave a new look to the industrialization by encouraging IT sector in the economy. Taking inspiration from other countries, government introduced the concept of technology parks in the country by establishing Software Technology Parks of India (STPI) scheme, in order to provide infrastructure to attract foreign direct investment and also to encourage domestic entrepreneurs with the ambition to generate business opportunities in thrust areas and derive benefits in global software and electronic markets. The Software Technology Parks were first established in 1991 in major cities Bangalore, Pune and Bhubaneswar with the support of Department of Communication and Information Technology. STPI was basically set up to promote exports of software by working directly with software companies.

Technological dynamism has become essential requirement for industrial growth that can be attained by swapping the traditional/backward techniques with advanced techniques of production (Sutcliffe, 1971).The dynamic strategy of technology parks is an attempt for endorsing entrepreneurship, expansion of knowledgeñbased industry and economic growth within the regions (Research & Industry, 1986, Link &Scott, 2003). Government of India has introduced several industry-oriented policies for promoting innovation and entrepreneur in the country with the aim to accelerate investment, generate employment opportunities, promote small and medium enterprises and also maximum utilization of available resources within the country.

Software Technology Parks of India and Punjab

Information Technology, a knowledge-based industry, proceeds as a locomotive, for speeding up economic growth, upgrading the productivity for all sectors of the economy, and proper utilization of available resources in the economy. It increases employment potential, linkages between private and public sector, enhances access to information and also creates investment for expansion of industries (Punjab Development Report, 2002). The software industry plays a prominent role in the growth strategy of the economy. The software industry in India is growing very fast and develops a market on globe. In India, developing technology parks in the area of information technology has proved a fruitful initiative by policy makers. After observing the impact and benefits of Software Technology Park, and for reaping the advantage of available skilled educated labour and generating export opportunities, the Centre Government took the initiative to develop technology parks related with IT/ITes in Punjab.

Software Industry is one of the growing industries in India, with significant contribution to foreign exchange. In order to give push to software export industry in state of Punjab, in concrete manner, the government took an initiative to provide an encouraging environment to entrepreneurs for performing the international practices within the state. Setting up Software Technology Parks of India in less industrialized state of Punjab, with the objective to promote software exports through on-site as well as off-shores services is the very effective step by Government of India. The software technology parks were encouraged to set up R&D units for making technology transfer, create employment opportunities for the educated youth, promote foreign collaboration and foreign investment and provide sound infrastructural facilities to the industry.

Software Technology Parks of India was started in year 1998 with export of Rs. 8 crores by the ministry of Information Technology, for the development of IT industry at state level in SAS Nagar (Mohali). The office of STPI is on rent located amid 3 acres of land at Industrial Area Phase VIII, of Mohali district with around 150 export oriented units.Depending upon the growing demand of IT industry, the bandwidth operated from STPI Mohali has been increased from 15mbps to 40 mbps for software services and Datacom facilities (Department of Industries and Commerce, Punjab).

Objectives of Software Technology Parks of India

Software Technology Parks of India was proposed to establish with the objective to introduce data communication infrastructure and computing

facilities and also provide and maintain the services like technology assessment, consulting and professional training in the state. The major objectives for establishing STPI are:

ξι. To encourage the exports of software and software services including IT/ITES.

ξιι. Providing promotional services like data communication services, value added services to the exporters of IT/ITES industry, through Software Technology Park scheme, Electronics and Hardware Technology Parks schemes and other schemes, that are introduced and formulated by the Government time to time.

ξιιι. Creating conducive environment for micro, small and medium entrepreneurs of IT/ITES industry by providing infrastructural facilities and professional training, upgrading technology according to the international standard, so that entrepreneurs can compete globally and achieve the customer satisfaction (Software Technology Parks of India, 2015).

To fulfill the objectives the STP schemes and EHTP schemes are introduced. A brief look on such schemes is:

Software Technology Park Scheme

(4) Single Window Clearance.

(5) 100percent Foreign Equity is permitted.

(6) All the imports in the STP units are duty free.

(7) Domestic purchases are completely excise duty free.

(8) The sales in domestic tariff area are permissible up to 50percent of the value of exports.

(9) Re-export of capital goods brought on loan/lease/free of cost is permitted.

Electronic and Hardware Technology Park Scheme

- EHTP units may import all types of goods, including capital goods, required for manufacture, services, production and processing will be free of duty.
- Units may procure goods required for manufacture, services from bonded warehouses in DTA setup under EXIM policy.
- The units shall also be permitted to import goods required for approved activities, free of cost or on loan from clients (Software Technology Parks of India,2015)

Section II: Status of Software Technology Park of India in Punjab

Technology Parks are considered as an essential component for edifying infrastructure and generating employment opportunities and also acts as funnel for policy makers in achieving the objective for sustainable development (Chadha & Kaur, 2012). Tables below, explicates the growth trends of some important variables through Software Technology Park of India for period 1998-99 to 2013-14.The table 1 reveals that the employment grew positively and has high growth rate. It has been observed that during the study period growth of investment in this area is positive but more than export turnover. From period 1998-99 to 2009-10, the investment grew positively, but after 2010-11, the investment decreases. The reason behind that is there is lack of domestic investment in the state in comparison to foreign investment and also due to lack of incentives provided by the government the number of registered units falls.

TABLE1
Growth Rates of Important Variables through Software Technology Park of India in Punjab

Year	*Investment (Rs. Crores)*	*Employment (No.)*	*Turnover (Rs. Crores)*
1998	98.66	48	9.74
1999	173.288	87	17.97
2000	626.32	325	61.11
2001	821.38	440	79.69
2002	1130.93	641	175.73
2003	1957.82	1129	271.43
2004	2725.24	1662	350
2005	4319.06	2634	476
2006	4689.64	2860	540
2007	5427.86	5023	682.67
2008	7092.33	6760	769
2009	7544.7	7427	779.73
2010	2042.81	9717	852.38
2011	1202.89	8767	843.8
2012	1359.56	12916	909.31
2013	1773.01	13431	976.82
CAGR	7.1	9.49	12.76

Source: Government of India (various issues),*Annual Reports*, Software Technology Park of India, Mohali

Table 2, depicts the growth of employment and units was very low in year 2006. The growth of employment is negative from year 2006 onwards and also shows downward trend in the share of per unit employment. It happens because the IT Sector depends upon the high-qualified manpower and capital.

TABLE 2

Trends in Growth of Employment and Units

Year	*No. of Employees*	*No. of Units*	*Per Unit Employment*
1999	0.32	0.81	0.77
2000	0.33	2.73	0.56
2001	0.09	0.35	0.23
2002	0.11	0.45	0.16
2003	0.10	0.76	0.12
2004	0.30	0.47	0.09
2005	0.07	0.58	0.08
2006	-0.05	0.08	0.06
2007	-0.10	0.75	0.05
2008	-0.06	0.34	0.04
2009	0.14	0.09	0.02
2010	-0.02	0.30	0.01
2011	-0.11	-0.09	0.01
2012	0.10	0.47	0.01
2013	-0.21	0.03	0.01

Source: Government of India (various issues),*Annual Reports*, Software Technology Park of India, Mohali

The chart represents the share of software exports through STPI Mohali in total software export through all centres of STPI of India. From period 1998-99 to 2004-05, the share has been increasing, because the private firm has been in the process of setting up IT infrastructure in the state. But from period 2006-07 to 2013-14, the share has declined, due to lack of proper direction and vision, non-conducive environment for the national as well as multinational companies in the state (Punjab Development Report, 2002).

Share of Software Export Turnover of STPI, Mohali in Total Software Export Turnover of STPI

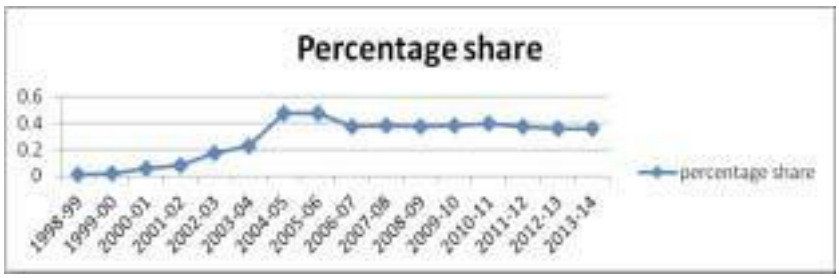

Table 3, represents the factor intensity and productivity of Software Technology Parks of India in Punjab from period 2005-06 to 2013-14. The table shows that the capital productivity is high in this area as compared to labour productivity. The software industry requires capital investment as well as well qualified manpower. The labour productivity is low comparative to capital productivity, as the IT sector depends on quality of man power and infrastructure. The IT sector is high qualityñoriented, human-resource intensive and requires consistent performance with high standards, and also knowledge-based skill oriented training; all these essentials are lagging in state (Punjab Development Report, 2002).

Table 3

Factor Intensity and Productivity of Software Technology Parks of India in Punjab

year	*Capital Labour Ratio*	*Labour Productivity*	*Capital Productivity*
2005-06	1.64	0.24	1.79
2006-07	1.58	0.21	1.74
2007-08	1.08	0.20	1.71
2008-09	1.05	0.19	1.68
2009-10	1.02	0.23	1.39
2010-11	0.21	0.24	1.35
2011-12	0.14	0.17	1.21
2012-13	0.11	0.14	1.03
2013-14	0.13	0.11	0.80

Source: Government of India (various issues),*Annual Reports*, Software Technology Park of India, Mohali

Section III

Constraints and Policy Implications

Constraints

Though State took an innovative step for promoting industries in the state, but there has not been any significant progress in the IT industry. No doubt the policies introduced by the state government to push IT industry in the state are quite impressive, but still state faces specific constraints in the growth of IT industry.

- Compared to other states of the country, the quality of infrastructure and manpower required for achieving the accelerated growth is not available in Punjab.
- The qualification of human resources is not suitable as required for IT industryís manpower.
- The IT industry in the state faces the deficiency of trained manpower.
- Both National and Multinational Companies faces, non-conducive environment for setting up IT industries in the state.
- The government provides in sufficient funds and incentives for the IT industries.

Policy Implications

The findings of study, has significant policy implications related with manufacturing sector of Punjab. Based on the major findings, following policy implications can be offered:

- From the above analysis, it is clear that the State has to follow the concerted policy of Software Technology Parks of India for revitalizing the software industry in the state for achieving the sustained growth of the economy as well as generation of employment (Chadha, 2015).
- A high-level committee should be introduced for the promotion of IT industry in the state that will formulate various innovative policies to attract more and more investors in the IT industry.
- New Innovations in the economy, is imperative for achieving balanced growth. For attaining global competitiveness, investment by industry in R&D sector should be encouraged (Kaur, 2013). The investment in R&D sector in the state is low. High growth of software industry will only happen if the government realizes to increase their investment in such sectors, which will result in improved quality of goods.

- For bridging the skill gaps, promoting innovation-based entrepreneurship, generating employment to attain sustainable livelihood, creating opportunities and developing high quality skilled workforce/ entrepreneurship especially for youth, women and disadvantaged group, the Center Government has introduced integrated National Skill Development Policy and Make-in-India schemes to forming entrepreneurial skills among the workforce (Baruah, 2015; Kaura, 2015).
- Initiatives like building up specialized Technology Parks for different industries would be very instrumental in stimulating the growth of employment both for male and female workers, besides inducing capital investment in the state. The State has already set up the Technology Parks for Apparels, Food, and IT sector such initiative will go a long way in increasing capital investment, diversifying as well as generating employment opportunities for skilled and trained workers..
- However, IT services require high quality manpower, state-of-the-art skills, world-class telecom and IT-Knowledge based environment.

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PSE ECONOMIC ANALYST, VOL. XXXII, 2017

EFFICIENCY OF SUB-NATIONAL PUBLIC EXPENDITURE IN INDIA: A CASE OF PUNJAB

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Abstract

The present paper analyses the efficiency of public expenditure at sub-national level in India with special reference to Punjab, a developed state in North India. After discussing the general profile of expenditure of the state government from 2002-03 to 2014-15, a comparison is made with other states of India in terms of important heads of public expenditure. Using input oriented Data Envelopment Analysis, the technical and allocative efficiency scores have been computed over a period of 10 years from 2002-03 to 2011-12.The major outcomes of the technical efficiency analysis are: i) Delhi is the most efficient state in terms of average technical efficiency of public expenditure while Punjab occupies the second rank, ii) in the year 2011-12, Punjab ranked at 5th place in terms of technical efficiency. The analysis of economic and allocative efficiency reveals that i)a major source of economic inefficiency is the allocative inefficiency ii) technical inefficiency is not a major source of economic inefficiency in public expenditure; iii) average allocative inefficiency is high in public expenditure of Punjab; and iv) the low allocative efficiency is pervasive phenomenon among the states and union territories under evaluation and thus, the ranking of Delhi and Punjab remains the same at 1st and 2nd places, respectively.

Introduction

With the changing role of the state under the welfare criterion, the growth of public expenditure has become a worldwide phenomenon. Growth of public expenditure has been attributed to rapid industrialisation of the

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economy, growth of population, urbanization and rigidity of some other current spending such as defense and social expenditure including subsidized public services (health and education) and capital expenditures in infrastructure projects. This phenomenon of steadily increasing public expenditure has affected both the developed and developing countries. Growing public expenditure without any commensurate growth of revenue may cause fiscal imbalance in the government accounts and can lead to high fiscal deficits. And this high level of fiscal deficit, as Rangarajan and Srivastava (2004) pointed out, ìnot only cause sharp increases in the debt-GDP ratio, but also adversely affect savings and investment, and consequently growth. The usability of fiscal policy as a tool of countercyclical intervention is also compromised when fiscal deficit is high and structural in natureî.

While studying the fiscal policy and macroeconomic performance of developing countries Easterly and Schmidt-Hebbel (1993) pointed out that fiscal deficits were at the forefront of macroeconomic adjustment in 1980s, in both developing and industrial countries. They were blamed in large part for the assortment of ills that beset developing countries during the decade: over-indebtedness, leading to the debt crisis that began in 1982; high inflation; and poor investment and growth performance. In 1990s fiscal deficits still occupy the centre stage in the massive reform programs initiated in Eastern Europe and the former U.S.S.R. and by many developing countriesî. India was also one such developing economy which initiated Economic Reform Programme in 1991 as one of the many problems facing the country at that time was high fiscal deficit and indebtedness.

The paradigm shift in public policy since 1991 has necessitated the sub-national governments to play an increasing role in order to create an enabling environment for the markets to function effectively. This responsibility can only be discharged efficiently if the states have adequate resources and use them efficiently for development. Herd and Leibfritz (2008) observed that the borrowing requirement (fiscal deficit) of state and local governments had reached nearly 10 percent of GDP by 2001 and public debt was rising significantly. One of the important components of state finances is the public expenditure. It is important to study the pattern, adequacy, quality and efficiency of public expenditure as it determines, to a certain extent, the need for borrowings by the governments and deficits in public finances. Public expenditure is classified in several ways like Plan-non-Plan, revenue-capital, development-non-development, etc. and this has been explained extensively in the case of India in a Report on Efficient Management of Public Expenditure (2011) by the Planning Commission of India. The Report also brings out that the international practices vary considerably with respect to classification of public expenditure.

