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Performance of Agricultural Sector in Azamgarh and Basti Division of U.P. Since 1993 To 2008

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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 six districts of two divisions was assessed. Six districts were selected for the present study. Findings indicated that four 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

Agriculture's role in economic growth can be summarized into four headings. First, providing productive employment, second, providing more food and raw material, third, supplying savings to other sectors of the economy and fourth, serving as a market for the products of industrial market.

Industry is a labour using activity which can draw freely from a pool of surplus agricultural labour. Economic growth is defined as the transfer of labour from subsistence agriculture to market oriented industry. Industry is defined as everying that is modern and growing and agriculture, as everying that is traditional and stagnant.[1] The process development was observed as a transfer of labour from agriculture to industry. As these processes unfolded, the growing productive forces in both agriculture and industry symbolically generated the 'home market' .[2] In essence, HYVs and irrigation are complementary to each other and these constitute the integral parts of this new revolutionized technology. HYV seeds with controlled irrigation have the physiological attribute of being able to turn large amounts of soil nutrients into grain rather than leaf growth. This enables the plants to produce higher yields, especially so if the supply of nutrients in the soil can be increased.[3]

Objectives of the Study

1. To measure the district-wise total factor productivity (TFP) for foodgrain crops in six 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 recognised that partial productivity measure , such as output per unit of individual inputs , is of limited use as indicater 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. Patil and Jha (1978) studied the changes in output, input and

agricultural productivity growth in Maharastra state, India for the period 1951-52 to 1971-72. During the sub-period 1951-52 to to 1960-61, 18 out of 25 districts recorded positive output growth, and the growth in input varied between 0.82% and 2.89% per annum in different districts. The average growth in inputs was nearly 1.84% and growth in modern inputs, it was negligible. The total factor productivity growth rates were positive in 14 districts and were between .85% and 5.92% per annum . During the sub-period 1960-61 to 1971-72, the rate of TFP growth decreased. Only 9 of 23 districts which showed growth had rates of over 2.5% per annum. Only 3 districts recorded productivity gains while other showed a decline in productivity. During the 1960s, the agricultural output stagnated in spite of rapid growth in inputs mainly because the technological assets acquired in the 1950s had depreciated largely and this completely nullified the contribution of modern inputs. Agricultural research and extention to disseminate new technology has a critical role in rapid output growth.

Bramhananda (1982) estimated the TFP for agricultural sector (crop production and livestock) of India vis-à-vis other sectors. The chain index of productivity in agricultural sector showed a productivity improvement of 1.5 percent per annum during 1950-1960 and thereafter it declined to .8 percent per annum between 1960-61 and 1970-71 and further to .3 percent per annum between 1970-71 and 1980-81. After studying other sectors also, he reported, ' one broad conclusion that appears is that as we move from first to the third decade, TFP growth rates move down universally.' What is the contribution of improvement in TFP to growth in different sectors? The contribution moved down over the decades and for the entire period, it was just one-fifth. Thus, the contribution of improvement in TFP to the sectoral growth seems to have become less and less as we moved from the first decade to the third decade.

The most important commodity-producing sector like agriculture had a negative contribution to TFP growth in the third decade. The productivity growth momentum was thus lost.

Fan et al. (1999) have computed TFP for the agriculture sector of India and its different states for the period 1970 to 1995. Five major crops (rice, wheat, sorghum, pearl millet and maize), 14 minor crops (barley, cotton, groundnut, pulses, potato, rapeseed, mustard, sesame, sugar, tobacco, soybean, jute, sunflower and others minor crops), and 3 major livestock products (milk, meat, and chicken) were included in the measurement of output index. Five inputs (labour, land, fertilizer, tractor, and buffalo) were included in the measurement of input index. It was found that TFP for India grew at an average annual rate of 1.75 per cent. During the 1970s, the TFP growth rate was 1.55 per cent, but it grew faster during the 1980s at 2.52 per cent per year. Since 1990, the TFP growth in Indian agriculture has continued to grow at a rate of 2.3 per cent per year which is slightly lower, but is still at a high level. The TFP growth in agriculture was the prime driving force behind the acceleration of overall growth in the Indian economy achieved during 1980s. Modern inputs such as HYV seed, fertilizer and irrigation had raised the TFP growth in Indian agriculture. Rapid adoption of new technologies and improved rural infrastructure had also induced productivity growth.

