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Performance of Agricultural Sector in Nine Districts of Uttar Pradesh 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 nine districts of u.p. was assessed. Nine districts were selected for the present study. Findings indicated that all districts showed the negative total factor productivity growth during the period of the study expect Bulandshahar and Moradabad.

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

Introduction

The contribution of agricultural sector in economic development can be viewed in term of food supplies, agricultural exports, transfer of labour force, additional capital –formation, additional purchasing power as a result of an increasing income, demand for industrial output, savings for development of the other sectors, etc.[1]

Rapid economic growth and development has been a major goal of all underdeveloped countries since the world war second. A major difference between the developed and undeveloped economy is the dominance of non-agricultural sector in the former and agricultural sector in the later. From this, one may infer that development requires the rapid growth of non-agricultural sector, but the role of agricultural sector in the process of economic development should not be under-estimated.[2] Agriculture may make significant contribution to net foreign exchange earnings through displacement of current and potential imports and through expanded exports. The contribution from import displacement may represent a direct displacement of import of agricultural commodities through expanded domestic production or an indirect change through a shift in consumption patterns towards domestically produced agricultural commodities and away from imported agricultural commodities. In either cage expanded production is a pre-requisite to the contribution.[3]

Intensive agriculture can be pursued firstly by increasing area under multiple crops. Secondly by increasing the yield per-acre. In the second one, we have to use new technology such as high yielding varieties of seeds, new methods of irrigation, fertilizer etc. agriculture can be viewed as a chemical processing industry where the seeds, water, plant nutrients and other inputs present in the soil are converted into foodgrains, foods, fibres, fodder and other, needed by the people and animals. To fulfil their requirements, the intensity of cultivation is required.

Objectives of the Study

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

Review of Literature

Totals 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. **Krishan (1967)** discussed the Intensive Agriculture District Programme which was initiated in 1961 to achieve a rapid growth in agricultural production in some selected districts. As a result of the programme, farmers are using higher level of inputs such as HYV's, irrigation, fertilizers, pesticides etc. On an aggregate there has been some improvement in the managerial skills of the farmers as reflected in aggregate productivity of resources. **Abraham and Reheja (1967**) examined the growth of production of rice (1951-52 to 1964-65) and analysed the contribution of inputs like area, irrigation and fertilizers. They found that three inputs viz. unirrigated area, irrigated area and fertilizers consumption accounted for about 7.16, 15.84 and 77.00 percent of the growth in rice production respectively. In case of wheat three inputs factors accounted for 30, 35, and 35 percent respectively. **Sahota (1968)** carried out a more detailed and comprehensive analysis of resource allocation in Indian Agriculture based on cross-section data relating to different crops and different size group of farms. With a view to accounting for specific characteristics peculiar to individual units. His methodology, is based on application of season-wise dummy variables and also the intercept shifting and slope-shifting dummy variables. The regressions based on the usual Cobb-Dougles type production function, revealed that no definite conclusion could be derived regarding the algebraic sign of coefficient of labour and that the value of the marginal product of irrigation was above its costs. His study also revealed that though the effect of the size of the farm on general production efficiency is concerned but his study could not arrive at any conclusive generalization.

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.

The above method has its own merits and demerits.

In the present study due to limitation of data, we have used Kendrick index for measuring the Total Factor Productivity (TFP) in agricultural sector. In this study 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 study, TFP is measured for foodgrain crop sector in nine districts 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 study covers 9 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:

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

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 nine districts 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.

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Section I: District-wise Agricultural Performance of Nine Districts of U.P.

The results of estimation of CAGR of area, output and yield in respect of foodgrains of nine districts of U.P. for the two sub-periods i.e. 1990-91 to 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 nine districts of U.P. in Table 1.

The district-wise results make clear that CAGR of agricultural output for foodgrain crops in nine districts 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 Bulandshahr and Aligarh. It is also observed from these results that all districts experienced a fall in output growth rate of foodgrains over the study period 1990-91 to 2007-08 except Bulandshahr and Aligarh. But the CAGR of output of foodgrain crops varied. All the districts have so bad experienced over the entire period of study.