The efficiency of public expenditure is as important in the context of sub-national governments as for the national government. The present study seeks to examine the efficiency of Public Expenditure in Punjab, a developed north Indian state over the period 2002 -03 to 2011-12 as compared with other major states of India. The paper is divided into four sections including the present introductory one. Section-2 deals with the profile of public expenditure in Punjab followed by section 3 explaining the sources of data, construction of variables and methodology applied to work out technical and allocative efficiencies of public expenditure. Section-4 presents the empirical evidence regarding the trends in technical and allocative efficiency of Public expenditure in Punjab using Data Envelopment Analysis (DEA) and compares Punjab with other major Indian states. The last section concludes the analysis.

Profile of Public Expenditure in Punjab

There has been fiscal instability in Punjab since the mid-1980s, which became more pronounced by the end of 1990s. Several reasons can be identified for the precarious fiscal health of the State and the slowdown of its economy in the last two decades. Punjab witnessed a decade long civil strife during 1980s which resulted in the breakdown of the administrative machinery of the state hampering the revenue mobilization capability of the government. Expenditure for the maintenance of law and order increased substantially and the spending on para-military forces in the state necessitated borrowings, thus adding to the public debt of the State. The Fifth Pay Commission recommendations for pay revision of the government employees were adopted by almost all the state governments, including Punjab, further adding to its revenue expenditure. The successive governments in the state extended subsidies to the farm sector in the form of free power and the State Level Public Enterprises also have huge accumulated losses. All these factors together resulted in deficits, mounting public debt, declining development expenditure and overall fiscal stress in Punjab. It is in this context that the efficiency of public expenditure has been analyzed in this paper.

For enhancing the levels of human development, the states are required to step up their expenditure on key social services like education, health etc. The fiscal priority to a particular sector is considered low, if it is below the respective national average. In Table 1 the fiscal priority of the state government with regard to development expenditure, expenditure on social sector and capital expenditure etc. is shown.

Table 1

Expenditure Profile of Punjab

(percent)

Year	*AE/GSDP*	*DE/AE*	*SSE/AE*	*CE/AE*	*EDU/AE*	*HEALTH/AE*
2002-03	21.08	34.17	17.25	14.49	12.07	3.52
2003-04	22.57	34.20	17.36	22.78	10.23	2.99
2004-05	21.68	37.65	17.86	18.08	10.14	2.90
2005-06	18.83	42.76	19.80	10.97	11.28	3.42
	(17.58)	(61.39)	(30.91)	(13.92)	(15.02)	(4.06)
2006-07	20.74	39.43	17.91	29.48	8.88	2.66
2007-08	17.36	44.75	18.82	13.04	10.29	2.87
	(16.85)	(64.28)	(32.54)	(16.14)	(14.64)	(3.98)
2008-09	16.54	44.81	23.83	10.40	11.29	2.96
	(17.00)	(67.09)	(34.28)	(16.47)	(15.41)	(3.97)
2009-10	15.85	43.05	22.71	12.46	12.21	3.17
	(18.18)	(66.11)	(35.76)	(14.85)	(16.18)	(4.29)
2010-11	16.34	42.79	22.53	11.23	11.71	3.32
	(16.68)	(64.29)	(36.68)	(13.49)	(17.00)	(4.34)
2011-12	14.36	45.95	27.1	10.23	14.77	4.34
	(16.09)	(66.44)	(36.57)	(13.25)	(17.18)	(4.30)
2012-13	15.61	49.64	28.2	11.34	15.31	4.28
	(15.93)	(65.79)	(32.77)	(13.23)	(17.23)	(4.47)
2013-14	15.01	48.05	27.5	12.62	14.23	4.13
	(15.92)	(66.45)	(37.56)	(13.62)	(17.20)	(4.51)
2014-15	15.21	48.54	29.1	12.41	14.33	4.44
	(16.49)	(69.12)	(36.50)	(14.01)	(16.23)	(5.04)

Note : Figure in parenthesis is General Category Statesí Average for the years it was available.

Source: RBI State Finances: A Study of Budgets and CAG Reports, Various Issues.

Public expenditure indicated by the ratio of aggregate expenditure (AE) to GSDP is greater than the General Category States (GCS) since 2005-06 and this trend continued till 2007-08. From 2008-09 this trend reversed and stateís ratio has fallen below the average of GCS.

Development expenditure (DE) refers to the expenditure on economic and social sector. Increased priority to development will result in better human and physical asset formation which will further increase the growth prospects of the state. In case of Punjab, lower priority was given to the development expenditure, as lower proportion of aggregate expenditure as compared to General Category States is spent under this head.

Since the beginning of the study period ratio of DE in Punjab is much below the General Category States average. From 2005-06 to 2010-11 the ratio remained around 42-44 percent while that of General Category States remained more than 61-66 per cent. During later years this ratio of development expenditure increased to nearly 49 percent but by this time average for General Category States also increased to 69 percent. This showed that Punjabís performance remained poor in terms of expenditure on developmental activities. Similarly, lower priority has been given to the social service expenditure as compared to General Category States. From 2002-03 to 2007-08 the ratio of social service expenditure (SSE) remained less than 20 percent while General Category States average was more than 30 percent. Since 2010-11, this ratio went up and varied around 27-29 percent for Punjab but it remained lower than the General Category Statesí average. This showed that the state has been continuously lagging behind in terms of social service expenditure. Similarly, the ratio of capital expenditure (CE) as well as the expenditure on education and health services has remained below the comparable ratios for average of GCS. This analysis shows that Punjab has not paid adequate attention to the delivery of basic and important social services and creation of capital assets in the state over the study period.

To take the analysis further, table 2 presents a comparison of expenditure on social services by all the states in India. It is apparent from the table that Punjab has performed poorly as compared to the national average. From the year 2002-03 to 2007-08 the ratio fell below 20 percent whereas the national average fluctuated between 28.4 to 35.3 percent during the same period. It was only during recent years (2011-12 to 2014-15) when this expenditure on social services came close to 30 percent but by this time national average rose to nearly 40 percent.

Table 2- Social Sector Expenditure to Aggregate Disbursements

(Per cent)

State	2002 03	2003 04	2004 05	2005 06	2006 07	2007 08	2008 09	2009 10	2010 11	2011 12	2012 13	2013 14	2014 15
Non-Special Category States													
Andhra Pradesh	32.5	33.3	29.3	30.8	32.9	32.7	38.9	35.6	38.9	39.2	38.2	39.3	41.2
Bihar	36.4	36.7	30.5	38.4	41.0	43.8	43.9	41.8	38.2	40.0	44.4	43.4	44.8
Chhattisgarh	41.3	36.2	37.7	44.2	47.6	46.2	50.1	54.2	50.2	51.6	48.7	53.4	50.2
Goa	26.1	28.4	31.4	30.9	31.8	31.6	32.2	32.5	33.5	33.1	34.0	35.8	35.2
Gujarat	30.4	27.3	29.0	32.1	33.4	34.9	35.0	38.4	39.9	38.2	38.7	40.0	40.5
Haryana	26.6	18.6	24.2	32.0	28.5	33.3	37.2	41.0	39.6	40.9	40.8	37.0	39.3
Jharkhand	50.0	44.4	44.1	45.9	47.0	43.5	47.8	44.2	46.4	41.2	39.6	39.0	44.3
Karnataka	31.4	28.4	28.5	33.4	32.7	36.7	37.8	39.9	39.9	37.8	39.2	37.6	40.0
Kerala	37.4	30.0	36.2	35.6	31.0	31.4	33.4	33.6	33.4	34.8	34.9	34.5	35.7
Madhya Pradesh	37.7	28.4	34.7	32.5	35.3	35.7	36.7	35.2	39.0	33.6	40.0	39.8	39.7
Maharashtra	33.3	30.9	28.1	35.3	37.3	37.0	36.8	40.3	41.4	41.1	42.6	41.9	42.7
Odisha	31.7	28.0	28.9	34.2	31.7	35.9	41.6	41.0	42.3	42.9	41.6	44.2	44.6
Punjab	**17.2**	**17.3**	**17.8**	**19.8**	**17.9**	**18.8**	**23.8**	**22.7**	**22.5**	**27.1**	**28.2**	27.5	**29.1**
Rajasthan	37.3	35.7	34.1	40.1	39.5	38.9	45.2	44.3	42.4	42.6	41.5	44.5	47.1
Tamil Nadu	32.0	34.3	33.6	36.9	33.1	35.9	39.7	40.3	40.2	38.3	38.5	41.1	39.9
Uttar Pradesh	31.1	18.7	28.6	33.7	32.1	34.4	37.8	39.0	37.7	38.8	38.8	38.1	36.6
West Bengal	30.5	23.4	29.1	28.2	31.9	34.7	31.9	41.7	41.9	42.5	42.1	42.1	46.5
All States (NSC+SSC States)	**32.6**	**28.4**	**29.6**	**33.7**	**33.9**	**35.3**	**37.6**	**38.7**	**39.0**	**38.7**	**39.3**	**39.0**	**41.0**

Source: RBI State Finances: A Study of Budgets 2016-17

Note: a- Classifications as per RBI; b.- Includes expenditure on social services, rural development and food storage and warehousing under revenue expenditure, capital outlay and loans and advances by the State Governments.

Table 3 shows that Punjab has devoted less resources as compared to national average for the promotion of education. The ratio for Punjab consistently remained below the national average throughout the period. If a comparison is made only among the non-special category states then it has performed better than some states (but not consistently) like Andhra Pradesh, Madhya Pradesh and for the year 2012-13 it performed better than Gujarat, Jharkhand and Tamil Nadu also.

Another major area of government expenditure is medical, public health and family welfare. In terms of expenditure on public health also, Punjab performed lower than the national average on a consistent basis throughout the period. If a comparison is made among the non-special category states, Table 4 shows that Punjab has outperformed only the state of Haryana and during the recent years this ratio remained more than that of Bihar, Chhattisgarh, Jharkhand and Maharashtra but its ratio remained lower than other Non-special category states.

This analysis shows that as far as share of expenditure is concerned towards the major social services and especially health and education, the performance of Punjab has been far from satisfactory. The state has performed below the national average as well as among non-special category states.

Further the efficiency of public expenditure in Punjab has been looked into. One of the desired canons of public expenditure is the canon of efficiency. The expenditure incurred by the government must be technically and allocatively efficient. However, the expenditure is allocatively efficient if the chosen combination of inputs is technically as well as economically efficient i.e., the chosen combination of public inputs must be cost effective too. Thus, the analysis of technical and allocative efficiency of public expenditure assumes importance in deciding the allocation of funds to Indian states. In a federal setup, a state with higher efficiency must be provided more funds in comparison to those with low efficiency.

The analysis of technical and allocative efficiency can be performed using either output or input oriented approaches. The output oriented approach deals with an objective of maximization of output of state given constant combination of public inputs whereas, the input oriented approach deals with the objective of input minimization to produce given combination of output of state. The input oriented approach suits our objective to evaluate the efficient allocation of public inputs i.e., different types of public expenditure. The analysis will help to rank the efficiency

Table 3 - Expenditure on Education– As Ratio to Aggregate Disbursements

(Per cent)

State	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Non Special Category States													
Andhra Pradesh	11.7	11.6	9.8	11.1	10.8	9.0	9.0	10.0	12.5	13.0	12.9	13.7	13.6
Bihar	18.4	18.9	15.8	19.6	19.7	17.6	18.5	18.1	16.3	17.0	20.9	18.7	17.5
Chhattisgarh	11.0	10.8	12.3	13.4	12.9	13.5	14.4	15.6	18.6	17.7	16.3	18.0	20.2
Goa	13.0	12.1	13.9	12.3	13.7	12.3	13.3	14.1	13.4	14.8	13.4	13.7	13.1
Gujarat	13.5	11.2	11.5	12.6	12.7	13.4	11.7	13.8	15.9	15.8	14.3	15.0	15.2
Haryana	13.7	10.2	11.6	10.4	11.9	12.9	15.0	16.0	17.0	16.0	15.4	15.4	16.9
Jharkhand	19.0	14.2	14.9	15.8	15.2	15.1	18.6	13.4	15.8	15.9	14.8	13.5	14.6
Karnataka	14.8	12.9	12.7	14.0	13.1	14.4	16.1	14.0	15.6	14.7	15.5	15.0	14.3
Kerala	17.6	15.7	16.2	16.6	17.1	15.9	16.7	16.8	17.0	17.7	17.2	17.2	16.4
Madhya Pradesh	12.2	9.9	8.8	10.2	12.4	11.1	12.8	13.0	14.2	12.4	13.2	13.4	14.8
Maharashtra	18.9	15.5	14.0	15.7	16.4	17.2	17.0	19.1	20.8	20.2	20.7	20.5	19.2
Odisha	14.3	13.2	12.6	14.7	12.8	14.7	16.9	18.2	18.7	16.4	15.5	15.0	15.5
Punjab	**12.1**	**11.2**	**11.1**	**11.3**	**8.9**	**10.3**	**11.3**	**12.2**	**11.7**	**14.8**	**15.3**	**14.2**	**14.3**
Rajasthan	15.5	14.1	13.8	17.3	15.6	14.6	17.9	19.0	19.1	17.8	16.1	16.3	16.7
Tamil Nadu	13.8	12.6	11.2	11.6	12.2	12.7	13.1	15.2	15.2	14.7	14.7	16.0	15.8
Uttar Pradesh	14.6	9.1	12.5	15.2	14.7	14.1	13.2	13.8	16.1	17.1	17.3	16.0	15.0
West Bengal	15.9	11.8	14.9	13.7	15.2	15.2	13.1	17.7	19.7	19.1	18.1	17.2	17.2
All States (NSC+SC States)	**15.1**	**12.6**	**12.7**	**14.2**	**14.0**	**13.8**	**14.3**	**15.3**	**16.6**	**16.3**	**16.4**	**16.5**	**16.0**

Source: RBI State Finances: A Study of Budgets 2016-17.

Note: a. Classifications as per RBI, b. Includes expenditure on social services, rural development and food storage and warehousing under revenue expenditure, capital outlay and loans and advances by the State Governments.

performance of states and derive the implications that how the state under evaluation could have incurred less expenditure to produce the given level of output.

Database, Construction of Variables and Methodology Used

The study is based on the secondary data of state finances obtained from various issues of the Reserve Bank of India publication on State Finances: A Study of Budgets. In order to evaluate the technical and allocative efficiency of public expenditure, well defined sets of outputs and inputs are required. A state works as a multiproduct firm having a number of social and economic outputs. The variables such as Gross Enrollment Ratio, infant mortality etc. indicate social output whereas, the variable like per-capita state domestic product indicates the economic output of the state under evaluation. However, due to the data limitations regarding social indicators, the per-capita net state domestic product at factor cost has been used as an indicator of the output of states.

Construction of Variables

Four public sector inputs namely i) Revenue expenditure-Planned; ii) Revenue expenditure- Non-planned; iii) Capital expenditure-Planned; and iv) Capital expenditure-Non-planned have been used for the evaluations of efficiencies.

As per the macroeconomic theory, Net National Product at factor cost is the true indicator of national income and so the net state domestic product (NSDP) at factor cost will be true indicator of domestic income. For the normalization purpose and remove state specific heterogeneity, all output and inputs have been divided by the population of state and figures are obtained in per-capita terms. It is worth mentioning here that the population of the state has been obtained by dividing the State domestic product at current prices by per-capita State domestic product; both series are available in aforementioned data source of RBI. For neutralizing the effect of inflation, the figures at constant prices have been used instead of the data on current prices. The multi deflation technique has been followed instead of using single deflator for each state. The implicit deflators have been constructed for each state by dividing the NSDP at Factor cost at current prices by the NSDP at factor cost at constant prices. Using the splicing method, the deflators have been spliced to the year 2004-05=100. Thus, all the variables are in per-capita terms at constant prices of base 2004-05.