Pratt et al. (2008) indentified and TFP is measured using a non-parametric Malmquist index which allows the decomposition of TFP growth into its components: efficiency and technical change. Comparing TFP growth in China and India it is found that efficiency improvement played a dominant role in promoting TFP growth in China, while technical change has also contributed positively. In India, the major source of productivity improvement came from technical change, as efficiency barely changed over the last three decades, which explains lower TFP growth than in China. Agricultural research has significantly contributed to improve agricultural productivity in both China and India. Even today, returns to agricultural R and D investments are very high, with benefit / cost ratios ranging from 20.7 to 9.6 in China and from 29.6 to 14.8 in India.

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 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, TFP is measured for foodgrain crop sector in six 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 6 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 six 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 six districts of two divisions of U.P.

The results of estimation of CAGR of area, output and yield in respect of foodgrains of districts six 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 foodgrains of six districts of two divisions of U.P. in Table 1.

The district-wise results make clear that CAGR of agricultural output for foodgrain crops in six districts of two divisions 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 except Sidharthnagar. It is also observed from these results that all districts experienced a rise in output growth rate of foodgrains over the study period 1990-91 to 2007-08 except Basti. But the CAGR of output of foodgrain 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 Foodgrain (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	Mau	-1.18	0.15	-0.75	0.94	-0.23	0.43	2.15	-0.38	1.18
2	Azamgarh	0.10	1.47	0.30	1.80	1.74	0.78	1.70	0.26	0.48
3	Ballia	-0.58	3.19	0.03	3.09	2.39	0.89	3.69	-0.77	0.86
4	Basti	-7.81	0.37	-4.64	-4.44	-0.87	-3.47	3.65	-1.24	1.23
5	Sant Kabir Nagar		1.13			0.08			-1.04	
6	Sidharthnagar	-1.56	1.98	-0.68	3.29	3.50	1.55	4.94	1.49	2.25

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

The compound annual growth rates of total factor productivity (TFP) six 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 fall in TFP growth over the period from 1993-94 to 2007-08. During this period, the Ballia 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 six 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	Azamgarh	3.15	0.26	0.39	3.36	-0.65	1.10	-0.20	0.92	-0.70
2	Mau	3.03	-0.38	1.02	0.57	0.83	1.10	2.44	-1.20	-0.08
3	Ballia	2.08	-0.77	-0.22	-1.25	-2.77	-1.36	3.38	2.06	1.15
4	Basti	3.36	-1.24	0.41	11.66	-0.52	6.09	-7.43	-0.72	-5.35
5	Sant Kabir Nagar		-1.04			4.94			-5.70	
6	Sidharthnagar	5.86	1.49	1.67	1.23	-0.84	1.27	4.57	2.35	0.40

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 two divisions of Utter Pradesh, it seems proper to evolve a sound strategy to raise the productivity of agriculture in Azamgarh, Mau, Basti and Santkabir Nagar districts of two divisions of U.P., especially in low productive regions. For this the following suggestions for raising the productivity may be recommended.

1. First step should be taken to divert the population from agriculture sector to secondary and Service sectors.
2. Regulated markets may be strengthened so that the farmers are able to obtain remunerative prices for their produce.
3. Priority must be given to check the floods & water logging and soil erosion hazards.
4. Ground water development programs with modern methods in areas of water scarcity.
5. Arrangements must be made to ensure the regular water by canals.
6. The highest priority in all the districts should be given to the promotion of cropping Intensity.
7. The rural credit facilities at more liberal rates and in great amount should be made available to the farmers.
8. Soil and water conservation programs are to be needed.

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Footnotes

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