Performance of Agriculture in Uttar Pradesh-A District-level Analysis

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Introduction

Indian economy at the dawn of 21st century finds itself at the cross-roads. Last few years have seen its transformation from an ailing agricultural economy to a rapidly growing one with services sector emerging as the power house for the economy. The economy has experienced an average annual growth rate of approximately 6 to 8 per cent during the last two decades. As is to be expected, improvement in economic growth and per capita income has translated, at least partly, into reduction in the level of poverty in the country and accelerated improvement in various indicators of human development. However, there is a broad consensus among critics as regards growth not being inclusive and balanced. It is claimed that there exist huge diversity and regional disparity across the economy at state level. The gap between rich and poor regions that existed even at the time of independence has widened over the years and significantly intensified during the period of reforms.

There exists voluminous literature dealing with the issue of regional disparity. Most studies have targeted state as unit for measuring disparity and have sought to gauge the impact of development policy on relative development of the states. The findings of such studies have been used by government agencies to frame policies to promote balanced regional development. These policies have met with limited success and not only disparity has increased but has started showing its ugliest face. One significant factor causing limited success to efforts of balanced developments has been the neglect of variations within states and exclusive reliance on information relating to disparity at the state level. For a huge country like India where some of the states are bigger than many nations, it is very important to look at the disparity at the disaggregate level. Regional development policy framed by the government by treating the state as a homogenous unit fails because of existence of inter-district differences within the state. The widening gulf between advanced and backward

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regions within a state leaves those living in backward regions disgruntled and dissatisfied, creates an aversion towards the civic processes and raises doubt about the viability and usefulness of the political system. This has destabilizing impact on district economy and polity**.** A study of disparity at the disaggregated level is therefore essential for ascertaining the level of development in agriculture, industry, infrastructure, per capita net state domestic product, level of literacy, health cover and other sectors across all the districts of a particular state and also for analyzing the respective roles of physical/natural factors vis-à-vis man-made factors in causing (or aggravating) these inequalities.

It is this realisation that has encouraged the present authors to attempt at analysing inter-district agricultural disparity in Uttar Pradesh. Indian agriculture is known for its diversity which is mainly the result of variations in resource endowments, climate, topography and historical, institutional and socio economic factors. Policies followed in the country and nature of technology that became available over the times has reinforced some of the variations resulting from natural factors. As a consequence, production performance of agriculture sector has followed an uneven path and large gaps have developed in productivity between different geographic locations across the country. Being primarily agricultural, high growth in agriculture sector is a pre-requisite for attaining higher growth in the overall economy of the state, as also for reduction in the incidence of poverty. Unfortunately however, since the tenth plan the agricultural sector in the economy has not been doing well and the growth rate in the sector has remained in the vicinity of a low 2% per annual. There is deceleration in the growth of agriculture along with the distressed state of farmers, in general and that of small and marginal farmers, in particular. What is more intriguing is that there is wide inter-region and inter-district disparity within the state. While the districts of the Eastern and Central (Bundelkhand) regions are fighting tough situation riddled with the problem of small size of land holding, farmer's indebtedness, migration and poor access to modern technology; those located in Western region are relatively better-off. This variation in situation of agriculture is on the one hand causing lop-sided development of the state and increasing dissatisfaction and disenchantment of farmers of the backward area, on the other making policy formulation extremely difficult. Policymakers can not apply one set of policy for all the regions/districts of the state because the nature of the ailment, level of development and complications differ. What is, therefore, required is to have firsthand detailed information of the variation among different districts of the state in agricultural development, their growth trend, strength and weaknesses, so as to formulate right mix of policy that can resurrect the agricultural sector of the State. It is this need that the present paper addresses. It attempts to see the extent of variation among different districts of UP in the last two decades. It compares the districts at two time periods 1990-91 and 2008-09 to see how the disparity is evolving over a period of time. The paper is divided into four sections-Section-I provides a brief review of literature. Section-II describes methodology and data source of the study. Section-III analyses district and regional level attainment of

agricultural in Uttar Pradesh in terms of the indicators chosen and measures the inter-district and inter-region disparity. Section IV gives some suggestions to make things better for the state.