Table 4 Expenditure on Medical and Public Health and Family Welfare – As Ratio to Aggregate Disbursements

(Per cent)

State	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Non-Special Category States													
Andhra Pradesh	4.0	3.7	3.9	3.4	3.3	3.3	3.6	3.9	4.1	4.4	4.2	4.3	4.1
Bihar	4.2	3.8	3.1	4.5	4.2	4.1	3.5	3.5	3.3	3.5	3.5	3.2	3.8
Chhattisgarh	4.0	3.3	3.3	3.4	3.5	3.2	3.5	3.7	3.6	3.8	3.7	3.9	4.0
Goa	4.0	4.5	4.7	4.9	4.6	4.6	5.1	5.3	5.6	5.8	5.8	5.7	5.6
Gujarat	3.0	2.7	2.8	3.1	2.9	3.2	3.1	3.8	4.2	4.2	4.7	4.9	5.5
Haryana	3.3	2.4	2.7	3.1	3.5	3.6	3.9	3.4	3.2	3.1	3.4	3.6	4.0
Jharkhand	4.2	4.1	3.7	6.9	6.3	5.0	5.1	4.4	4.1	3.8	3.1	3.8	4.0
Karnataka	4.2	3.4	3.0	3.3	3.1	3.8	3.8	3.6	3.9	3.9	4.1	4.1	4.5
Kerala	4.8	4.9	4.5	4.7	4.9	4.5	4.8	4.8	5.1	5.4	5.2	5.2	5.3
Madhya Pradesh	4.1	3.3	3.1	3.4	3.8	3.5	3.4	3.3	3.6	3.9	4.0	3.8	4.3
Maharashtra	3.7	3.2	2.7	3.2	3.1	3.5	3.5	3.3	3.6	3.6	3.9	3.9	4.3
Odisha	3.8	3.2	4.0	3.0	3.1	3.3	3.5	3.8	3.5	3.3	3.7	3.5	4.0
Punjab	3.5	3.0	2.9	3.1	2.7	2.9	3.0	3.2	3.3	4.3	4.3	4.1	4.1
Rajasthan	4.2	4.0	3.7	4.4	4.1	4.0	4.8	4.8	4.8	5.1	4.8	5.0	5.6
Tamil Nadu	4.1	3.8	3.2	4.2	3.3	3.3	3.7	4.8	4.8	4.0	4.1	4.3	4.7
Uttar Pradesh	3.8	3.7	3.8	5.1	5.7	4.8	4.7	5.0	4.8	4.4	5.0	4.6	5.1
West Bengal	4.9	3.7	4.2	3.9	4.1	4.0	3.6	4.8	4.8	4.8	4.2	4.3	5.2
All States (NSC+SC States)	4.0	3.4	3.4	3.9	3.9	3.8	3.9	4.2	4.2	4.2	4.3	4.4	4.8

Source: RBI State Finances: A Study of Budgets 2016-17.

Note: a- Classifications as per RBI; b.- Includes expenditure on social services, rural development and food storage and warehousing under revenue expenditure, capital outlay and loans and advances by the State Governments.

Measuring Efficiency: A Non-Parametric Frontier Approach

To be precise, the concept of technical efficiency refers to the producerís ability to avoid the waste of the resources by producing as much output as input usage allows, or by using as little input as output production allows. Simply, technical efficiency is a measure of how well the inputs are converted into output(s) by the production process (Avkiran, 2006). Sherman (1988) defines technical efficiency as ëthe ability to produce the outputs or services with a minimum level of resources requiredí (see Avkiran (2006) for detailed discussion).

Several different mathematical programming Data Envelopment Analysis (DEA) models have been proposed in the literature (see Charnes et al., 1994). Essentially, these DEA models seek to establish which of the n decision making units (DMUs) determine the envelopment surface, or efficiency frontier. The geometry of this surface is prescribed by the specific DEA model employed. In the present study we use the input-oriented CCR model named after Charnes, Cooper and Rhodes (1978), to get a scalar measure of technical efficiency[1]. To illustrate input-oriented CCR model, consider a set of DMUs, $j = 1,2,..., n$, utilizing quantities of inputs $X \in R_+^m$ to produce quantities of outputs $Y \in R_+^s$. We can denote x_{ij} the amount of the ith input used by the jth DMU and y_{rj} the amount of the rth output produced by the DMU. Assuming constant returns to scale (CRS), strong disposability of inputs and outputs and convexity of the production possibility set, the technical efficiency score of the DMU k(h_k) can be obtained by solving following model (Charnes et al., 1978):

$$\min \ \theta_k - \varepsilon \left(\sum_{r=1}^{s} s_r^+ + \sum_{i=1}^{m} s_i^- \right)$$

subject to:

$$\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta_k x_{ik} \qquad i = 1,2,...,m;$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{rk} \qquad r = 1,2,...,s; \quad (1)$$

$$\theta_k \text{ free}, \ \lambda_j \geq 0, \qquad j = 1,2,...,n.$$

$$s_r^+, s_i^- \geq 0 \quad 0 < \varepsilon \leq 1$$

In the said model, input weights of DMU *k* are denoted by θ_k and the input and output weights of other DMUs in the sample by λ_j. The model has m + s constraints and the number of DMUs (n) should usually be considered larger than the number of inputs and outputs *(s + m)* in order to provide a fair degree of discrimination of results. In the present study, we solved Model (1) to obtain technical efficiency scores for 28 Indian states.

Underlying the CCR method is the assumption of constant returns-to-scale (CRS). The CRS assumption is only appropriate when DMUs are operating at an optimal scale. Imperfect competition, constraints on finance, etc., may cause a DMU to be not operating at optimal scale [Coelli, Rao and Battesse (1999)]. The BCC model modifies the CCR model by allowing variable returns-to-scale (VRS). This is done by simply

adding the convexity constraint $\sum_{j=1}^{n} \lambda_j = 1_2$ into problem (1). The solution

obtained via solving BCC model is denoted by TE_{VRS}. Clearly, $TE_{CRS} \leq TE_{VRS}$. Note that the BCC method measures purely the technical efficiency whereas CCR method measures both pure technical efficiency and scale efficiency. By using TE_{CRS} and TE_{VRS} measures, we derive a measure of scale efficiency i.e., $SE = TE_{CRS}/TE_{VRS}$. However scale inefficiency can be due to the existence of either sub-optimal scale size (i.e., increasing returns-to-scale (IRS)) or supra-optimal scale size (i.e., decreasing returns-to-scale (DRS)). The nature of scale inefficiencies for a particular DMU can be determined by executing an additional DEA program with the assumption of non-increasing returns-to-scale (NIRS) imposed. By adding

the restriction $\sum_{j=1}^{n} \lambda_j \leq 1$ in DEA model (1) the TE scores assuming

NIRS can be calculated. The calculation of technical efficiency assuming NIRS facilitates the identification of the nature of returns-to-scale. Let the measure of TE assuming NIRS be denoted by TE_{NIRS}. The existence of increasing or decreasing returns-to-scale can be identified by seeing whether the TE_{NIRS} is equal to the TE_{VRS}. The process for determining the nature of returns-to-scale is as follows:

(10) If $TE_{NIRS}=TE_{VRS}$ and $TE_{NIRS}=TE_{CRS}$ then Constant *returns-to-scale*;

(11) If $TE_{NIRS} \neq TE_{VRS}$ then Increasing *returns-to-scale*; and

(12) If $TE_{NIRS}=TE_{VRS}$ and $TE_{NIRS} \neq TE_{CRS}$ then decreasing *returns-to-scale.*

Extending DEA for Measuring Economic Efficiency

However, to carry out the analysis of economic efficiency, the following DEA model will be executed:

$$\min C_k = \sum_{i=1}^{m} p_i^k x_i^k$$

subject to:

$$\sum_{j=1}^{n} \lambda_j x_{ij} \le x_{ikj} \qquad i = 1, 2, ..., m;$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} \ge y_{rkj} \qquad r = 1, 2, ..., s; \quad (2)$$

$$\lambda_j \ge 0, \qquad j = 1, 2, ..., n.$$

$$s_r^+, s_i^- \ge 0$$

$$0 < \varepsilon \le 1$$

In above model, the p_i represents price paid to use i^{th} input x_i by state k. Thus, the scalar C_k is the cost of production incurred by k^{th} state (see, Coelli and Rao, for details on the model).

Empirical Evidences

The execution of model (1) provides the technical efficiency estimates of 28 major states over the period of 10 years. Table 5 provides these estimates along with the rank of each state. The ranking of inefficient states on the basis of overall technical efficiency (OTE) is an easy task; i.e., a state with high OTE score is provided better rank and *vice-versa*. However, the ranking of best practice states is difficult as each best-practice state score OTE equals unity. The researchers use different methods for ranking the best-practice decision making units (DMUs). In our case, the frequency count of benchmark states in terms of its occurrence in the reference set of inefficient states has been taken as the yardstick to rank efficient states. Higher the number of times a state occurs in the reference set of inefficient states, better the rank and *vice-versa*.

Table 5 confirms that the public expenditure is technically efficient by the proportion 63.46 percent in India; i.e. 36.54 percent lesser expenditure could have been incurred to produce the given level of per-capita income. In terms of ranking the states, the public expenditure found to be most efficient in two states namely, Delhi and Punjab ranked at 1st and 2nd position. These states have been observed technically efficient with a technical efficiency score equal to unity and thus, observed

to be forming the best practice frontier in each of 10 years. Though both the states scored equal in terms of technical efficiency, the ranking is done on the basis of number of times a state appeared in the reference set of inefficient states. Thus, the state of Punjab observed to be second most efficient state after Delhi in minimizing the public expenditure to produce the given level of per capita income of state.

Given that Punjab is technically efficient, the analysis of economic efficiency becomes imperative to find out the causes of poor fiscal outcomes in Punjab. To carry out the analysis of economic efficiency a well-defined set of factor prices is required. In our analysis, the implicit deflators have been taken as the indicator of prices for revenue expenditure, whereas, the average prime lending rate of banks has been used as proxy variable for prices of capital expenditure.

Table-6 provides the components of economic efficiency obtained by estimating model (2) for the 28 states over the period of 10 years. The analysis reveals that the economic inefficiency at All-India level is to the tune of 64.99 percent (i.e. 1-0.3501=0.6499). Thus, the public expenditure in India is economically inefficient by all standards. Given that the economic efficiency score can be bifurcated into two mutually exclusive non-additive components namely, allocative and technical efficiencies, the analysis helps to identify the causes of observed inefficiency. The analysis of Table-7 reveals that 45.77 percentage points of 64.99 percent economic inefficiency has been contributed by allocative inefficiency and the remaining portion is subject to technical inefficiency. Hence, the Indian states failed to select the most economical combination of public expenses.

The analysis of the components of economic efficiency of Punjab reveals that though Punjab is technically efficient in public spending yet the level of economic efficiency is very low. The observed 31.54 (i.e., 1-0.6846) percent level of economic inefficiency is despite the selection of economically inefficient collection of inputs. When a decision making unit fails to select the combination of inputs that minimize the cost of production, the unit is called allocatively inefficient. Hence, Punjab fails to allocate the input up to the minimum cost level.

However, the inter-temporal analysis of Punjab reveals that the level of economic inefficiency was the highest in the year 2006-07 when the economic efficiency had fallen to the lowest level of 22.4 percent. The perusal of Table-7 and Figure-1 also confirms that the decline in economic efficiency had been observed from 2002-03 to 2006-07. However, after 2006-07 the economic efficiency of Punjab started improving and attained a level of unity in the year 2009-10; a level maintained by the state during the recent three years 2009-10, 2010-11 and 2011-12 of the study.

Table 5: Ranking the States on the basis of Overall Technical Efficiency in Public Expenditure

States	Years											
	2002-03		2003-04		2004-05		2005-06		2006-07		2007-08	
	OTE	Rank	OTE	Rank	OTE	Rank	OTE	Rank	OTE	Rank	OTE	Rank
Andhra Pradesh	0.3638	12	0.3056	17	0.8103	8	0.4512	12	0.4439	13	0.6770	10
Arunachal Pradesh	0.0551	26	0.0427	28	0.0755	27	0.0883	26	0.0722	28	0.1127	25
Assam	0.6022	8	0.7380	8	0.3330	20	0.5112	11	0.4471	12	0.5686	14
Bihar	0.3443	14	0.6159	9	0.6434	11	0.5318	10	0.4117	14	0.6174	13
Chhattisgarh	0.2892	16	0.2281	20	0.2963	21	0.3725	18	0.3268	20	0.2973	20
Delhi	1.0000	4	1.0000	4	1.0000	3	1.0000	5	1.0000	3	1.0000	4
Goa	0.3234	13	0.2728	19	0.3211	17	0.3384	19	0.3233	15	0.3655	17
Gujarat	0.6099	7	0.5236	11	0.5605	14	0.6536	9	0.6199	8	0.7430	8
Haryana	1.0000	3	1.0000	6	1.0000	1	0.9738	6	0.6993	6	0.6419	11
Himachal Pradesh	0.1533	24	0.2211	21	0.6634	10	0.3369	20	0.3007	21	0.6890	9
Jammu & Kashmir	0.1924	21	0.2870	18	0.3585	19	0.3154	21	0.5467	10	1.0000	6
Jharkhand	0.2552	20	0.7668	7	0.6359	12	0.4379	16	0.3570	19	0.2587	22
Karnataka	0.3688	11	0.3485	16	0.5939	13	0.4498	13	0.3661	16	0.7671	7
Kerala	0.6817	5	1.0000	5	1.0000	4	1.0000	3	1.0000	1	1.0000	5
Madhya Pradesh	0.2341	17	0.3632	15	0.3586	18	0.3886	17	0.3433	18	0.2974	19
Maharashtra	1.0000	1	1.0000	3	0.9943	5	1.0000	3	0.9744	4	1.0000	3
Manipur	0.2294	18	0.1741	23	0.1397	25	0.1308	25	0.1208	25	0.1081	26
Meghalaya	0.1884	22	0.1568	24	0.2081	24	0.2685	22	0.2596	23	0.2858	21
Mizoram	0.0704	25	0.0554	26	0.0971	26	0.0733	27	0.0751	27	0.0949	27
Nagaland	0.2387	19	0.1341	25	0.2089	23	0.1619	24	0.1800	24	0.1327	24
Orissa	0.3276	15	0.4733	12	0.8330	7	0.7699	7	0.5484	9	0.5263	15
Punjab	*1.0000*	2	*1.0000*	2	*1.0000*	2	*1.0000*	1	*1.0000*	2	*1.0000*	1
Rajasthan	0.3736	10	0.4013	14	0.4435	16	0.4423	14	0.5444	11	0.4238	16
Sikkim	0.0408	27	0.0514	27	0.0511	28	0.0668	28	0.0775	26	0.0717	28
Tamil Nadu	0.6120	6	0.4066	13	0.6824	9	0.7590	8	0.6531	7	0.6858	12
Tripura	0.1832	23	0.1288	22	0.2208	22	0.2126	23	0.2446	22	0.1728	23
Uttar Pradesh	0.5514	9	0.5843	10	0.5080	15	0.4017	15	0.3571	17	0.3356	18
West Bengal	1.0000	3	1.0000	1	0.9921	6	1.0000	4	0.8335	5	1.0000	2
All-India	0.4406		0.4767		0.5393		0.5031		0.4681		0.5295	

Notes: i) OTE represents overall technical Efficiency; and ii) the figures of All India are arithmetic mean of 28 states under evaluation.

