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Performance of Agricultural Sector in Devipatan and Gorakhpur Divisions of U.P. Since 1993 To 2008

Rajeev Sirohi
Associate Professor,
Deptt.of Economics,
D.A.V. (PG) College,
Bulandshahr

Abstract

It is well known fact that productivity is the key factor in agriculture sector**.** In this paper, total factor productivity of foodgrain crops of eight districts of two divisions of U.P. was assessed. Eight districts were selected for the present study. Findings indicated that three districts showed the negative total factor productivity growth during the period of the study.

Keywords: Compound Average Growth Rate (CAGR) and Total Factor Productivity.

Introduction

An increase in the productive capacity of the agriculture can be brought about by the combination of two courses (a) by extending the area under cultivation and (b) by improving the yield per hectare on intensive cultivation.[1] The extensive agriculture's elasticity would not bear much stress. Increase in the agricultural productivity has therefore to be sought for largely on the intensive side and here is obvious scope for improvement. A remarkable illustration of possibilities of intensive cultivation was furnished by pre-war Japan which supported population of nearly 60 million on the cultivated area of barely 17 million acre.[2] The 1970s saw a huge increase in India's wheat production that heralded the Green Revolution in the country. The increase in post -independence agricultural production has been brought about by bringing additional area under cultivation, extension of irrigation facilities, use of better seeds, better techniques, water management, and plant protection.

Objectives of the Study

1. To measure the district-wise total factor productivity (TFP) for foodgrain crops in eight districts of two divisions of U.P.
2. To suggest policies and strategies to sustain the growth in TFP by district.

Review of Literature

Total Factor Productivity

The increased use of input, to certain extent, allows the agricultural sector to move up along the production surface by increasing the yield per unit area. Their use may also induce an upward shift in production function to the extent that technological change is embodied in them. It has long been recognized that partial productivity measure, such as output per unit of individual inputs, is of limited use as indicator of real productivity change as defined by the shift in a production function. The concept of total factor productivity (TFP), which implies an index of output per unit of total factor input, measures properly this shift or increase in output, holding all inputs constant. The relative sectoral growth rates of productivity are important determinants of structural transformation of economy, and the rate of growth of productivity in the long-run ; productivity being the ' engine of growth '. Since the publication of solow's paper in 1957, voluminous literature dealing with the measurement and analysis of productivity at different levels of aggregation has appeared. Until recently, much of it was concerned mainly with developed countries.

Adinarayan (1986) found a significant increase in paddy productivity since introduction of high-yielding varieties in Andhra Pradesh (India) during the mid-1960s. Using production function analysis, the study showed that the relative value share of land declined while the value share of labour, fertilizer and capital improved significantly. The increase in the relative share of labour indicated that farmers were benefited from the general rise in productivity but the rural sector on the whole might lose to the urban sector in the long-run through the substantial value share

attributed to fertilizer and capital service. Appropriate policy measures may also be needed to check the decline in the factor share of land.

Pinstrup et al. (1991) stated that technological change had been effective in increasing the yields of staple and cash crops such as rice and wheat in South Asia, and had raised the income of farmers considerably over the last 25 years. The study focused on analyzing the impact of technological change on nutritional standards in areas that had displayed success in economic terms as a result of Green Revolution. Data were derived from a study carried out by India's Madras and the UK's Cambridge universities, on village in North Arcot districts of Tamilnadu. The changes in household income and expenditure were examined between 1972-73 and 1982-83 and the proportion of income spent on rise was estimated. The protein consumption levels were analyzed and deficiencies were that most farm household were consuming 80% of the recommended calorie intake by 1982-83, as a result of income increases. Much improvement in nutritional status were also assumed to be a consequence of greater rice production by each household.

Kumar and Rosegrant (1994) estimated TFP for rice in India. The results revealed that growth in input index declined from 2.52 percent during 1970s to 1.72 percent during 1980s. Closely following the input-output index, the TFP growth declined from 2.44 percent during 1970s to .85 percent during 1980s. Thus, the recent studies covering the period up to 1980s in Indian crop sector indicated the growth of TFP over time, though there were indications that TFP growth had declined during 1980s as compared to 1970s, as shown in the case of rise.