Brief Review of Literature

The literature on regional disparity is though very vast and varied yet the issue of variation in agricultural development across regions has received rather scant attention. There are a number of attempts made at discussing backwardness of a particular region or prevalence of crisis like situation in some other but the thrust on regional disparity in agricultural development has been rather lacking. Clearly, the studies relating to backwardness of agriculture have pointed out some major problems of the agriculture sector but have failed to compare the variations in performance of different regions and the reasons thereof.

Among the works that investigate causes of backwardness of agriculture/crisis of agriculture in the state and in selected regions mention may be made of the works of Vakulabharanam, Chand, Mishra and others. For example, Vakulabharanam (2005, 2008) has argued that the reduction of domestic support in terms of subsidy and credit on the one hand, and drastic price fall of agricultural commodities in the international market on the other hand, has led to distress in the farming class of the state. Mishra, (2007), Reddy and Mishra, (2008) emphasise that crisis in agriculture was well underway by the 1980s and economic reforms in the 1990s have only deepened it. Decline in the supply of electricity to agriculture has been regarded as major cause of distress by Chand et. al (2007); Chand, (2005); and Chand and Kumar (2005).

Narayanamoorthy (2007) argues that fall in wheat and rice production is not due to technology fatigue rather due to extensive mono crop cultivation and high use of fertilisers and faulty agricultural pricing. Lack of allocation of funds to irrigation development after liberalisation has also resulted in the stagnation of net area irrigated. This poor growth in surface irrigation has compelled farmers to rely heavily on groundwater irrigation. The increased dependence on groundwater irrigation increases the cost of cultivation and depletion of ground water resources and in addition to this credit unavailability for investment on inputs put farmer in further crisis.

Suri (2007) and Reddy (2006) argue that agrarian distress is result of the liberalisation policies which prematurely pushed the Indian agriculture into the global markets without a level-playing field; heavy dependence on high-cost paid out inputs and the other factors such as changed cropping pattern from light crops to cash crops; growing costs of cultivation; volatility of crop output; market vagaries; lack of remunerative prices; indebtedness; neglect of agriculture by the government; decline

of public investment have contributed further to agrarian crisis. Same time, they points out that technological factors, ecological, socio cultural and policy related factors have contributed for the crisis.

Further, authors argue that extensive cultivation has led to decrease in productivity, which is due to intensive use of fertilisers, which in turn resulted in increasing cost of inputs, ultimately leading to decrease in profit margins. Ecological factors include decreasing quality of land and water resources due to intensive chemical and fertiliser use. Socio and cultural factors include the effects of globalisation and urban culture on villages had shown impact on health and education consciousness in the rural agrarian families, in order to get the access of better facilities farmers have changed their cropping pattern. Policy related factors like decrease in public investment from 4 per cent of agricultural GDP during 1980's to 1.86 during early 2000. Patnaik (2005) examined how neo liberal policies introduced in the 1990's affected peasant community by examining the fund allocation to the rural development and concludes that fund allocation has come down from 4 per cent of NNP in 1990-91 to 1.9 per cent of NNP by 2001-02. Gulati and Bathla, (2001), Chand and Kumar, (2004) have studied the impact of capital formation on Indian agriculture and have found that growth in capital formation in Indian agriculture has been either stagnating or falling since the beginning of 1980s. The process has been further aggravated by the macro economic reforms that have squeezed public investment. Vyas (2001) examined the impact of economic reforms on agriculture and claimed that Indian farmers mostly consists of small and marginal farmer who mainly depend on agricultural price policies such as Minimum Support Prices (MSP) subsidies on inputs and irrigation, however, after reforms the MSP has not been properly regulated by the government leading to farmers distress.