Table 5: Contd....

States	Years									
	2008-09		2009-10		2010-11		2011-12			
	OTE	Rank	OTE	Rank	OTE	Rank	OTE	Rank	OTE	Rank
Andhra Pradesh	0.4670	14	0.4810	10	0.5567	9	1.0000	5	0.5567	10
Arunachal Pradesh	0.0619	28	0.0596	27	0.0722	28	0.1024	21	0.0743	27
Assam	0.3018	17	0.3450	14	0.3462	15	0.2612	14	0.4547	15
Bihar	0.3217	20	0.2558	20	0.2496	20	1.0000	5	0.4992	13
Chhattisgarh	0.4426	16	0.3156	15	0.3209	16	0.2376	16	0.3127	21
Delhi	1.0000	4	1.0000	4	1.0000	5	1.0000	4	1.0000	2
Goa	0.4518	15	0.2945	17	0.4424	12	0.3944	11	0.3705	19
Gujarat	0.6132	8	0.8340	7	0.7403	7	1.0000	5	0.6907	7
Haryana	0.7567	7	0.7053	8	1.0000	4	1.0000	5	0.8767	6
Himachal Pradesh	0.3467	19	0.2451	21	0.3077	17	1.0000	4	0.4263	16
Jammu & Kashmir	1.0000	5	1.0000	5	0.5513	10	0.8669	6	0.6119	9
Jharkhand	0.3011	11	0.2123	22	0.2093	22	0.2724	13	0.3847	18
Karnataka	0.4955	12	0.3937	13	0.4001	14	1.0000	3	0.5184	12
Kerala	1.0000	1	0.9741	6	0.9684	6	1.0000	2	0.9627	3
Madhya Pradesh	0.3795	18	0.3104	16	0.2643	19	0.3310	12	0.3290	20
Maharashtra	1.0000	3	1.0000	3	1.0000	3	1.0000	3	0.9969	3
Manipur	0.1240	26	0.0855	25	0.1001	26	0.0842	22	0.1307	25
Meghalaya	0.2238	22	0.2622	18	0.1795	23	0.1647	18	0.2157	23
Mizoram	0.1372	25	0.0958	24	0.0908	27	0.1050	19	0.0805	26
Nagaland	0.1670	24	0.1280	23	0.1330	24	0.1835	17	0.1650	24
Orissa	0.5166	10	0.4810	11	0.4054	13	0.4835	9	0.5360	11
Punjab	*1.0000*	2	*1.0000*	1	*1.0000*	1	*1.0000*	1	*1.0000*	1
Rajasthan	0.4844	13	0.4097	12	0.5036	8	0.6011	7	0.4718	14
Sikkim	0.0682	27	0.0671	26	0.1065	25	0.1030	20	0.0714	28
Tamil Nadu	0.5806	9	0.7324	9	0.5503	11	0.5253	8	0.6185	8
Tripura	0.1827	23	1.0000	5	0.2108	21	0.2452	15	0.2822	22
Uttar Pradesh	0.3107	21	0.2593	19	0.2863	18	0.4154	10	0.4050	17
West Bengal	0.8850	6	1.0000	3	1.0000	3	1.0000	3	0.9713	4
All India	0.4978		0.5016		0.4678		0.5874		0.5011	

Note: i) OTE represents overall technical Efficiency, and ii) the figures of All-India are arithmetic mean of 28 states under evaluation

Source: Authors' Calculations

Table 6: Components of Economic Efficiency in Public Expenditure of Indian States

States	Overall Technical Efficiency		Allocative Efficiency		Economic Efficiency	
	Score	Rank	Score	Rank	Score	Rank
ANDHRA PRADESH	0.7460	9	0.5027	20	0.3626	12
ARUNACHAL PRADESH	0.2090	27	0.3745	27	0.0735	28
ASSAM	0.6220	16	0.4525	24	0.2933	18
BIHAR	0.6599	13	0.4861	22	0.3210	15
CHHATTISGARH	0.6233	15	0.4330	26	0.2615	20
DELHI	1.0000	1	0.7513	1	0.7513	1
GOA	0.5695	20	0.6230	5	0.3525	13
GUJARAT	0.8217	7	0.5636	11	0.4579	7
HARYANA	0.9196	6	0.6047	7	0.5594	5
HIMACHAL PRADESH	0.5584	21	0.5514	14	0.3081	16
JAMMU & KASHMIR	0.6744	12	0.4362	25	0.2601	21
JHARKHAND	0.5929	17	0.5017	21	0.2840	19
KARNATAKA	0.7253	11	0.5329	17	0.3817	9
KERALA	0.9858	5	0.5777	9	0.5699	4
MADHYA PRADESH	0.5836	18	0.5214	18	0.3026	17
MAHARASHTRA	0.9977	3	0.6563	3	0.6558	3
MANIPUR	0.2342	25	0.5384	16	0.1291	25
MEGHALAYA	0.4520	22	0.3678	28	0.1657	24
MIZORAM	0.2097	26	0.4527	23	0.0911	26
NAGALAND	0.2926	24	0.6131	6	0.1785	23
ORISSA	0.7296	10	0.5089	19	0.3710	11
PUNJAB	*1.0000*	*2*	*0.6846*	*2*	*0.6846*	*2*
RAJASTHAN	0.6466	14	0.5881	8	0.3775	10
SIKKIM	0.1435	28	0.6270	4	0.0823	27
TAMIL NADU	0.7974	8	0.5630	12	0.4476	8
TRIPURA	0.4066	23	0.5747	10	0.2150	22
UTTAR PRADESH	0.5805	19	0.5562	13	0.3307	14
WEST BENGAL	0.9866	4	0.5409	15	0.5355	6
All-India	**0.6346**		**0.5423**		**0.3501**	

Note: The figure of All-India represents average of 28 states.

Source: Author's Calculations

Table 7: Economic and Allocative Efficiency in Public Expenditure

States	Years													
	2002-03		2003-04		2004-05		2005-06		2006-07		2007-08		2008-09	
	AE	EE	AE	EE	AE	EE	AE	EE	AE	EE	AE	EE	AE	EE
Andhra Pradesh	0.599	0.476	0.531	0.408	0.653	0.581	0.500	0.303	0.681	0.365	0.660	0.471	0.630	0.435
Arunachal Pradesh	0.264	0.095	0.422	0.078	0.635	0.120	0.442	0.081	0.433	0.067	0.340	0.080	0.481	0.062
Assam	0.652	0.581	0.775	0.627	0.754	0.580	0.560	0.376	0.556	0.195	0.664	0.405	0.290	0.172
Bihar	0.748	0.432	0.779	0.626	0.782	0.609	0.361	0.215	0.450	0.225	0.589	0.378	0.538	0.271
Chhattisgarh	0.571	0.411	0.553	0.334	0.614	0.360	0.475	0.250	0.498	0.218	0.667	0.376	0.503	0.303
Delhi	0.511	0.511	0.828	0.828	0.857	0.857	1.000	1.000	1.000	1.000	0.782	0.782	1.000	1.000
Goa	0.854	0.425	0.691	0.392	0.801	0.484	0.578	0.267	0.568	0.256	0.875	0.495	0.667	0.425
Gujarat	0.051	0.652	0.749	0.622	0.690	0.496	0.550	0.397	0.540	0.367	0.049	0.724	0.590	0.454
Haryana	0.851	0.851	0.802	0.802	1.000	1.000	0.321	0.294	0.330	0.252	0.945	0.727	0.728	0.628
Himachal Pradesh	0.545	0.251	0.788	0.541	0.645	0.564	0.559	0.252	0.555	0.215	0.585	0.425	0.509	0.241
Jammu & Kashmir	0.655	0.215	0.718	0.321	0.441	0.292	0.634	0.210	0.415	0.229	0.235	0.235	0.275	0.275
Jharkhand	0.360	0.266	0.527	0.441	0.579	0.427	0.731	0.344	0.792	0.292	0.646	0.329	0.753	0.404
Karnataka	0.670	0.500	0.719	0.479	0.761	0.606	0.584	0.334	0.545	0.261	0.705	0.585	0.631	0.439
Kerala	0.614	0.545	0.592	0.592	0.591	0.591	0.488	0.488	0.497	0.497	0.905	0.905	0.642	0.642
Madhya Pradesh	0.544	0.381	0.773	0.490	0.713	0.403	0.591	0.311	0.495	0.243	0.731	0.378	0.572	0.338
Maharashtra	1.000	1.000	1.000	1.000	0.040	0.036	0.660	0.660	0.029	0.020	1.000	1.000	0.762	0.762
Manipur	0.779	0.239	0.840	0.259	0.829	0.188	0.716	0.135	0.507	0.096	0.611	0.145	0.337	0.082
Meghalaya	0.584	0.271	0.342	0.149	0.331	0.140	0.303	0.131	0.419	0.184	0.656	0.288	0.495	0.219
Mizoram	0.424	0.116	0.640	0.113	0.410	0.131	0.590	0.000	0.563	0.079	0.630	0.113	0.439	0.101
Nagaland	0.617	0.233	0.661	0.195	0.777	0.248	0.687	0.171	0.715	0.154	0.810	0.208	0.606	0.201
Orissa	0.689	0.430	0.764	0.546	0.759	0.669	0.472	0.380	0.381	0.288	0.768	0.523	0.487	0.350
Punjab	0.813	0.813	0.567	0.567	0.581	0.581	0.517	0.517	0.224	0.224	0.965	0.965	0.864	0.864
Rajasthan	0.757	0.472	0.704	0.432	0.715	0.419	0.543	0.300	0.523	0.312	0.935	0.551	0.502	0.377
Sikkim	0.716	0.065	0.733	0.098	0.862	0.073	0.750	0.078	0.702	0.074	0.687	0.096	0.860	0.100
Tamil Nadu	0.847	0.709	0.682	0.544	0.764	0.602	0.467	0.391	0.422	0.319	0.889	0.676	0.602	0.446
Tripura	0.592	0.250	0.739	0.298	0.797	0.290	0.504	0.178	0.418	0.133	0.815	0.287	0.493	0.177
Uttar Pradesh	0.012	0.622	0.633	0.405	0.934	0.561	0.407	0.232	0.295	0.134	0.923	0.469	0.451	0.229
West Bengal	0.977	0.977	0.640	0.640	0.680	0.677	0.467	0.467	0.351	0.324	0.801	0.801	0.563	0.534
All-India	0.674	0.457	0.686	0.451	0.709	0.47	0.555	0.315	0.488	0.251	0.759	0.48	0.587	0.376

Notes: i) OTE represents overall technical Efficiency, and ii) the figures of All-India are arithmetic mean of 28 states under evaluation.

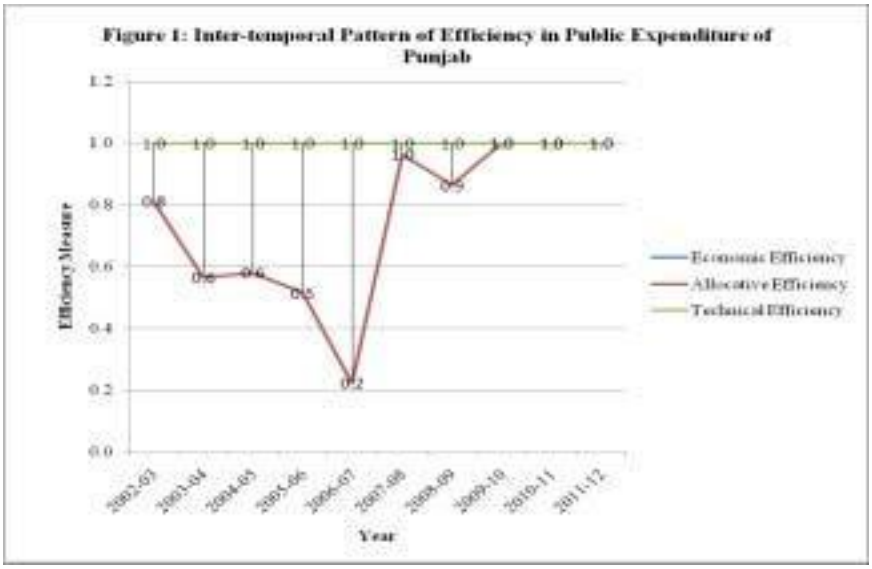
Sources: Authors' Calculations

Table 7: Contd...

States	Years						
	2009-10		2010-11		2011-12		
	AE	AE	EE	AE	EE	AE	EE
Andhra Pradesh	0.599	0.675	0.456	0.419	0.349	0.155	0.155
Arunachal Pradesh	0.264	0.488	0.071	0.256	0.071	0.350	0.083
Assam	0.632	0.269	0.137	0.305	0.178	0.417	0.177
Bihar	0.743	0.452	0.235	0.347	0.234	0.306	0.306
Chhattisgarh	0.571	0.416	0.239	0.200	0.168	0.266	0.195
Delhi	0.511	0.919	0.919	0.611	0.611	0.756	0.756
Goa	0.854	0.700	0.398	0.519	0.372	0.570	0.371
Gujarat	0.851	0.447	0.409	0.367	0.357	0.559	0.559
Haryana	0.851	0.660	0.584	0.492	0.492	0.523	0.523
Himachal Pradesh	0.545	0.599	0.246	0.701	0.309	0.599	0.599
Jammu & Kashmir	0.655	0.241	0.241	0.596	0.329	0.588	0.514
Jharkhand	0.368	0.542	0.257	0.236	0.161	0.345	0.203
Karnataka	0.670	0.521	0.318	0.334	0.286	0.392	0.392
Kerala	0.614	0.533	0.528	0.659	0.649	0.834	0.834
Madhya Pradesh	0.544	0.494	0.277	0.332	0.220	0.490	0.288
Maharashtra	1.000	0.563	0.563	0.639	0.639	0.726	0.726
Manipur	0.779	0.406	0.084	0.393	0.095	0.504	0.097
Meghalaya	0.584	0.416	0.199	0.251	0.120	0.249	0.122
Mizoram	0.424	0.563	0.112	0.256	0.059	0.441	0.098
Nagaland	0.617	0.659	0.185	0.491	0.142	0.629	0.207
Orissa	0.689	0.349	0.257	0.400	0.283	0.529	0.355
Punjab	0.813	1.000	1.000	1.000	1.000	1.000	1.000
Rajasthan	0.757	0.533	0.362	0.501	0.397	0.676	0.531
Sikkim	0.716	0.756	0.109	0.351	0.095	0.471	0.117
Tamil Nadu	0.847	0.394	0.343	0.509	0.399	0.617	0.495
Tripura	0.592	0.335	0.335	0.801	0.185	0.768	0.232
Uttar Pradesh	0.812	0.515	0.268	0.509	0.289	0.639	0.429
West Bengal	0.977	0.495	0.495	0.458	0.458	0.518	0.518
All-India	0.674	0.534	0.344	0.462	0.32	0.533	0.389

Notes: i) OTE represents overall technical Efficiency; and ii) the figures of All-India are arithmetic mean of 28 states under evaluation.