Kumar et al. (2002) analysed the performance of irrigated agriculture by measuring TFP indices at district and regional levels in the Indo-Gangetic Plains (IGP) . The result revealed that the TFP index of the crop sector in IGP had risen by 1.2 percent during 1981-1997. It was higher in the Lower Gangetic Plain (3.1 PERCENT) and Lowest in the middle Gangetic Plain (0.4 percent). Productivity alone had contributed to the total output growth in IGP. The TFP had contributed in 65 percent of the GCA in IGP. Only one third of the GCA did not witness any contribution of technical change. The public policies such as investment in research, extension and infrastructure had been the major source of TFP growth in IGP. They have concluded that the sustainability issue of the crop system in the IGP has to be addressed for maintaining the country's overall economic development and the national food and household security.

Ali (2005) analyzed the impact of Research and Extension (R&E) investment on TFP growth Pakistan during the period 1960-96 within a distributed lag framework. The estimation of the productivity-R&E relationship provided evidence of a strong relationship, explaining 96 percent of the variation in TFP index. The marginal internal rate of return on R&E investment is estimated at 88 percent.

Methodology

The Kendrick Index

This index is based on the assumption of a linear production function of the following from assumed by Kendrick (1961)

$$Q = aL + bK.$$

Where a and b are positive constants, and Q, L and K convey the usual meanings.

This index is the ratio of output to weighted average of the two factors of production, where base year rates of reward are taken as weights.

Kendrick index of TFP is given by:

$$A_t^K(t) = \frac{Q_t}{W_0L_t+r_0K_t}$$

W_0 and r_0 are the base year rates of reward for labour and capital respectively. Above method has its own merits and demerits.

In the present paper due to limitation of data, we have used kendrick index for measuring the Total Factor Productivity (TFP) in agricultural sector. In this paper we have taken yield as output and fertilizer, pesticides, Seeds, working capital used as inputs. Then this formula is convert as:

$$A_t = \frac{Y_t}{WC+F+S+P}$$

where Y_t= yield in 't' year

WC= Working Capital per hectare in 't' year

F= Fertilizer consumption per hectare in 't' year

S= Seed Consumption per hectare in 't' year

P= Pesticide consumption per hectare in 't' year

A_t= Index of Total factor productivity in 't' year

In the above formula, we take equal weightage of all inputs (Non availability of price data at district level) and we make indexing of inputs and outputs.

In this paper, TFP is measured for foodgrain crop sector in eight districts of two divisions of U.P. during the period from 1993/94 to 2007/08. For analytical convenience this period has been divided into two sub periods, namely, 1993/94 to 1999/2000 (first sub-period) and 2000/01 to 2007/08 (second sub-period). The paper covers 8 districts of U.P.. We have taken rice, wheat, jowar, bajara, maize, barley and gram crops as foodgrains.

A widely accepted exponential model, $y = a\ b^t\ e^u$, has been fitted to the time series data for estimating growth rates. The logarithmic form of this function is given by;

$$\ln (y) = \ln(a) + t \ln(b) + u$$

where,

y is the dependent variable whose growth rate is to be estimated.

t is the independent variable (Time)

u is the disturbance or error term.

a and b are the parameters to be estimated from sample observations. The regression coefficient b is estimated by ordinary least squares (OLS) technique.

The Compound Average Growth Rate (CAGR) in % term is estimated as:

$$CAGR = \{antilog\ (b) - 1\}$$

Results and Discussion

Productivity as a source of growth has been an important theme of analytical enquiry in economics all along. Analysis of total factor productivity, attempts to measure the amount of increase in total output which is not accounted for by increase in total inputs. There is a large residual which is the contribution of the knowledge sector; this is called technological change or total factor productivity. The total factor productivity index is computed as the ratio of an index of aggregate output to an index of aggregate inputs.

This paper is divided into two sections. Agricultural performance of eight districts of two divisions of U.P., i.e, trend analysis of Area, Production and Yield, has been discussed in Section I. Section II appraises the district-wise trends and growth of total factor productivity in foodgrain crops at district level.

Section I: District-wise Agricultural Performance of Eight Districts of two divisions of U.P.