A review of the studies reveals that the studies have highlighted major reasons for agricultural distress. These reasons include vagaries of nature (primarily, inadequate or excessive water), lack of irrigation facilities, market related uncertainties such as increasing input costs and output price shocks, emphasis on commercial and plantation crops due to agricultural trade liberalisation, unavailability of credit from institutional sources or excessive reliance on informal sources with a greater interest burden and new technology among other. In addition, decline in the area under cultivation, which seems to be a result of expanding urbanization and industrialisation, deterioration in the terms of trade for agriculture, stagnant crop intensity, poor progress of irrigation and fertiliser have also been stressed.

The studies do not highlight the inter-district or inter-region variation in agricultural development and talk mainly in terms of the overall state or just one region of it but, contribute in finding the variables that should be taken to measure level of agricultural development in different regions of the state. The present study gets hints and impetus from the study done so far in identifying the appropriate variable and bridging the gap in the literature pertaining to comprehensive treatment

of agricultural disparity. It makes an attempt to identify the backward regions of Uttar Pradesh in agricultural development indicators at two cross-section periods 1990-91 to 2008-09.

Methodology & Database

The present paper makes an attempt to develop suitable indices involving appropriate indicators to measure the extent of disparity in agricultural attainment in the state of Uttar Pradesh. The indicators are different and heterogeneous across the district of the state. District level data on the variables have been chosen keeping in the view the availability of information. There are two problems related to methodology that we come across in course of the exercise-

First, there are a number of indicators of level of agricultural attainment, but the source of data for these indicators, the definition of area and variables, objectives of the exercise methodology, period (calendar year/financial year) etc. vary across these agencies making it difficult to use all the indicators jointly to develop a composite index. Further, the fact that the present study attempts to compare disparity in agricultural attainment at different time periods cause additional problem. This is because the agencies providing the information have been frequently changing the definition and coverage making it difficult to use data across time period without involving considerable error.

Second, the study seeks to compare regional variation for the benchmark year 1990-91, and 2008-09. The year 1990-91 represents the turning point of reform period and 2008-09 represents the latest year for which most of the information are available. Between 1990-91 & 2008-09 a number of new districts have come up in UP. Although in the most cases one big district has been bifurcated to form two new districts but in some stray cases out of two big districts a third one has been carved out. For making comparisons as we try to reconstruct the old districts in 2008-09, the ideal methodology would have been to find figures for different blocks of the new districts created and then add relevant blocks to get the figure of the old district but, the non-availability of relevant block level data makes this impossible. We are, therefore, forced to go for adding the data of new districts to get information of the old district in the process assuming that the new districts are subset of the old one. This indeed involves some error but we are compelled to commit this because of lack of information. The study thus takes only 54 districts and all newly created districts have been merged accordingly on the basis of 1990-91 year. The merging of these new districts for the year 2008-09 have been done by averaging all the indicators according to population of districts.

Data for regional development are mainly cited or calculated from the latest available statistics, mostly from U.P. Planning Commission, Census of India and U.P. District Development Report. The study computes composite index for agricultural

development which shows the pattern of development and rank of various districts in agricultural attainment. The methodology of computation is explained below-

First, the values of the selected indicators for all the 54 districts of the state were collected and tabulated. Then the tabulated data were transformed into standardised X_{id}'s, using equation 1, where X_{idr} stands for actual value of ith variable for district dr^{th} (number of district) and Min X_{idr} stands for minimum value of ith variable of all districts. Max X_{idr} stands for the maximum value of ith variable within the all districts and X_{id} stands for the standard value of the ith variable in the dth district and d^{th} runs from 1 to 54, representing the 54 districts of the state of Uttar Pradesh.

$$X_{id} = \frac{(X_{idr} \mid Min\ X_{idr})}{Max\ X_{idr} - Min\ X_{idr}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 1$$

If, however, X_i is negatively associated with development, as, for example, the infant mortality rate or the unemployment rate which should decline as the district develops and then equation 1 can be written as:

$$Xid = \frac{(Min\ X_{id} - X_{id})}{Max\ X_{id} - Min\ X_{id}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 2$$

By giving the weight on the basis of HDI method we have averaged the value of all variables according to the weight and find the composite index of agricultural sector.