Sources: Authors' Calculations



Therefore, the analysis confirms that the state of Punjab remained technically efficient during the study period under evaluation whereas, a high economic inefficiency has been observed due to high allocative inefficiency during the first seven years of the study. However, in the later three years, the state has also been observed to be allocatively efficient along with being technically efficient.

Summary, Conclusions and Policy Implications

The present analysis has been carried out with a prime objective of analyzing canon of efficiency in public expenditure of Punjab using the data of 28 major Indian states over a period of 10 years. The non-parametric frontier techniques have been used to evaluate the technical and allocative efficiency in public expenditure of various states. The analysis reveals an enormous level of economic inefficiency to the tune of 64.90 percent; a figure that depicts the apathetic state of Indian public finances. Looking into the sources of economic inefficiency, it has been observed that both allocative inefficiency (45.77 percentage points of 64.90 percent) and technical inefficiency (36.54 percentage points of 64.90 percent) are substantial sources of economic inefficiency in the public expenditure of India. It reflects that 36.54 percent less public expenditure could have been incurred to attain the given level of per capita income at All-India level and the existing expenditure by Indian states is 45.77 percent higher than required. Thus, the country needs to improve upon both technical and allocative efficiency parameters to ensure the canon of efficiency in public expenditure of India.

However, comparing the state of Punjab with all-India, it has been observed that Punjab is technically efficient in the public spending but the level of economic efficiency is very low. The observed 31.54 (i.e., 1-0.6846) percent level of economic inefficiency is because of the selection of economically inefficient combination of public expenses. The level of economic inefficiency in public expenditure of Punjab is also high as in the case of all India. The same level of per-capita income with the given level of public expenditure could have been attained with 31.54 percent less cost. Thus, in public expenditure of Punjab, on an average 31.54 percent higher expenditure is incurred to provide public services.

Thus, the analysis confirms that though the canon of technically efficient public expenditure is satisfied by the state of Punjab throughout the study period, the allocative efficiency has been attained in the last three years only. The reason of the existence of such a huge amount of allocative inefficiency in public expenditure of Punjab is the higher proportion of non-plan expenditure. A huge proportion of non-planned expenditure is generally cost ineffective. Whenever, expenditure is made in haste, the outcomes/cost is ignored. The untimely receipt of grants and aids forces the government to spend the resources without taking the cost factor under consideration thus, causes allocative inefficiency in public expenditure. Hence, high allocative inefficiency in public expenditure of Punjab seems to be the major source of present state of fiscal distress for the state. Therefore, an increase in the plan expenditure in a cost effective manner may help Punjab to get out of the fiscal distress. It is important to mention here that long term inefficiency in public expenditure is detrimental to the overall growth of the state. This must be addressed at the earliest by the policy makers, if Punjab has to maintain, atleast, the present level of development.

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(Footnotes)

- Given the small sample size in the present study, CCR model provides better discrimination than any other DEA model especially BCC model, named after Banker, Charnes and Cooper (1984). In the CCR-model, it is assumed that constant returns to scale (CRS) prevails.

2. The convexity constraint $\sum_{j=1}^{n} \lambda_j = 1$, essentially ensures that an inefficient

DMU is only ìbenchmarkî against DMUs of a similar size.

PSE ECONOMIC ANALYST, VOL. XXXII, 2017

FACTORS EFFECTING THE PRODUCTION AND RESOURCE USE EFFICIENCY OF CAPSICUM CROP UNDER PROTECTED CULTIVATION: A CASE STUDY OF HAMIRPUR DISTRICT

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Abstract

The present study has been conducted in Hamirpur district of Himachal Pradesh on the primary data collected from the 150 sample polyhouse farmers to access the factor effecting the production of capsicum crop and resource use efficiency of capsicum crop. The polyhouse were classified into three categories, i.e. small (i.e.40 m^2), medium (i.e.250 m^2) and large (i.e.500 m^2). Further each size of polyhouse has been divided into three crops, i.e. tomato, capsicum and cucumber. Capsicum grown under 18 m^2, 125.71 m^2 and 256.67 m^2 under the small, medium and large of polyhouses, respectively. Among all sample size of farms it has been worked out 116.00 m^2. In order to analyse factor effecting the production, Cobb-Douglas production function has been fitted to the data of total production as dependent variable (Y) and human labour (X_1), expenditure on fertilizers (X_2), expenditure on plant protection (X_3), fixed capital (X_4), expenditure on seeds (X_5) and management index (X_6) as explanatory variables. The effect of these explanatory variables has been analysed on the total production of selected crops. The estimates of the fitted production function was to study the effect of different variables on total production, production elasticity, resource use efficiency, marginal value of productivity of the different inputs and the returns to scale. The more than 90 per cent of the variation in total productions of the capsicum has been explained by the explanatory variables on different sizes of polyhouses. The resource use efficiency in production of different vegetables has been studied by comparing the Marginal Value Productivity (MVPs) with the Marginal Factor Costs (MFPs) of explanatory variables taken for Cobb-Douglas production function.

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Introduction

The†***economy***†of Himachal Pradesh is third fastest growing economy in†***India. Agriculture***†contributes nearly 45 per cent to the net state domestic product. It is the main source of income as well as employment in†***Himachal.*** About 93 per cent of the state population depends directly upon agriculture. To achieve faster and more inclusive growth in the Eleventh Five Year Plan, the Department of Agriculture, Himachal Pradesh has prepared a project on production of cash crops by adoption of precision farming practices through polyhouse cultivation.[1] The most significant in this regard is ëPandit Deen Dayal Kisan Baagwaan Samridhi Yojana,í a flagship programme for the upliftment of farmers in the state. The project provides for 80 percent subsidy to farmers for land up to 1000 square meters for developing polyhouses and to establish sprinklers and drip irrigation systems, the remaining 20 per cent is to be borne by the farmer himself. The scheme has been launched with the assistance of NABARD RIDF-IV Tranche. This project has been implemented in all the twelve districts of the state with an outlay of Rs. 353.01 crores. This project comprises of two parts, production of cash crops through adoption of precision farming practices through polyhouse cultivation for Rs. 154.92 crores and project on diversification of agriculture through micro-irrigation and other related infrastructure for Rs. 198.08 crores. The project has been launched in January 2009 for four years. Over the period of four years an area of about 2.59 lakh sq. meters is intended to be covered under the polyhouse cultivation. It envisages construction of 16500 polyhouses and bringing 20,000 hectare area under micro irrigation. Though the subsidy provided is 80 percent for BPL families, constructing polyhouses, the state government has decided to reduce the beneficiary share from 20 percent to 10 percent. Thus, such families will get a ninety percent subsidy. According to the information as provided by the department of agriculture, polyhouses have been constructed in 55.02 hectares of land in 2009-10 as against the targeted 48.88 hectares. For this an assistance of Rs. 24.24 crores was released to the farmer on account of construction of 4,796 polyhouses. [2]

Several studies on this theme have been conducted by Sing and Pandey[3], Singh and Patel[4], Gupta et al [5] on the resource use efficiency and they concluded that farmers were not using their limited resources rationally. The improved seeds, organic manures and fertilizers were found to be highly responsive as compared to the human and bullock labour. Hanumantha Rao[6] has used production function, i.e. Cobb-Douglas Function

to analyse agricultural data. He also applied regression separately for farmers in different size-groups and also for three natural regions of the Hyderabad State. The study revealed that the production elasticity of labour to be higher than that of land in two relatively less fertile regions and a reverse situation in the track of Marathwada. Mathur and Balishter[7] studied the impact of HYVís of crops on farm labour use. An attempt has been made to know the extent of labour utilization across different size of farms under various types of HYV s in a sub-region of Agra district of Utter Pradesh. It is pointed out that average labour use per hectare in high-yielding varieties is higher than that of other type of varieties. Venkatesam, Naidu and Venkateswarlu[8] have discussed the resource use efficiency on maize farms in Karimnagar district of Andhra Pradesh. They applied the Cobb-Douglas production function to study the resource use efficiency of sample farms. They identified in the case of maize production, contribution of family labour and total cost of cultivation decreases with the increase in farm size. Small farmers use more manures and less fertilizers, whereas medium and large farmers used more fertilizers and less manures. It is also observed that the average yield of hybrid maize was more on small farms and decreased as the farm size increased. Cost of production was the lowest in small farms.

Need and Importance of Study

The pattern of input use provides important insights into the extent of adoption of technology in protected farming. Productivity level of any agricultural crop largely depends on the quality and quantity of critical inputs applied in the cultivation of the crop. As we know under the protected cultivation, off-seasonal crops are grown. In order to grow off-seasonal crops different type of costly and high quality inputs are used so it is very necessary to analyse the economic efficiency of inputs used for crops grown under protected farming.

Objectives

The present study has been undertaken to achieve the following objectives: i) to study the socio-economic profile of the sample farms ii) to study the factors effecting the production of capsicum crop; and iii) to study resource use efficiency of different input factors under different farms size for the production of capsicum crop.

Methodology

The present study has been conducted in Hamirpur District of Himachal Pradesh. A sample of 150 polyhouse farmers involved in tomato cultivation under protected farming has been selected on purposive random sampling technique. The polyhouse growers were classified into three categories viz. small (40 m^2), Medium (250^2) and large (500 m^2) with the sample size of 50, 70 and 30 from the each size of polyhouse respectively. The collection of information is based on a structured questionnaire designed to collect relevant information on family size, land holding, cropping pattern, production, factors for production and factor cost etc. In the present paper, the factors effecting the production of capsicum crop and resource use efficiency of different inputs under protected cultivation has been worked out with the help of following formulasí i.e. Cobb-Douglas production function, Returns to scales and marginal value product and MVP- Factor cost ratio.

Production Function

To examine the allocative efficiency of resources under polyhouse cultivation, the Cobb-Douglas production function has been used. The algebraic form of the function is[9]:-

$$Y = a\, x_{1b1}\, x_{2b2}\, x_{3b3}\, x_{4b4}\, x_{5b5}\, x_{6b6}$$

Where

Y = Output

a = Constant term (coefficient)

x_1 = Land (Hectares)

x_2 = Seeds (Quintals)

x_3 = Human labour(Days)

x_4 = Fertilizer (Quintals)

x_5 = Capital (Rupees)

x_6 = Management Index

and b_1, b_2, b_3, b_4, b_5 and b_6 are the elasticity coefficient of the respective explanatory variables.

The log linear transformation of the Cobb Douglas function is as follows:

$$\text{Log } Y = \text{Log } a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + b_6 \log x_6$$

The adjusted coefficients of multiple correlation ($\bar{R}$) were estimated and tested for their significance by calculating F-value as follows:

$$F\ (k-1)\ (n - k)\ d.f. = \frac{R^2 (k-1)}{\frac{1 - R2}{} (n-k)}$$

The seriousness of multicollinearity among independent variables was also tested using zero order correlation. The significance of estimates of production functions was tested by usingëtí test.

Returns to Scales[10]

$$F\ (1, n - k)\ d.f. = \frac{\left(\sum bi - 1\right) 2 \left(n - k\right)}{\sum v\ (bi)}$$

Where,

n= number of observations

k= total member of parameter estimated

Σbi = sum of elasticity coefficients

Marginal Value Product and MVP-Factor Cost Ratio[11]

$$MVP_{xi} = bi \frac{\bar{y}}{\bar{x}i} (PY)$$

Where,

$\bar{*}$*= Geometric mean of output

= Geometric mean of ith input

bi = regression coefficients

i = 1- - - - n

PY = Price of output per unit (Rs.)

To test the significance of difference between ratio of marginal value of productivity to factor cost and unity the variance of ratio of the marginal value of productivity to the factor cost of input

has been estimated by the following formulas[12]:

PY and Pxi = Price of output Y and xi respectively

$\bar{y}$ Geometric means

The value of ëtí to test the significance of the difference between the ratio of marginal value productivity to the factor cost and unity is given by:

In order to know how much of a particular input could be used profitability by vegetables growers, the marginal value productivity of each input for individual crop was compared with its factor.

Results and Discussion

Average Family Size, Percentage of Family Work Force, and Percentage of Dependents among the Sample Farms

The average size of family, percentage of labour force and the percentage of dependents among the sample farms has been presented in table I. The average size of family has been worked out, 6.88, 6.84 and 9.33 per cent on the small, medium and large size of farms respectively. The average size of family among all the sample farms together came out 7.35 as compared to the average size of family at the State level as a whole i.e. 4.66 according to 2011 census. Thus, as the farm size increases, almost the average size of family also increases. It shows that as the economic status of a household improves they become more social. The percentage of labour force has been worked out 68.90, 63.67.08 and 61.30 per cent on the small, medium and large size of farms group

respectively. Among all the farms together, this percentage came out 64.88 per cent. The percentage of dependents is the highest on the medium size of farms group (i.e. 36.32 per cent) as compared to the other class of farms. Among all the holding groups together, this percentage of dependents came out 35.12.Thus, the percentage ratio of labour force shows almost a decreasing tendency with an increase in the size of farms whereas, contrary to it, the percentage of dependents shows an increasing tendency with an increase in the size of farms. The lowest percentage of the dependent is on the small size of farms group mainly due to higher percentage of work force as compared to the medium and large size of farms.

Production Function

The impact of various factors of production like labour, seed, fertilizers, plant protection materials etc. on production of selected crop i.e. capsicum under protected conditions has been analysed with help of Cobb Douglas production. The Cobb- Douglas production function has been fitted to the data of total production as dependent variable (Y) and human labour (X_1), expenditure on fertilizers (X_2), expenditure on plant protection (X_3), fixed capital (X_4), expenditure on seeds (X_5) and management index (X_6) as explanatory variables. The effect of these explanatory variables has been analysed on the total production of capsicum crop. The regression coefficients based on the estimated Cobb-Douglas production function, their standard errors and the value of adjusted coefficient of multiple determination and returns to scale have been estimated for the capsicum.

The regression coefficients, their standard error and value of adjusted coefficient of multiple determination in case of capsicum obtained from the Cobb-Douglas production function for different categories of polyhouses, i.e. the small, medium and large size are depicted in table 2. The table reveals that more than 90 per cent of the variation in total production of the capsicum has been explained by the explanatory variables on different sizes of polyhouses. On overall farm situation human labour (X_1), fertilizers (X_2), seed (X_5) and management index (X_6) were positively related with the total production (Y). The elasticity of production of these significant explanatory variable were found to be 1.3085, 0.3276, 0.5328 and 0.5430, respectively. This implies with 1 per cent increase in human labour (X_1), fertilizers (X_2), seed (X_5) and management index (X_6), result a increase the production of capsicum by 1.31, 0.33, 0.53 and 0.54 per cent, respectively. In case of small size of polyhouses, three explanatory variables i.e. human labour (X_1) , fertilizers (X_2) and fixed capital (X_4)

turned out to be significant out of the six explanatory variables. On an average 1 per cent increase in expenditure on human labour (X_1), fertilizers (X_2) and fixed capital (X_4) resulted in a 0.85, 1.37 and 1.74 per cent increase in total productions of capsicum, respectively. Others variables like plant protection (X_3), seeds (X_5) and management index (X_6) were negatively related with production but were statistically non-significant.