The results of estimation of CAGR of area, output and yield in respect of food-grains of districts eight districts of two divisions of U.P. for the two sub-periods i.e. 1990-91to 1999-2000, 2000-01 to 2007-08 and as also for the complete period i.e., 1990-91 to 2007-08 are presented in Table1.

The results of estimation of CAGR of area, production and yield in respect of food-grains of eight districts of two divisions of U.P. in Table 1.

The district-wise results make clear that CAGR of agricultural output for food-grain crops in Grakhpur division of U.P. in the later period i.e. 2000-01 to 2007-08 has significantly decreased as compared to first period i.e. 1990-91 to 1999-2000. CAGR of agricultural output for food-grain crops in Devipatan division of U.P. in the later period i.e. 2000-01 to 2007-08 has significantly increased as compared to first period i.e. 1990-91 to 1999-2000 except Shravasti district. It is also observed from these results that all districts experienced a rise in output growth rate of food-grains over the study period 1990-91 to 2007-08 except Deoria and Gonda districts. But the CAGR of output of food-grain crops varied. All the districts have so good experienced over the entire period of study.

Table 1: District-wise CAGR in Area, Production and Yield for Food-grain (in per cent)

S. No.	Districts	area			Production			Yield		
		1990-2000	2000-2008	1990-2008	1990-2000	2000-2008	1990-2008	1990-2000	2000-2008	1990-2008
1	Gorakhpur	-0.43	0.16	-0.19	2.00	1.48	1.29	2.44	1.32	1.48
2	Kushinagar	43.99	-0.17	18.02	66.65	-0.08	26.84	15.74	0.09	7.48
3	Deoria	-7.90	-1.85	-4.06	-6.97	-2.50	-3.56	1.01	-0.66	0.52
4	Maharajganj	0.11	1.19	0.27	3.50	-0.49	1.47	3.39	-1.66	1.19
5	Gonda	-7.65	2.06	-4.45	-3.24	0.95	-2.27	4.77	-1.09	2.28
6	Bahraich	-7.34	7.82	-2.09	-4.05	6.09	0.35	3.55	-1.60	2.50
7	Shrawasti	78.21	2.53	42.10	99.87	-0.21	50.65	12.15	-2.67	6.01
8	Balrampur		2.33			6.67			4.24	

Section II: Total Factor Productivity: District-wise Analysis of Eight Districts of Two Divisions of U.P.

The compound annual growth rates of total factor productivity (TFP) eight districts of two divisions of U.P. for foodgrain crop over the two sub-periods of the study as well as for the entire period were at the district level, and the results is presented in table 2. It is observed from these results in table 2 that most of district, experienced a rise in TFP growth over the period from 1993-94 to 2007-08 except Gorakhpur, Deoria and Maharajnagar. During this period, Shrawasti district recorded the highest TFP growth performance. The results also indicate that the CAGR of TFP in the later period in comparison to the first period for food grain crops shown a sharp deceleration.

Table 2: District-wise CAGR in Output, Input and TFP for Foodgrain in eight districts of Two Divisions (in Per Cent)

S.No.	District	Output			Input			TFP		
		1993-2000	2000-2008	1993-2008	1993-2000	2000-2008	1993-2008	1993-2000	2000-2008	1993-2008
1	Gorakhpur	1.71	1.32	1.09	3.87	1.48	1.77	-2.08	-0.16	-0.67
2	Kushinagar	18.33	0.09	5.26	0.90	-0.05	0.16	17.27	0.14	5.09
3	Deoria	1.13	-0.66	0.36	6.83	1.48	3.85	-5.33	-2.11	-3.36
4	Maharajganj	1.69	-1.66	0.18	1.61	1.24	1.06	0.08	-2.87	-0.87
5	Gonda	4.20	-1.09	1.38	8.70	0.67	-0.15	-4.14	-1.75	1.53
6	Bahraich	3.89	-1.60	2.05	5.28	-5.34	0.24	-1.32	3.95	1.80
7	Shrawasti	10.88	-2.67	3.91	-11.23	-2.40	-2.53	24.91	-0.28	6.61
8	Balrampur		4.24			-1.08			5.38	

To sum up the result of this study lead to the conclusion that It rises serious doubts about the sustainability of state's agricultural output and food security programmes in the face of no significant reduction being achieved in the population growth during the last two decade. It implies that the post higher growth rates of output and TFP observed in foodgrain crops may not be sustained without substantial technological improvements in future.