List of Agriculture indicators

	Per-capita Food-grain Production**(PCFP)**
	Distribution of Total Fertilizer per Hectare of Gross Area Sown**(DTFGAS)**
	Gross Irrigated Area as Percentage of Gross Sown Area**(GIA)**
	Percentage of Area Under Commercial Crops to Gross Sown Area**(PCCGSA)**
	Availability of Gross Area Sown per Tractor**(AGAST)**
	Cropping Intensity**(CI)**
	Percentage of Area Under Forest to Total Reporting Area**(PNASRA)**
	Percentage of Net Area Sown to Total Reporting Area**(PAUFTRA)**
	Number of Regulated Mandies per Lakh of Population**(NRASRA)**
	Percentage of Net Area Sown to Cultivable Land (**PNASCL)**
	Percentage of Electricity Consumption in Agriculture Sector to Total Consumption **(PECASTE)**
	District-wise Percentage Distribution of Private Pumping Sets/Tubewells **(DPDPPT)**
	District-wise Percentage Distribution of Government Tubewells **(DPDGT)**

Regional Disparity in Agriculture in Uttar Pradesh –Inter-district and Regional Analysis

Uttar Pradesh, despite more than six decades of planned efforts and industrialization drives still remains basically an agricultural and food producing state of India. Agriculture not only contributes significantly to the states' NSDP but, at the same time, is a major source of employment in rural areas. Despite the prominence of agriculture the situation of agriculture in the state is not something to be really proud of. Table-1 and Chart-1 provides a brief description of how the UP economy and agriculture have grown vis-à-vis the country.

A brief perusal of the table and the chart reveals some important things- First, that barring V Plan (and marginally the VI Plan), the Annual Plans and the X Plan the growth rate of agricultural sector in UP has remained considerably lower than that for the nation as a whole. For a state where agriculture is the mainstay for bulk of population this shows the poor state of affairs of the sector and also the apathy and lack of support of the government. Second, in all the plans in which the growth rate of agriculture has exceeded that for the nation as a whole, the overall growth rate of the UP economy has also exceeded the growth of the nation as a whole. This reaffirms our hypothesis that Uttar Pradesh is basically an agricultural state. Third, the chart clearly shows that the agricultural sector in the state has not grown in any consistent fashion. There has been regular fluctuation in the growth rate (Chart makes it very clear) with the rate of growth varying between -0.09% in the III Plan to 5.42% during the Annual Plans. The fluctuation shows the vulnerability of the sector to seasonal conditions.

Table 1 Growth Rate of Agriculture and Allied Sector during the Plan Period

	Plan	Agriculture & Allied Sector (%)		Overall Economy (%)	
		UP	India	UP	India
1	First Plan (1951-56)	1.86	2.71	2.12	3.60
2	Second Plan (1956-61)	1.48	3.15	1.75	3.95
3	Third Plan (1961-66)	-0.09	-0.73	1.58	2.32
4	Three Annual Plan (1966-69)	0.62	4.16	0.32	3.69
5	Fourth Plan (1969-74)	0.94	2.57	2.23	3.25
6	Fifth Plan (1974-79)	5.23	3.28	5.70	5.30
7	Sixth Plan (1981-85)	2.54	2.52	4.11	4.10
8	Seventh Plan (1985-90)	2.69	3.47	5.70	5.80
9	Two Annual Plan (1990-92)	5.42	1.01	3.14	2.47
10	Eighth Plan (1992-97)	2.70	3.90	3.20	6.80
11	Ninth Plan (1997-02)	0.80	1.90	2.00	5.60
12	Tenth Plan (2002-07)	2.10	1.10	5.30	7.70