The table further reveals that in case of the medium sized polyhouses all the explanatory variables and found to have positive relationship and were statistically significant except plant protection (X_3) and fixed capital (X_4). The production elasticity coefficients of Human labour (X_1), fertilizer (X_2), fixed capital (X_4) and management index (X_6) were estimated at 0.2712, 0.1187, 0.568, and 0.5611, respectively which means that with 1 per cent increase in these variables the production of capsicum will increase by 0.27, 0.11, 0.59 and 0.56 per cent, respectively. On the large sized polyhouses elasticities of co-efficient were 0.8432, 0.6508 and 1.0004 for use of human labour(X_1), fertilizers (X_4) and management index (X_4) and were found to be significant. Which indicates that there are scope of increasing total productions of capsicum by increasing level of human labour (X_1), fertilizers (X_2) and improvement in management index.

The table further indicates there has been increasing return to scale in the production of capsicum on different categories of polyhouses. This indicates that if all the factors of production are increased simultaneously by 1 per cent, then the production of capsicum will increase by 2.99, 1.68 and 2.14 per cent in case of the small, medium and large polyhouses, respectively. Whereas, in case of overall farm situation, the production will increase by 1.43 per cent with 1 per cent increase in all the factors of production under consideration.

Resource Use Efficiency in the Production of Capsicum Crop

The resource use efficiency in the production of capsicum crop has been presented in table 3. The resource use efficiency in production of capsicum crop has been studied by comparing the Marginal Value Productivity (MVPs) with the Marginal Factor Costs (MFPs) of explanatory variables taken for Cobb-Douglas production function. The resource use efficiency has been studied only in case of those explanatory variables (X_is) which showed statistically significant effect on dependent variable i.e. total production of capsicum. In the regression analysis, among the different explanatory variables, the human labour (X_1) has

been measured in mandays, while other explanatory variables i.e. fertilizers (X_2), plant protection (X_3), fixed capital (X_4), seeds (X_5) etc. has been used in monetary terms. In order to judge the efficient use of resources, the Marginal Value Productivities (MVP_{xi}) of different significant variables has been compared with their respective Marginal Factor Costs (MFC_{xi}). If the $MVP_{xi} = MFC_{xi,}$ then there resources has been efficiently used otherwise there was inefficient use of resources in the production of vegetables in polyhouse conditions. If $MVP_{xi} > MFC_{xi}$, then the resources has been under-used and the total productions can be increased by increasing the level of resource use. On the other hand if $MVP_{xi} < MFC_{xi}$ then there was excess use of resources, and gross income can be increased by decreasing the level of resources in production. In our case as the inputs were measured in monetary terms except human labour (X_1), hence the MVPs were compared with Rs 1 in case of all explanatory variables except human labour where it has been compared with Rs 150, the wage rate of human labour/day. The MVPs of the significant explanatory variables in case of capsicum.

The careful examination of table revealed that the marginal value productivities of human labour varied from about Rs. 423 in case of capsicum on the small size polyhouses to Rs 909 on the large polyhouses. This indicates that the marginal value productivities of human labour (X_1) in capsicum crop were more the MFC, i.e. Rs 150. Hence, it can be concluded that there are scope of increasing the total productions from the selected crop by increasing the human labour on the small, medium and large size polyhouses in case of capsicum until the MVPs reaches the value of MFC of labour (i.e. Rs 150).

The plant nutrients required for the growth and development of plants are supplemented through the use of different fertilizers brands available in the market. It can be observed from the table that the use of fertilizers was found to be significant in different sizes of the polyhouses in selected vegetable crop. The MVPs of fertilizer ranged from Rs 2.71 in the medium size polyhouses to Rs 13.74 on the large size polyhouses. This indicates that the value of MVPs of fertilizers in different category of polyhouses were quite high compared to MFC of fertilizer (i.e. Rs 1), therefore, in order to increase the total productions of the crops, the use of fertilizers should be increased until MVPs of fertilizer use decreases to Rs 1. The vegetable growers of the study area has also been found using

of the plant protection materials for the management of insect pest and diseases. The use of plant protection material (X_3) has been found to be significant in case of capsicum on the medium farms. The value of MVPs of plant protection materials use was more than one and positive on the medium size of polyhouses i.e. Rs 5.68.This implies the use of plant protection materials should be increased to increase the total productions of vegetables until the MVPs of plant protection materials (X_3) is decreased to Rs 1.

Similarly, the tables further reveals that the MVPs of use of fixed capital on the small and medium size polyhouses has been positive in selected vegetable but more than Rs 1, this indicates that the investment in fixed capital (X_4) should be increase until it reaches optimum level, i.e. MVP (X_4) =Rs 1. So there is need to increase the investment on fixed capital (X_4) on small and medium size polyhouses under capsicum. The table further indicate that there are chances of increasing the total productions of capsicum by increasing the expenditure on seed (X_5) on the medium size polyhouses until the condition of MVP (X_5) =1 is not achieved, because in these cases the MVPs (X_5) were greater than Rs 1. The table further indicates that among the various factors of production, the marginal value productivity of management index was quite high on all the sizes of polyhouses except the small size of farms, i.e. 271.63, 622.21 and 198.09 in case of medium, large and all size of farms respectively. Since the management is a composite index which indicates the adoption of technical guidelines for the production of capsicum crop. So, it is suggested that farmers may be guided to adopt the recommended package for the production of capsicum through proper trainings and technical know-how to vegetable cultivation.

Thus, it can be concluded from the present study that more than 90 per cent of the variation in total productions of the capsicum has been explained by the explanatory variables on different sizes of polyhouses. On overall farm situation human labour (X_1), fertilizers (X_2), seed (X_5) and management index (X_6) were positively related with the total productions (Y). The elasticity of production of these significant explanatory variable were found to be 1.3085, 0.3276, 0.5328 and 0.5430, respectively. It can further be concluded that there has been increasing return to scale in the production of capsicum on different categories of polyhouses. This indicates that if all the factors of production are increased simultaneously

by 1 per cent, then the production of capsicum will increase by 2.99, 1.68 and 2.14 per cent in case of the small, medium and large polyhouses, respectively. Whereas, in case of overall farm situation, the production will increase by 1.43 per cent with 1 per cent increase in all the factors of production under consideration. The marginal value of productivity of variables under different size of polyhouses indicated that labour, fertilizers, seeds and management index was underutilised, so in order to increase the production, sample farms should increase the use of these inputs.

Policy Implications

Polyhouse cultivation is poised to get a big boost under the NABARD sponsored scheme entitled *ìPandit Deen Dayal Kisan Bagwan Samridhi Yojnaî* that has an outlay of Rs 154.92 crores for the production of cash crops by adopting precision farming techniques. Following are the policy implication of polyhouse farming:

1. Under polyhouse farming, the production of commercial crops produced under protected cultivation regime is likely to witness manifold increase in the near future.
2. Under polyhouse farming, farmers can make the better use of small size of landholding which is the major problem of hilly areas.
3. Under polyhouses, farmers grows off-seasonal crops and the production of off seasonal crops has bright future prospects and will be instrumental in improving the socio-economic status of the farming community.
4. The production under protected conditions of different crops and flowers are highly profitable, i.e. higher returns, so it is a very good source of self-employment. All these factors can be useful to farmers to adopt polyhouses farming.

However, increasing agricultural production alone is not sufficient to raise the farm incomes. Proper marketing of agricultural products is must to achieve this highly cherished objective. And it is more so for the highly perishable products under the regime of protected cultivation where stakes involved are pretty high. Proper marketing of polyhouse commodities is essential as different problems related to grading, packaging, transportation, market intelligence, *etc.* are encountered in selling these farm products.

Table I

Average Family Size, Percentage of Family Work Force, and Percentage of Dependents among the Sample Farms

Sr. No.	*Particulars*	*Among the Sample Farms*			
		Small	Medium	Large	All farms
1	Total Numbers of Sample Farms	50	70	30	150
2	Total Number of Family Members	344	479	279	1102
3	Average Size of Family	6.88	6.84	9.3	7.35
xv.	Percentage of Family Work Force				
	a) Male	109	165	111	385
		(66.06)	(70.21)	(68.52)	(68.51)
	b) Female	130	140	60	330
		(72.63)	(57.38)	(51.29)	(61.11)
	c) Total	239	305	171	715
		(68.90)	(63.67)	(61.30)	(64.88)
5	Percentage of Dependents				
	a) Males	56	70	51	186
		(33.93)	(29.78)	(31.48)	(33.09)
	b) Females	49	104	57	210
		(27.37)	(42.62)	(48.71)	(38.88)
	c) Total	105	174	108	387
		(30.52)	(36.32)	(38.70)	(35.12)
6	Literacy Percentage				
	a) Male	165	235	162	572
		(94.50)	(96.20)	(98.80)	(96.70)
	b) Female	179	244	117	1102
		(82.60)	(86.10)	(90.60)	(86.40)
	c) Total	344	479	279	1102
		(88.80)	(91.00)	(95.3)	(91.60)

Note: Figures in parentheses indicate percentage to total family members of each category.

Table II

Estimated Regression Coefficients of Different Factors of Production Influencing Capsicum Production in Different Sizes of Polyhouses

S.No.		*Particulars†*	*Small*	*Medium*	*Large*	*Overall*
1.	Intercept†	A	-8.6835	-3.6686	-3.3941	-0.2585
		S.E (a)	3.2427	1.9328	0.7978	0.7223
2.	Human Labour (X_1)†	b_1	0.8552*	0.2712**	0.8432**	1.3085**
		S.E (b_1)	0.435	0.1213	0.3178	0.0849
3.	Fertilizers (x_2)†	b_2	1.3696**	0.1187**	0.6508**	0.3276**
		S.E (b_2)	0.2583	0.0431	0.2885	0.0744
4.	Plant protection (X_3)†	b_3	-0.0023	0.079	-0.3534	-0.7461
		S.E (b_3)	0.2516	0.1751	0.3473	0.0984
5.	Fixed capital (X_4)†	b_4	1.7396**	0.568	0.0798	-0.5318
		S.E (b_4)	0.9955	0.5875	0.2034	0.1452
6.	Seeds (X_5)†	b_5	-0.9402	0.0795*	-0.0781	0.5328**
		S.E (b_5)	0.3519	0.0727	0.1277	0.0854
7.	Management index (X_6)†	b_6	-0.0349	0.5611*	1.0004*	0.543*
		S.E (b_6)	0.381	0.4241	0.3709	0.3137
8.	R^2		0.9378	0.9027	0.9672	0.9837
9.	†Adjusted R^2		0.9291	0.8934	0.9587	0.983
10	†Returns to scale		2.9869	1.6775	2.1428	1.434

Note: Figures in parentheses denote standard error.

** Significant at 1 per cent level of probability.

(13) Significant at 5 per cent level of probability

Table III

Marginal Value Productivities of Factors of Production Used in Production of Capsicum on Different Sizes of Polyhouses

S.N.	*Particulars*		*Small*	*Medium*	*Large*	*All Farms*
1.	Human Labour (X_1)	MVP (Rs)	423.1004	248.5352	909.478	1703.1169
		S.E. (MVP)	215.1958	111.1792	342.783	110.5501
2.	Fertilizers(x_2)	MVP (Rs)	3.8986	2.7086	13.7366	7.8716
		S.E. (MVP)	0.7352	0.9827	6.09	1.7885
3.	Plant Protection (X_3)	MVP (Rs)		5.6819		
		S.E. (MVP)		12.6003		
4.	Fixed capital(X_4)	MVP (Rs)	1.1	1.222		
		S.E. (MVP)	0.6295	1.2642		
5.	Seeds (X_5)	MVP (Rs)		7.6498		35.0686
		S.E. (MVP)		6.9917		5.6199
6.	Management index(X_6)	MVP (Rs)		271.628	622.2059	198.0929
		S.E. (MVP)		205.2994	230.6816	114.4416

Note: S.E stands for Standard Error.

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PSE ECONOMIC ANALYST, VOL. XXXI, 2017

RIGHT TO EDUCATION ACT & COMMUNITY PARTICIPATION AT VILLAGE LEVEL: AN EMPIRICAL STUDY

Rekha

Abstract

The present study is an attempt to study the community participation in Government primary schools at village level. The recent form of community participation is the formation of the School Management Committee (SMC). The study was conducted in Jalandhar district of Punjab State. 7 Blocks out of 19 namely Adampur, Kartarpur, Nakodar, Bhogpur, Goraya, East-3 and West-1 were chosen for the study purpose. Five villages from each selected block and one school from each selected village were chosen at random making the total number of schools to be studied 35. A total sample of 140 respondents out of 70 were males and 70 were females were selected. Members were identified after procuring their names from the Government primary schools record. Data were collected from both primary and secondary sources. Information was collected by the Interview Schedule method. The purpose of the study was to examine the awareness, participation and views of the School Management Committee (SMC) members about composition of the School Management Committee; role and responsibilities of the School Management Committee with reference to Right to Education (RTE) Act. The study reveals that the awareness and participation of the School Management Committee (SMC) members is passive. Results also indicate that there is lack of awareness in members about composition and role and responsibilities of the SMC with reference to Right to Education (RTE) Act.

Introduction

The term ëCommunityí *in the present study refers to the Village Community in general and School Management Committee (SMC) in particular. Community Participation is not a new concept in Indian*

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education system. It is a regulatory body exist in a village to ensure smooth functioning of the school. Its role is to establish a link between school and community. It creates awareness about the importance of the formal education. On the other hand it is considered vital for promoting the primary education as a universal concept.

Universalization of Primary Education and Community Participation

Universalization of Primary Education (UPE) was one of the Constitutional goal of the Independent India. For the purpose of achieving the goal of Universalization of Primary Education (UPE) the Government of India (GOI) has introduced a number of Centrally-Sponsored Schemes (CSSs) and Programmes i.e. District Primary Education Programme (DPEP), Non-Formal Education Programme (NFEP), Operation Black Board Scheme (OBBS), Mid-Day Meal Scheme (MDMS) and Sarv Shiksha Abhiyan (SSA) etc.

In 2009-10, one of the major strategies of the Right to Education (RTE) Act is to strengthening the primary education through Community Participation in a big way. Under the Right to Education (RTE) Act, the community participation has been envisaged as a major catalyst in enhancing the enrolment, retention and quality in the Government primary schools.

According to guidelines of the Right to Education Act (RTE) 2009-10, the School Management Committees (SMCs) are expressed to develop into a participate system in which various stakeholders i.e. teachers, parents and community leaders work together with a common understanding for the purpose of ensure the maintenance of the school environment.

Related Studies

Lal (1997) in his study on ìCommunity Participation through Village Education Committee (VEC) in primary education in Biharî found that the awareness level about their (VEC) role and functions, however, was below average and there was lack of coordination between community, school and government functionaries. On the whole, majority of the VECs were not doing well in this state.

Tyagi (1999) studied Village Education Committees in Ranchi District and found that nearly half of the members were not attending the meetings regularly and activities. They did not even know the specific objectives of the VEC.

Menon (1999) in her study ìFunctioning of Village Education Committees (VECs) in Haryanaî found that the participation of women is limited in terms of role and functioning of the VEC.

Narayana and Chandrakant (2000) studied the functioning of VEC in Maharashtra and stated that the co-ordination between the VEC and the higher authority was very less. It was observed that no proper notice was given by the Secretary of the VEC to the members about meetings. There was no proper representation of females.