Table 1: District-wise CAGR in Area, Production and Yield for Foodgrain (in percent)

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	Saharanpur	-0.27	-1.62	-1.47	1.57	-2.83	-1.04	1.85	-1.23	0.43
2	Muzaffarnagar	-1.14	-1.88	-1.87	0.52	-3.00	-0.81	1.68	-1.14	1.08
3	Bijnor	-1.54	-2.25	-1.73	0.95	-2.06	-0.30	2.53	0.19	1.45
4	moradabad	-4.18	1.22	-1.59	-2.70	-0.31	-1.05	1.55	-1.51	0.55
5	Jyotiba Phule Nagar		-6.10			-5.58			0.55	
6	Meerut	-6.30	-1.99	-4.80	-5.10	-1.62	-4.05	1.27	0.37	0.78
7	Bulandshahr	-2.98	6.50	0.25	-0.93	2.57	0.64	2.11	-3.69	0.39
8	Aligarh	-2.95	2.89	-1.14	0.06	1.39	0.45	3.10	-1.46	1.61
9	Hathras		-0.05			-1.11			-1.06	

Section II: Total Factor Productivity: District-wise Analysis of Nine Districts of U.P.

The movements in TFP Index of foodgrain in nine districts (Uttar Pradesh) over the period 1993-94 to 2007-08 are presented in Figure (a) to Figure. Figure (C) shows that the level Comparisons among these districts over the period of study show that on an average in Figure (a) TFP levels have been the highest in Bijnore. In Figure (b), an average TFP levels have been the highest in Moradabad and In figure(c), an average TFP levels have been the highest in Aligarh.

Figure (a)

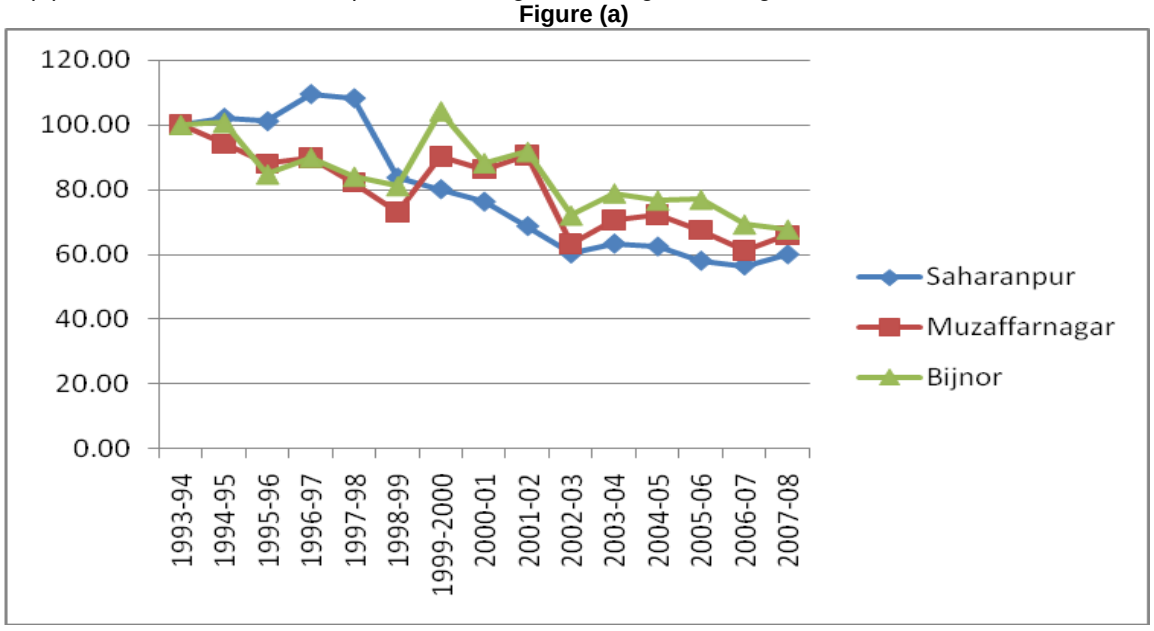


Figure (b)