Sources-Uttar Pradesh Planning Commission

Besides uneven and rather tardy growth of the agricultural sector in the state, a permanent issue is wide inter-region and inter-district variation in terms of almost all indicators of economic development and human development. The state, fifth largest in size and first in terms of population, UP is huge by any standard and variations in resource endowment, climate, topography and historical, institutional and socio-economic parameters, besides apathetic attitude and faulty policies of the government over a period of time, have taken together, resulted not only in perpetuation of inter-district/region disparity but even its intensification.
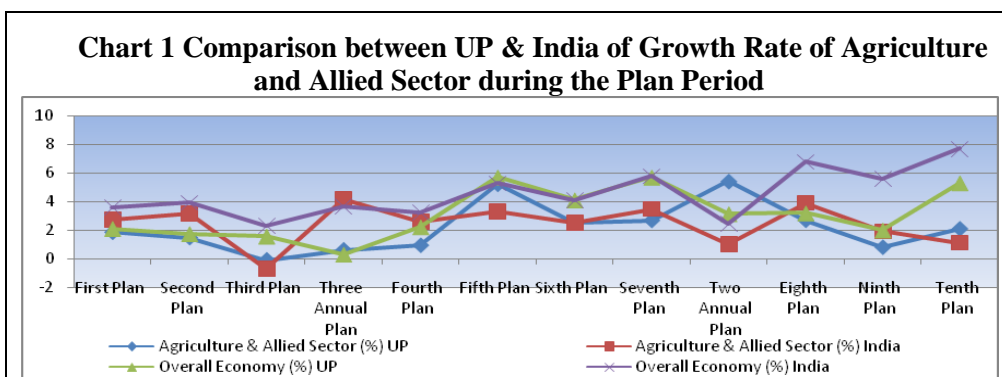
The primary focus of the present work is to talk about inter-region and inter-district variations/disparity in agricultural development in the state. The state is divided into four administrative/economic zones and nine agro-climatic zones. Since, for overall policy formulation administrative division is giving credence, we have also provided explanting of variation in terms of economic zones. Table-2 provides a summary picture of different zones of the state in terms of some important indicators.

Table 2 Region-wise Comparative Status of Agricultural Development in UP

S.N	Indicator	Year	Western	Central	Eastern	Bundelkhand	U P
	I. Agriculture and Allied						
1.	Area under marginal holdings less than one (hect.)	2000-01	1906.98	1374.24	3003.52	362.93	6647.66
2.	Percentage of total fertilizer distribution to gross cropped area(Kg.)	2008-09	17.9	15.4	15.9	4.3	15.5
3.	Cropping Intensity	2008-09	162.43	153.36	154.76	124.99	153.79

4	Length of roads per lakh of population (Kms.)	2008-09	76.86	80.50	84.81	118.29	82.73
5.	Percentage of Net irrigated area to net area sown	2008-09	91.7	84.5	76.4	56.4	81.1
	I.1 Productivity of Major Crops (qtls/hect)						
6.	Average yield of food-grain	2008-09	27.83	23.62	22.58	14.52	23.63
7.	Wheat	2008-09	34.04	30.26	26.91	23.82	29.97
8.	Rice	2008-09	22.46	20.51	22.09	13.19	21.09
9.	Potato	2008-09	223.80	184.17	157.32	205.46	205.46
10	Pulses	2008-09	8.59	9.22	8.99	8.99	8.99
11.	Oilseeds	2008-09	12.57	7.80	6.89	4.52	8.87
12.	Sugarcane	2008-09	564.46	477.35	444.20	369.86	524.67
13.	Monthly Returns from Cultivation per farmer Households (Rs)	2002-03	1398	815	572	1011	836
13.	Average Household Size of Farmer	2002-03	6.1	5.6	6.3	5.7	6.1

Source: 1. 11th five year Plan Document of Uttar Pradesh, 2.Mishra, 2007(Row 19 and 20), 3. Statistical Abstract, Uttar Pradesh, 2010

Regional Disparity: Position of Districts & Regions of Uttar Pradesh

Table-3 & Table- 4 together provides a wonderful picture of inter-region disparity in terms of agricultural development in the state. Table-3 classifies the districts of the state into three categories on the basis of percentile and index scores. The percentile score has been computed on the basis of the score of the best performing district of the state. The first category of high performers have a percentile score of 0.8 and above (the index score spread of the categories have been shown in column -2), the districts with a percentile score falling in the range 60% and 80% have been put in the category of moderate performers, while districts with index score of less than 60% have been branded as low performers. The Table reveals some very interesting results-

▪ There exist wide variations among districts with respect to agricultural development. In both time periods we have on the one hand some districts that have done very well while on the other there are some who have lagged behind.