Institute of Rural Research and Development (2010) in its report on capacity building needs to VEC in the Villages of Haryana. The report found that more than half of the VEC members are not aware about their role and responsibilities. Their participation in school meetings is inadequate. Even the members are not involved in budget tracking.

Gopinath and Bhavani (2012) in their study on ëCommunity Participation in Educational Administration in Andhra Pradesh (AP)-Rhetoric or Real?í analyzed the role and participation of Village Education Committees (VECs) in primary education. The study found that the role and participation of Village Education Committees (VECs) is not active. They do not participate in the school meetings as well as school activities. Even they do not aware about their own membership in the committee.

Objectives of the Study

The following objectives were undertaken to examine the community participation in primary schools at village level.

** To study the socio-economic profile of the School Management Committee (SMC) members.

** To study the awareness, participation and views of the School Management Committee (SMC) members.

** To examine the problems and suggestions of the School Management Committee (SMC) members.

Research Methodology

The State of Punjab occupies a unique position in the map of India. The State has an area of 50362 sq. kms. The state has 22 Districts. From 22 Districts, one of the district of Jalandhar has been selected for the purpose of studying the community participation at village level in the government primary schools with reference to Right to Education (RTE) Act 2009-10.

The present study was descriptive in nature and based on empirical evidences. It is highly important because of the first hand data were gathered through in a well-organized manner from the field. For the study purpose, both qualitative and quantitative method adopted for data collection. Looking at the nature of the study, both primary and secondary sources were used.

Sample and Sampling Frame

Selection of the Blocks

In order to select the sample a sampling frame was prepared. For this purpose, first of all an effort was made to collect three types of lists i.e. number of blocks, number of villages and number of Government primary schools in Jalandhar District. The lists were collected from the District Education Office (DEO) in Jalandhar District. Through this information it was found that there are 19 blocks in Jalandhar District of Punjab State. For the study purpose out of 19 blocks, 7 blocks namely Adampur, Kartarpur, Nakodar, Bhogpur, Goraya, East-III and West-I were selected by lottery method technique. So, one-third part of the blocks was taken as a sample.

Selection of the Respondents

For the study purpose, the sample comprised of 140 School Management Committee (SMC) members including 70 were males and 70 were females by simple random sampling. At least 4 members out of 12 were selected form the each selected SMC out of two were males and two were females. So, 1/3rd part of the respondents were selected.

Sample Size Selected for Study

Sr. No	Name of Blocks	No. of SMC Members		Total
		Male	Female	
1	Adampur	10	10	20
2	Bhogpur	10	10	20
3	Kartarpur	10	10	20
4	Nakodar	10	10	20
5	Goraya	10	10	20
6	East-3	10	10	20
7	West-1	10	10	20
	Total	**70**	**70**	**140**

*__Note:__ SMC denotes School Management Committee.

Tools of Data Collection

In order to collect the primary data, the researcher used of interview method. An Interview Schedule is the most appropriate tool was selected for the purpose of data collection. It was prepared in the light of objectives of the study. The interview schedule contained both open and closed ended questions according to the information required.

Data Analysis

After collecting the data the first step was editing which was done to check the completeness of the schedule. A code design was prepared and code numbers were aligned to responses to each question. Further these codes were transferred on coding sheets. After coding, tables were prepared manually.

Tabulation

The information was rearranged according to the convenience of the researcher into different groups or classes and their tabulation was made to extract the responses in a logical way. Thereafter the tabulation scoring was done and percentages were calculated for interpretation of the findings.

Thus the present study is devoted to analysis and interpretation of the data in the context of awareness, participation and views of the members of the selected School Management Committees (SMCs). The analysis has been done under three sections objectives of the study.

Section I

Socio-Economic Profile of the School Management Committee (SMC) Members

This section deals with the socio-economic profile of the School Management Committee (SMC) members. It is well-known fact that the socio-economic background of an individual plays an important role in the formation of values and behavior patterns. Therefore, in this chapter an attempt has been made to explore and thereby ascertain the socio-economic profile of the members who involved in the different School Management Committees (SMCs).

Socio-economic variables such as age, sex, education, marital status, caste, religion, region, occupation and income of the SMC members had been studied in this section.

Age

Age is generally considered as an important indicator because on its basis societies make assumptions about the role and responsibilities and opportunities that are assigned or denied to its members. The age greatly influences not only the status and position within the family but also has an important bearing on community participation.

The following table presents the age of the members of the selected School Management Committees (SMCs).

Table:-1
Distribution of Members according to their Age

Age Group	**Sex**		**Total**
(in years)	**Male**	**Female**	
Up to 30	02 (01.43)	06 (04.28)	08 (05.71)
31-40	38 (27.14)	53 (37.86)	91 (65.00)
41-50	25 (17.86)	11 (07.86)	36 (25.72)
Above 50	05 (03.57)	00 (00.00)	05 (03.57)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

While looking into the age distribution of the members of the selected School Management Committees (SMCs), it is clear from the Table No. 1 that 05.71 per cent of the members in the selected School Management Committees (SMCs) were placed in the age group of up to 30 years out of 01.43 were males and 04.28 were females. 65.00 per cent of them were engaged in the age category of 31-40 years out of 27.14 per cent were males and 37.86 per cent were females. 25.72 per cent of the members were placed in the age group of 41-50 years out of 17.86 per cent were males and 07.86 per cent were females. Remaining 03.57 per cent of the male members were above 50 years.

Thus it can be concluded from the table that majority of the members in the selected School Management Committees (SMCs) were placed in the age group of 31-40 years.

Sex

To know the awareness and views of the members of the selected School Management Committees (SMCs), the researcher was selected 140 members out of 70 (50.00 per cent) were males and 70 (50.00 per cent) were females.

Education

It is really an essential part of the study to know the educational status of the members of the SMC. It is the most prominent determinant which shapes or empowers oneís outlook. Educational attainment influences the attitude, ideas and values of an individual.

Thus an effort was made to find out the educational status of the members of the selected School Management Committees (SMCs).

Table:-2
Distribution of members according to their educational status

Educational Status	Sex		Total
	Male	Female	
Illiterate	09 (06.43)	24 (17.14)	33 (23.57)
Primary	37 (26.43)	29 (20.72)	66 (47.15)
Middle	17 (12.14)	12 (08.57)	29 (20.71)
Matric	05 (03.57)	04 (02.86)	09 (06.43)
Sen. Sec.	02 (01.43)	01 (00.71)	03 (02.14)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No. 2 shows that 23.57 per cent of the members in the selected School Management Committees (SMCs) were illiterate out of 06.43 per cent were males and 17.14 per cent were females. 47.15 per cent of them were acquired education up to primary level out of 26.43 per cent were males and 20.72 were females. Table also shows that 20.71 per cent of the members were up to middle standard out of 12.14 per cent were males and 08.57 per cent were females. 06.43 per cent of them were acquired education up to metric level out of 03.57 per cent were males and 02.86 per cent were females. Only 02.14 per cent of the members were acquired education up to senior secondary level out of 01.43 per cent were males and 00.71 were females.

Thus it can be concluded from the table that a large proportion of the members in the selected School Management Committees (SMCs) were educated up to primary level.

Marital Status

Marital status of the community members greatly influences their life style because it lays an important role in the later years of life. The marital status of the community members assumes special significance in

the context of care and support of their children and seem to be for better off in all social, economic and emotional aspects than who are single. Thus marital status has great importance for the community members.

On the basis of marital status of the SMC members, the following categories were made

Table:-3

Distribution of Members according to their Marital Status

Marital Status	**Sex**		**Total**
	Male	**Female**	
Married	70 (50.00)	66 (47.14)	136 (97.14)
Divorced and Widowed	00 (00.00)	04 (02.86)	04 (02.86)
Total	**70 (50.00)**	**70 (50.00)**	**140 (140.00)**

It is clear from the Table No. 3 that 97.14 per cent of the School Management Committee members were married and 02.86 per cent of the members were divorced and widowed.

Thus it can be concluded from the table that majority of the members in the selected School Management Committees (SMCs) were married.

Caste

Indian society is hierarchically divided on the basis of caste. Accordingly a classification of castes is made in terms of ëGeneral Casteí, ëOther Backward Casteí and ëScheduled Casteí. General Castes comprised of Brahmins, Khatris and Jat Sikhs. The Other Backward Castes refers to Tarkhans, Suniars, Lohar, Nai, and Mehra and Scheduled Castes comprising of kabirpanthis, Ramdasias, Ravidasias and Majhabi.

Table:-4

Distribution of Members according to their Caste

Caste	**Sex**		**Total**
	Male	**Female**	
General Caste	03 (02.14)	00 (00.00)	03 (02.14)
Other Backward Caste	08 (05.72)	00 (00.00)	08 (05.72)
Scheduled Caste	59 (42.14)	70 (50.00)	129 (92.14)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No. 4 shows that 02.14 per cent of the male members in the selected School Management Committees (SMCs) were belonged to General Castes (GCs) and 05.72 per cent of the male members were belonged to Other Backward Castes (OBCs). On the other side table also shows that 92.14 per cent of the members were belonged to Scheduled Castes out of 42.14 per cent were males and 50.00 per cent were females.

Thus it can be concluded that majority of the members in the selected School Management Committees (SMCs) were belonged to lower castes groups.

Religion

Religion is an important social variable and most of the cultural practices in a community are linked with religion. With regard to religion of the members in the selected School Management Committees (SMCs), the following categories were made.

Table:-5

Distribution of Members according to their Religion

Religion	Sex		Total
	Male	Female	
Hindu	55 (39.29)	67 (47.86)	122 (87.15)
Sikh	15 (10.71)	03 (02.14)	18 (12.85)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No.5 shows that 87.15 per cent of the members in the selected School Management Committees were belonged to Hindu religion out of 39.29 per cent were males and 47.86 per cent were females. On the other side 12.85 per cent of the members were belonged to Sikh religion out of 10.71 per cent were males and 02.14 per cent were females.

Thus it can be concluded that majority of the members in the selected School Management Committees (SMCs) were belonged to Hindu religion.

Occupation

Occupation is the determinant of oneís economic status in the society. In modern society, the economic condition of an individual plays a vital role in leading a satisfying life in old age. Occupation of an individual has a definite influence on oneís life style and status. So, in this context it is therefore important to analyze the occupational status of the School Management Committee Members (SMCMs).

To know the occupation of the SMC members, the following categories were made.

Table:-6
Distribution of Members according to their Occupation

Occupation	Sex		Total
	Male	Female	
Labour	56 (40.00)	16 (11.43)	72 (51.43)
Agriculture	09 (06.43)	00 (00.00)	09 (06.43)
Government Job	00 (00.00)	03 (02.14)	03 (02.14)
Shopkeeper	03 (02.14)	00 (00.00)	03 (02.14)
Private Job	02 (01.43)	00 (00.00)	02 (01.43)
No Occupation (Housewives)	00 (00.00)	51 (36.43)	51 (36.43)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No. 6 shows that 51.43 per cent of the School Management Committee members were labourer out of 40.00 per cent were males and 11.43 per cent were females. 06.43 per cent of the male members had been engaged with agriculture. Furthermore 02.14 per cent of the female members had been engaged with Government job (Anganwadi Worker). 01.43 per cent of the male members had been engaged with private jobs. 02.14 per cent of the members had been engaged with different shops. 36.43 per cent of the female members were not involved in any economic activity.

Thus it can be concluded that a large proportion of the members in the selected School Management Committees (SMCs) were engaged with labor work.

Monthly Income

Income is the amount of money which is earned by an individual from a particular occupation. It is also an amount which is paid to an individual for his work. In order to satisfy the basic necessities every person has one or more than one source of income. A source of income differs from person to person.

Let us have look at monthly income of the members in the selected School Management Committees (SMCs).

Table:-7
Distribution of Members according to their Monthly Income Status

Monthly Income Status (Individual)	Sex		Total
	Male	Female	
Up to 5,000	35 (25.00)	06 (04.29)	41 (29.29)
5,001-10,000	07 (05.00)	00 (00.00)	07 (05.00)
Above 10,000	03 (02.14)	00 (00.00)	03 (02.14)
No Income	00 (00.00)	51 (36.43)	51 (36.43)
No Response	25 (17.86)	13 (09.28)	38 (27.14)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No.7 shows that 29.29 per cent of the members of the SMCs had income up to Rs 5,000 per month out of 25.00 per cent were males and 04.29 per cent were females. 05.00 per cent of the male members had monthly income of Rs 5,000-10,000. 02.14 per cent of the male members had monthly income above Rs 10,000 per month. 27.14 per cent of the SMC members did not show their monthly income status out of 17.86 were males and 09.28 were females.

So, it can be concluded that majority of the members of the selected School Management Committees (SMCs) had monthly income up to 5000 per month.

Section II

Awareness, Participation and Views of the School Management Committee (SMC) Members

This section gives us an understanding about the awareness, participation and views of the selected School Management Committee (SMC) members. In this section, the researcher was collected information about composition of the School Management Committee (SMC), agenda of the meetings of the School Management Committee (SMC) with reference to Right to Education (RTE) Act 2009-10 and its provisions.

Composition of the School Management Committee (SMC)

The composition of the School Management Committee (SMC) has been studied using the guidelines of the Right to Education (RTE) Act 2009. As per guidelines, which schools have up to 300 students, it is mandatory for a School Management Committee to involve 12 members. 9 of whom will be the parents of the school going children from weaker

sections out of 5 will be women and remaining will be men, one member will be Chairman, one member will be Secretary (school Headmaster/ mistress) and one member will be teacher representative of the school.

On the basis of awareness of the members about composition of the School Management Committee (SMC), the following categories were made.

Table:-8
Membersí Awareness about Composition of the School Management Committee

Awareness	Sex		Total
	Male	Female	
Partially Aware	34 (24.28)	14 (10.00)	48 (34.28)
Not Aware	19 (13.57)	60 (42.85)	79 (56.43)
Fully Aware	13 (09.29)	00 (00.00)	13 (09.29)
Total	**70 (50.00)**	**70 (50.00)**	**140 (140.00)**

Table No. 8 shows that 34.28 per cent of the SMC members were partially aware about the composition (total number of members involved) of the School Management Committee (SMC) out of 24.28 per cent were males and 10.00 per cent were females. Although the members were partially aware but they were ready to respond the number of some members. Table also presents that 56.43 per cent of the members were not aware out of 13.57 per cent were males and 42.85 per cent were females. 09.29 per cent of the male members were fully aware.

Thus it can be concluded that majority of the female members in the selected School Management Committees (SMCs) were not aware about the composition of the School Management Committee (SMC).

Various Designations in the School Management Committee (SMC)

For the purpose of development of the primary school activities, the Right to Education (RTE) also mentioned that the School Management Committee Members (SMCMs) plays a vital role on various designations such as Chairman, Secretary and Members.

In the present study, the following table shows the awareness of the members about various designations in the School Management Committee (SMC).

Table:-9
Membersí Awareness about Various Designations in the School Management Committee

Awareness	Sex		Total
	Male	Female	
Not Aware	54 (38.57)	68 (48.57)	122 (87.14)
Partially Aware	09 (06.43)	02 (01.43)	11 (07.86)
Fully Aware	07 (05.00)	00 (00.00)	07 (05.00)
Total	**70 (50.00)**	**70 (50.00)**	**140 (140.00)**

Table No. 9 shows that 87.14 per cent of the members were not aware about various designations in the SMC out of 38.57 per cent were males and 48.57 per cent were females. On the other side 07.86 per cent of the members were partially aware out of 06.43 per cent were males and 01.43 per cent were females. They knew the designation of members only. 05.00 per cent of the male members were fully aware about the various designations in the School Management Committee i.e. Chairman, Secretary and Members.