Suggestions

In view of the foregoing analysis of Agricultural Productivity of foodgrain crops in Utter Pradesh, it seems proper to evolve a sound strategy to raise the productivity of agriculture in Gorakhpur, Deoria and Maharajgang districts of Gorakhpur division of U.P., especially in low productive regions. For this the following suggestions for raising the productivity may be recommended.

1. Government should be open soil test center in every block.
2. Government should be give low rate of interest loan to farmers.
3. The measures of land reforms should be strictly observed in all the districts and surplus land should be expeditiously distributed among land less persons.
4. Priority must be given to check the floods & water logging and soil erosion hazards.
5. Ground water development programs with modern methods in areas of water scarcity.
6. Arrangements must be made to ensure the regular water by canals.
7. The highest priority in Gorakhpur, Deoria and Maharajgang districts Should be given to the promotion of cropping Intensity.
8. The rural credit facilities at more liberal rates and in great amount should be made available to the farmers.
9. Soil and water conservation programs are to be needed.

References

1. *Abraham, J. P. and S. K. Raheja, "An Analysis Growth of Production of Rice and Wheat Crops in India", Indian Journal of Agricultural Economics, Vol. 22, No. 3, 1967, pp.1-15.*
2. *Ahmad, Munir, (2001), "Agricultural Productivity Growth Differential in Punjab, Pakistan: A District-Level Analysis", The Pakistan Development Review, 40:1, Pp. 1-25.*
3. *Bramhananda, P. R. (1982). "Productivity in the Indian Economy". Himalaya Publishing House, Bombay.*
4. *Braradwaj, Krishan, 'Agriculture Price Policy for Growth : The Emerging Contradictions', Terence J. Byres, The state Development Planning and Liberalisation in India,Oxford University Press, New Delhi, 1998. P.198.*
5. *Clark, Colin and Margaret Haswell, The Economics of Subsistence Agriculture, Fourth Edition, MacMillan, Martin's Press, 1970, pp. 215-239.*
6. *Census Report 2001, Government of India.*
7. *Dhawan, B. D., Role of Irrigation in Raising Intensity of Cropping, Journal of Indian school of political economy, vol. 3, No. 4, Oct- Dec., 1991.*
8. *Fan, S. and P. Pardey (June 1997). " Research, Productivity, and Output Growth in Chinese Agriculture." Journal of Development Economics. Vol. (53), pp. 115-137.*
9. *Johnston, Bruce F. and J. W. Mellor, 'The Role of Agriculture and Economic Development', American Economic Review, Vol. 41, No. 4, Sept. 1961,pp. 566-93.*
10. *Jones, E. L., Agriculture and The Industrial Revolution, Basil Blackwell, Oxford, 1974.*
11. *Kiani, A. K., M. Iqbal and T. Javed (2008), " Total Factor Productivity and Agricultural Research Relationship : Evidence from crops sub-sector of Pakistan's Punjab ", European Journal of Scientific Research, Vol. 23, No. 1, pp. 87-97.*
12. *STATISTICAL Abstract U.P, 2009, Economics and Statistics Division, State Planning Institute, U.P. Lucknow.*
13. *Shetty, S. A. "Agricultural Production Trends and Components" Indinal Journal of Agricultural Economics, Vol. 25, No. 2, 1970, pp. 28-46.*
14. *Shujie Yao and Zinon Liu. "Determinants of Grain Production and Technical Efficiency in China." Journal of Agriculture Economics, Vol. 49, No. 2, pp. 171-184.*

Footnotes

1. *Satish, S., H. S. Sai and S. P. Hemase Kharappa, Fertilizer Usage Effeciencies: A Micro Level Study, Commonwealth Publishers, New Delhi, 1990.*
2. *Clark, Colin and Margaret Haswell, The Economics of Subsistence Agriculture, Fourth Edition, MacMillan, Martin's Press, 1970, pp. 215-239.*