Table 3 classification of Districts According to Index Score

1990-91 (Reform & Economic Liberalization)			
Category	Index Score	Total 54	Districts
High (>_80%)	0.62 >_ 0.49	W-12 E-02	Bulandsahar, Saharanpur, Moradabad, Muzzafarnagar, Meerut, Pilibhit, Bijnor, Rampur, Budaun, Aligarh, Shahjahanpur, Mau, Ghazipur, Etah,
Moderate (80-60%)	0.48 >_ 0.37	W-09 E-13 C-07	Ghaziabad, Varanasi, Deoria, Farrukhabad, Bareilly, Ballia, Kheri, Mainpuri, Faizabad, Jaunpur, Firozabad, Agra, Etawah, Basti, Gorakhpur, Azamgarh, Rae Bareilly, Mathura, Fatehpur, Maharajganj, Bahraich, Gonda, Allahabad, Barabanki, Hardoi, Sitapur, Siddarthnagar, Kanpur Dehat,

			Sultanpur
Low (60% <_)	0.36 <_	C-03 B-05 E-03	Kanpur Nagar, Mirzapur, Unnao, Jalaun, Lucknow, Pratapgarh, Hamirpur, Banda, Jhansi, Sonebhadra, Lalitpur
2008-09 (Current Year & Post-reform)			
Category	Index Score	Total 54	Districts
High (>_80%)	>_0.46	W-17 C-03 E-05	Bulandsahar, Shahjahanpur, Moradabad, Badaun, Rampur, Saharanpur, Muzzafarnagar, Etah, Mainpuri, Pilibhit, Kheri, Bijnor, Meerut, Farrukhabad, Bareilly, Sitapur, Maharajganj, Ghazipur, Ghaziabad, Aligarh, Faizabad, Firozabad, Hardoi, Jaunpur, Gorakhpur,
Moderate (80-60%)	0.45 >_0.35	W-03 C-07 E-12	Barabanki, Mau, Eatawa, Sultanpur, Agra, Pratapgarh, Ballia, Raebareily, Kanpur Dehat, Gonda, Azamgarh, Basti, Fatehpur, Deoria, Allahabad, Siddarthnagar, Varanasi, Kanpur Nagar, Mathura, Unnao, Bahraich, Lucknow,
Low (60% <_)	0.34 _<	B-05 E-02	Mirzapur, Jalaun, Jhansi, Banda, Sonebhadra, Hamirpur, Lalitpur

Table 4 Level of Development of Agriculture in Different Districts of Uttar Pradesh