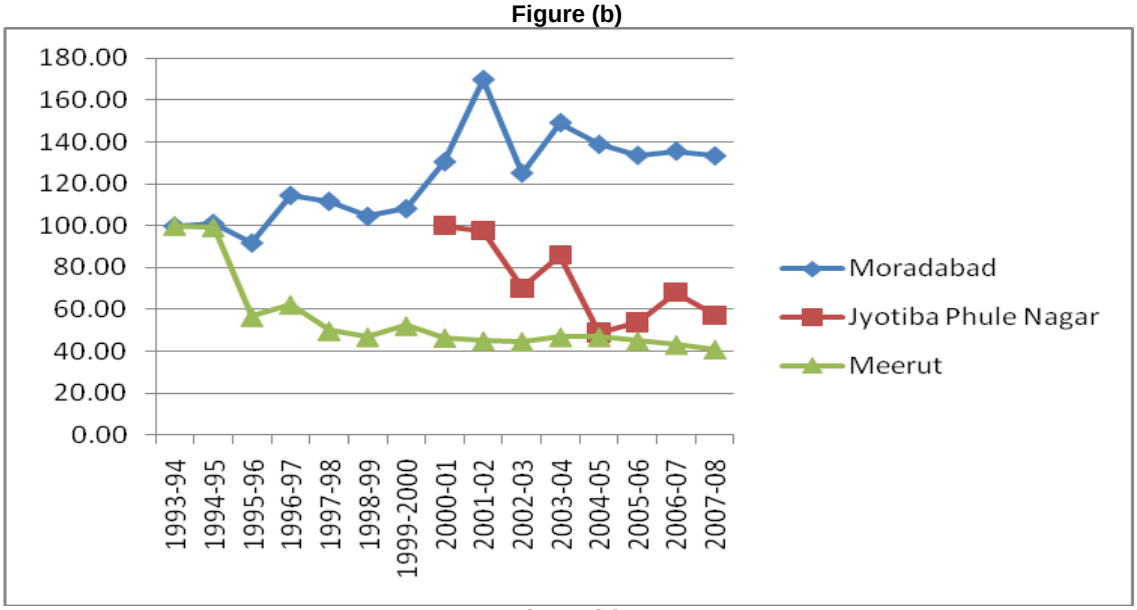
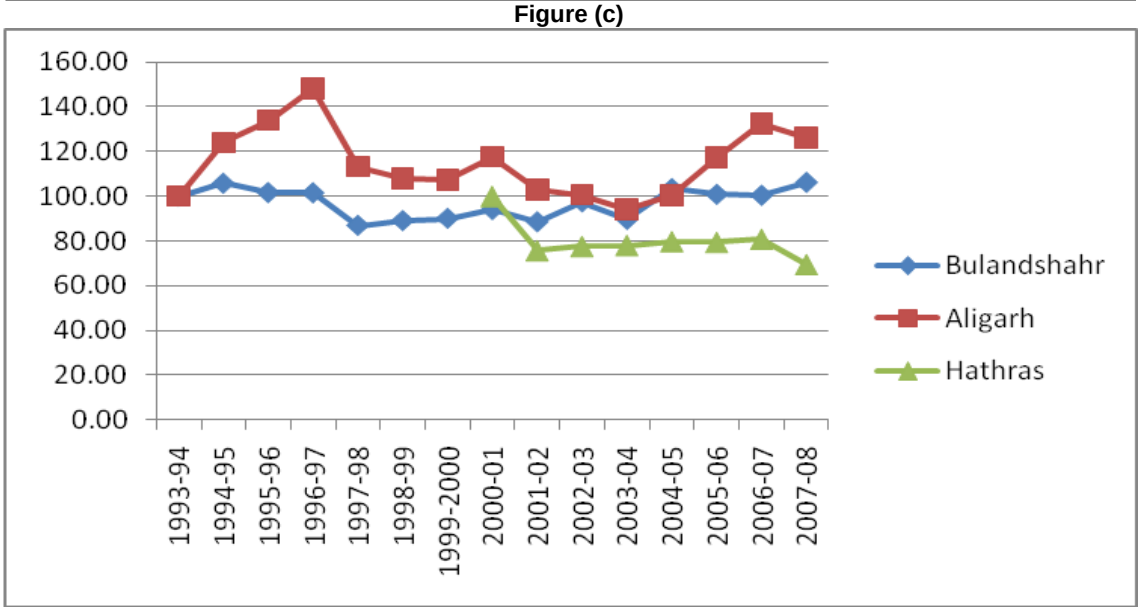


Figure (c)



The compound annual growth rates of total factor productivity (TFP) in Uttar Pradesh 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 Moradabad 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 nine districts (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	Saharanpur	2.55	-1.23	0.14	6.26	2.10	5.50	-3.49	-3.26	-5.08
2	Muzaffarnagar	1.94	-1.14	0.87	5.23	3.22	3.95	-3.12	-4.23	-2.96
3	Bijnor	3.12	0.19	1.24	4.28	3.92	3.66	-1.12	-3.59	-2.33
4	Moradabad	0.88	-1.51	0.09	-0.90	-0.52	-2.75	1.79	-1.00	2.93
5	Jyotiba Phule Nagar		0.55			9.36			-8.06	
6	Meerut	1.00	0.37	0.57	14.73	1.65	5.69	-11.96	-1.27	-4.84
7	Bulandshahr	2.63	-3.69	-0.11	5.69	-5.67	-0.26	-2.90	2.10	0.14
8	Aligarh	4.21	-1.46	1.28	5.09	-4.10	1.62	-0.84	2.75	-0.33
9	Hathras		-1.06			1.48			-2.51	

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 nine districts of Utter Pradesh, especially in low productive regions. For this the following suggestions for raising the productivity may be recommended.

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

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