Thus it can be concluded that majority of the female members in the selected School Management Committees (SMCs) were not aware about the various designations in the School Management Committee.

Role and Responsibilities of the School Management Committee

For the purpose of development of primary education in rural areas, the Right to Education (RTE) Act provides the different role and responsibilities of the members of the School Management Committees (SMCs) such as:

xvi. To ensure regular functioning of the schools

xvii. To maintenance the infrastructure i.e. furniture, drinking water, toilets, electricity, blackboards, library, and playground in the school

xviii. To ensure 100 per cent enrollment of children between the age group of 6 to 14

xix. To motivate the parents to enroll their children in school and retain them in the school till they complete the primary education

xx. To ensure enrollment and retention of girls belonging to lower category

xxi. To monitoring the teachersí attendance

(14) To ensure the children with special needs receive all the benefits given to them

(15) To initiate discussion on quality of school education in rural areas

(16) To ensure the proper arrangements for Mid-Day Meal (MDM) in the school

(17) To keep a watch on grants received by a school from time to time and ensure that every grant is spent as per rules and proper account of their utilization is maintained.

Let us know the views of the members about their role and responsibilities regarding School Management Committee (SMC).

Table:-10
Membersí Views about their Role and Responsibilities

Awareness	Views	Sex		Total
		Male	Female	
Partially Aware	To attend the school meetings and put the signature on essential documents	10 (07.14)	12 (08.58)	22 (15.72)
	To monitoring the Mid-Day Meal scheme	09 (06.43)	08 (05.71)	17 (12.14)
	To maintenance of the basic infrastructure facilities	06 (04.29)	02 (01.43)	08 (05.72)
	To ensure 100 per cent enrolment and retention of all children between the age group of 6-14 years	03 (02.14)	01 (00.71)	04 (02.85)
	To ensure the girl child education	02 (01.43)	01 (00.71)	03 (02.14)
	To monitoring the budget-tracking of all maintenance funds	04 (02.86)	01 (00.71)	05 (03.57)
	To monitoring the teachersí attendance	01 (00.71)	00 (00.00)	01 (00.71)
	Sub Total	**35 (25.00)**	**25 (17.86)**	**60 (42.85)**
Fully Aware	Multiple Response	02 (01.43)	00 (00.00)	02 (01.43)
Not Aware	No Response/Not Applicable	33 (23.57)	45 (32.14)	78 (55.72)
	Grand Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No. 10 shows that 42.85 per cent of the members were partially aware about role and responsibilities of the School Management Committee (SMC) out of 25.00 per cent were males and 17.86 per cent were females. 15.72 per cent of the members out of 07.14 were males and 08.58 were females viewed to attend the school meetings and put the signature on essential documents is their responsibility. 12.14 per cent of

them out of 06.43 per cent were males and 05.71 per cent were females viewed that their role is to monitoring the Mid-Day Meal (MDM) scheme. 05.72 per cent of the members out of 04.29 per cent were males and 01.43 per cent were females opined to maintenance the basic infrastructure facilities. 02.85 per cent of them out of 02.14 per cent were males and 00.71 per cent were females viewed to ensure the 100 per cent enrolment of children between the age group of 6-14 years. 02.14 per cent of the members out of 01.43 per cent were males and 00.71 per cent were females observed to ensure the girl child education. 03.57 per cent of them out of 02.86 per cent were males and 00.71 per cent were females responded to monitoring the budget tracking of the Government grants/ funds is their role and responsibility. 00.71 per cent of the male members viewed to monitoring the teachersí attendance in the school. Table also shows that 01.43 per cent of the members of the SMC members gave multiple responses regarding their role and responsibilities. At the end table shows that 55.72 per cent of the members out of 23.57 per cent were males and 32.14 per cent were females were not aware about their role and responsibilities.

Thus it can be concluded that majority of the members were not aware about role and responsibilities about School Management Committee (SMC). So, there is need to aware the members about role and responsibilities of SMC.

Agenda of the Meetings of the School Management Committee

According to norms of the Right to Education (RTE) Act, the School Management Committees (SMCs) of the Government primary schools will be hold meetings with all the members in a proper way. It is mandatory for every SMC will lay out agenda of the meetings which will be helpful in the development of the Government schools. According to its (RTE) guidelines, this agenda will based on both academic as well as non-academic areas of the schools.

In the context of academic area the agenda of meetings of the School Management Committee (SMC) will be based on enrolment, retention and achievement of the students. On the other side in the non-academic area, the agenda of meetings will be based on construction, maintenance, replacement and sanction of the grants of the schools.

For the study purpose to know the views of the members regarding agenda of meetings of the School Management Committees (SMCs) in the sample schools, the following categories were made.

Table:-11
Membersí Views about Agenda of the Meetings of the School Management Committee

Views	Sex		Total
	Male	Female	
Academic	24 (17.14)	11 (07.86)	35 (25.00)
Non-Academic	21 (15.00)	19 (13.57)	40 (28.57)
Both	14 (10.00)	08 (05.71)	22 (15.71)
No Response	11 (07.86)	32 (22.86)	43 (30.72)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No.11 shows that 25.00 per cent of the SMC members out of 17.14 per cent were males and 07.86 per cent were females viewed that the agenda of the SMC meetings is based on academic area i.e. enrolment, retention and achievement of the students. 28.57 per cent of them out of 15.00 per cent were males and 13.57 per cent were females stated that the agenda of the SMC meetings is based on non-academic areas i.e. construction, maintenance, replacement and sanctions of the grants of the schools. On the other side 15.71 per cent of the members out of 10.00 per cent were males and 05.71 per cent were females viewed on both the academic as well as non-academic areas. 30.72 per cent of the members out of 07.86 per cent were males and 22.86 per cent were females did not respond.

Thus it can be concluded that majority of the female members were not aware about the agenda of the meetings of the School Management Committees (SMC).

Right to Education Act 2009

The Right to Education (RTE) Act is an historic step which recognizes the importance of community participation in school education. The Act specifies that a School Management Committee (SMC) will be constitute in every school to monitoring the school functioning. Under the Right to Education (RTE) Act 2009, the community participation has been envisaged as a major catalyst in enhancing the enrolment and retention of the students and also responsible for quality education in the Government rural primary schools.

Let us know the awareness and views of the members of the selected SMCs on Right to Education (RTE) Act 2009-10.

Table:-12
Membersí Awareness and Views about Right to Education Act
2009-10

Awareness	Views	Sex		Total
		Male	Female	
Not Aware	No Response	63 (45.00)	67 (47.86)	130 (92.86)
Partially Aware	Free of cost Education till 8th standard	00 (00.00)	01 (00.72)	01 (00.72)
	Promote the students till 8th standard	00 (00.00)	01 (00.72)	01 (00.72)
	Provision of Community Participation	02 (01.43)	00 (00.00)	02 (01.43)
	Provision of adequate infrastructure facilities	02 (01.43)	00 (00.00)	02 (01.43)
	Provision of budget-tracking of Govt. schemes	01 (00.71)	00 (00.00)	01 (00.71)
	Sub Total	**05 (03.57)**	**02 (01.43)**	**07 (05.00)**
Fully Aware	Multiple Response	02 (01.43)	01 (00.71)	03 (02.14)
	Grand Total	**70 (50.00)**	**100.00**	**140 (100.00)**

Table No. 12 shows that 92.86 per cent of the members out of 45.00 per cent were males and 47.86 per cent were females were not aware about Right to Education Act 2009 and its provisions. 05.01 per cent of the members out of 03.57 per cent were males and 01.44 per cent were females were partially aware and stated that Right to Education (RTE) means free of cost education till 8th standard (00.72 per cent), promote the students till 8th standard (00.72 per cent), provision of community participation (01.43 per cent), provision of adequate infrastructure facilities (01.43 per cent) and provision of budget-tracking of the Government schemes (00.71 per cent) in primary schools etc. Table also presents that 02.14 per cent of the members were fully aware out of 01.43 per cent were males and 00.71 per cent were females and stated the multiple responses on RTE Act and its provisions.

Thus it can be concluded that a very small proportion of the members of the selected School Management Committees were aware about Right to Education Act 2009-10 and its provisions.

Section III

This section deals with problems faced by the members of the selected School Management Committees (SMCs). The researcher was collected information about problems in availability of the Government benefits in the primary schools. It also mentioned the suggestions recommended by the members of the School Management Committees (SMCs).

Problems Encounter by the SMC Members regarding availability of the Government Benefits in the sample primary schools

To achieve the goal of Universalization of Primary Education (UPE) the Government of India (GOI) has provided free and compulsory education through various incentives such as free text books, free school uniforms, stipends, free teaching-learning materials and mid-day meal etc. These incentives have been initiated in all the Government primary schools to improve the attendance as well as retention of the students.

But there are so many problems in implementation of the Government benefits. If centrally sponsored schemes (CSSs) are properly implemented, the socio-economic condition of the disadvantaged people shall be develop which makes education universal.

Let us know the problems of the members of the selected School Management Committees (SMCs) in the government rural primary schools.

Table:-13

Problems encounter by the Members of the School Management Committees

Problems	Sex		Total
	Male	Female	
Delaying in textbooks and uniforms	05 (03.57)	08 (05.71)	13 (09.28)
Lack of quality in school uniforms	02 (01.43)	04 (02.86)	06 (04.29)
Lack of stipends to poor students	04 (02.86)	10 (07.14)	14 (10.00)
Lack of basic infrastructure facilities	05 (03.57)	06 (04.29)	11 (07.86)
Lack of computer & vocational education	04 (02.86)	06 (04.29)	10 (07.15)
Shortage of teachers	13 (09.28)	14 (10.00)	27 (19.28)
Lack of purity in mid-day meal	12 (08.57)	13 (09.29)	25 (17.86)
Multiple Response	25 (17.86)	09 (06.42)	34 (24.28)
Total	**70 (50.00)**	**70 (50.00)**	**140 (100.00)**

Table No. 13 shows that 09.28 per cent of the SMC members out of 03.57 per cent were males and 05.71 per cent were females stated the problem of delaying in both textbooks as well as school uniforms. 04.29 per cent of them out of 01.43 per cent were males and 02.86 per cent were females opined the problem of lack of quality in school uniforms. 10.00 of the members out of 02.86 per cent were males and 04.29 per cent were females stated the problem of lack of stipends to students from weaker sections. 07.86 per cent of them out of 03.57 per cent were males and 04.29 per cent were females viewed the problem of lack of infrastructure facilities i.e. classrooms, furniture, electricity, toilets and drinking water etc. 07.15 per cent of the members out of 02.86 per cent were males and 04.29 per cent were females stated the problem of lack of both computer and vocational education. 19.28 per cent of them out of

- per cent were males and 10.00 per cent were females noticed the problem of shortage of teachers in the Government primary schools.
- per cent of the members out of 08.57 per cent were males and
- per cent were females observed the problem of lack of quality in Mid-Day Meal (MDM). Table also presents that 24.28 per cent of the members out of 17.86 per cent were males and 06.42 per cent were females stated multiple responses on various problems prevailing in the sample schools.

Thus it can be concluded that all of the above problems were prevailing in the sample Government primary schools in rural areas of Jalandhar district.

Suggestions Prescribed by the School Management Committee Members

The next table presents the suggestions prescribed by the members of the selected School Management Committees (SMCs).

Table:-14
Suggestions Prescribed by the Members of the School Management Committees

Suggestions	Sex			Total
	Male		Female	
Textbooks and uniforms should be provided at the time of admission	05	(03.57)	08 (05.71)	13 (09.28)
Quality in school uniforms should be provided	02	(01.43)	04 (02.86)	06 (04.29)
Stipends should be provided to poor students at proper time	04	(02.86)	10 (07.14)	14 (10.00)
Sufficient basic infrastructure facilities should be provided	05	(03.57)	06 (04.29)	11 (07.86)
Computer & vocational education should be provided	04	(02.86)	06 (04.29)	10 (07.15)
Sufficient teaching staff should be provided	13	(09.28)	14 (10.00)	27 (19.28)
Purity in mid-day meal should be provided	12	(08.57)	13 (09.29)	25 (17.86)
Multiple response	25	(17.86)	09 (06.42)	34 (24.28)
Total	**70**	**(50.00)**	**70 (50.00)**	**140 (100.00)**

Table No.14 shows that 42.14 per cent of the members of the SMCs suggested that textbooks and school uniforms should be provided to students at the time of admission, good quality in school uniforms should be provided, Stipends for poor students should be provided at proper time. They responded that from a long time, students are not getting a single penny of the stipends. 31.43 per cent of the members stated that the purity in Mid-Day Meal (MDM) should be provided, sufficient infrastructure and sanitation facilities should be provided, computer and vocational education especially for girls should be provided. It also shows that 25.00 per cent of the members viewed that sufficient teaching staff should be provided in the sample primary schools. Most of the members stated that it is the duty of the school teachers to aware the members of the School Management Committees (SMCs) about Centrally Sponsored Schemes (CSSs) then they will actively participate in each and every school activity. 1.43 per cent of the members considered that all of the above suggestions are necessary for the development of the government primary education in rural areas.

Conclusions

In this paper, the researcher has tried to identify the community participation in primary education at village level in the context of Right to Education (RTE) Act. The present paper is divided into three sections:

In the context of socio-economic profile of the SMC members, study found that majority of the members were placed in the age category of 31-40 years. Majority of the members were qualified up to primary level. Majority of the members were married. A large section of the members belonged to Hindu religion. A big part of the members belonged to Scheduled Caste (SC) category. Majority of the members engaged with labour. Most of the members had monthly income up to 5000.

Further in the context of awareness and views of the SMC members, the study found that majority of the female members were not aware about composition of the School Management Committee (SMC). Most of the female members were not aware about their role and responsibilities in the School Management Committee. Study found that more than half of the members were partially aware about meetings hold with school Headmaster/mistress and less than half of the members were not aware about the agenda of the SMC meetings.

In the context of problems faced by the SMC members, they stated the various types of problems such as lack of basic infrastructure facilities, delaying in the textbooks and the school uniforms, lack of quality in the school uniforms, delaying in the stipends, no provision of the separate funds for electricity bills, shortage of teaching staff and extra burden of Government schemes.

Further the members of the selected School Management Committees (SMCs) prescribed the suggestions on various problems in the sample schools i.e. text books and school uniforms should be provided at the time of admission, quality in school uniforms should be provided, stipends should be provided to poor students, sufficient infrastructure facilities should be provided, computer and vocational education should be provided, teaching staff should be provided, quality in mid-day meal should be provided in each and every state run government primary school.

Thus the researcher conclude that the role of Right to Education (RTE) Act 2009-10 in strengthening the primary education at village level through community participation is very good because of without community participation the schools will not develop and function.

Although the study found that majority of the SMC members are illiterate and unaware about their role and responsibilities but still it is a good opportunity for SMC members that they contribute and share their

experiences with school teachers to strengthening the rural primary education. After all they are the important part of the school and it is essentially that they should be co-operative.

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