S.N.	Districts	1990-91 Index	R	2008-09 Index	R	S.N.	Districts	1990-91 Index	R	2008-09 Index	R
	Average	0.521		0.517		Bundelkhand Region	Average	0.274		0.248	
Western Region	S.D.	0.059		0.048			S.D	0.066		0.051	
	C.V.	11.31		9.329			C.V.	24.22		20.57	
1	Saharanpur	0.615	2	0.551	6	31	Jalaun	0.335	47	0.327	49
2	Muzaffarnagar	0.591	4	0.549	7	32	Jhansi	0.231	52	0.26	50
3	Bijnor	0.547	7	0.534	12	33	Lalitpur	0.18	54	0.198	54
4	Moradabad	0.595	3	0.555	3	34	Hamirpur	0.325	50	0.209	53
5	Rampur	0.545	8	0.552	5	35	Banda	0.299	51	0.244	51
6	Meerut	0.588	5	0.531	13	Eastern Region	Average	0.422		0.424	
7	Ghaziabad	0.49	15	0.487	19		S.D	0.069		0.06	
8	Buland Shahar	0.621	1	0.58	1		C.V.	16.39		14.1	
9	Aligarh	0.514	10	0.478	20	36	Pratapgarh	0.331	49	0.449	31
10	Mathura	0.426	32	0.389	44	37	Allahabad	0.399	38	0.407	40
11	Agra	0.455	26	0.449	30	38	Faizabad	0.463	23	0.476	21
12	Firozabad	0.459	25	0.475	22	39	Sultanpur	0.372	43	0.452	29
13	Etah	0.499	14	0.548	8	40	Bahraich	0.416	35	0.367	46
14	Mainpuri	0.467	22	0.548	9	41	Gonda	0.408	36	0.431	35
15	Budaun	0.539	9	0.554	4	42	Siddharth Nagar	0.382	42	0.406	41
16	Bareilly	0.477	19	0.501	15	43	Basti	0.451	28	0.425	37
17	Pilibhit	0.55	6	0.546	10	44	Mahrajganj	0.421	34	0.493	17
18	Shahjahanpur	0.509	11	0.557	2	45	Gorakhpur	0.448	29	0.464	25
19	Farrukhabad	0.484	18	0.509	14	46	Deoria	0.489	17	0.409	39

20	Etawah	0.453	27	0.455	28	47	Azamgarh	0.443	30	0.425	36
	Average	0.395		0.441		48	Mau	0.503	12	0.457	27
Central Region	S.D	0.044		0.054		49	Ballia	0.474	20	0.449	32
	C.V.	11.11		12.25		50	Jaunpur	0.461	24	0.471	24
21	Kheri	0.472	21	0.536	11	51	Ghazipur	0.503	13	0.489	18
22	Sitapur	0.391	41	0.495	16	52	Varanasi	0.489	16	0.405	42
23	Hardoi	0.392	40	0.473	23	53	Mirzapur	0.341	45	0.341	48
24	Unnao	0.338	46	0.388	45	54	Sonebhadra	0.23	53	0.239	52
25	Lucknow	0.332	48	0.355	47		Average	0.44		0.445	
26	Rae Bareli	0.44	31	0.444	33		S.D	0.095		0.092	
27	Kanpur Dehat	0.402	37	0.443	34	Uttar Pradesh	C.V.	21.7		20.77	
28	Kanpur Nagar	0.36	44	0.395	43						
29	Fatehpur	0.425	33	0.418	38						
30	Barabanki	0.397	39	0.459	26						

- The Western region overall has been the best performing region of the state in terms of agricultural development. Out of a total 14 high performing districts in 1990-91, 12 belonged to the Western region. Similarly for 2008-09 out of 25 districts in this category 17 were from the Western Region. None of the districts of this region fell in the low performer category. The relative position of the districts of this region has also improved with time as is evident from shifting of 5 districts of this category from moderate performer category to high performer category. The findings of Table-3 are substantiated by that of Table-4

- Table 4 shows region wise scores of different districts. The Table shows that the average index score of the districts of the Western region was the highest i.e. 0.521 in 1990-91(0.517 in 2008-09). This value is very high as compared to the state average of 0.44 in 1990-91 (0.445 in 2008-09). If compared with the lowest place region Bundelkhand the average score of Western region was 1.9 times higher in 1990-91 (2.08 times in 2008-09).

Another interesting feature of Western region is that not only the region has the best average score reflecting higher agricultural development; it also has relatively low inter-district variation in agricultural development. The best performing district of the region as judged by the index score in both the periods has been Bulandsahar with index score of 0.621 in 1990-91(0.58 in 2008-09) and the worst performer has been Mathura with a score of 0.43(0.39). The Coefficient of variation of index score among the districts was found to be 11.31 % in 1990-91 which has shown a decline over a period of time. It stood at 9.29% in 2008-09.

Among the districts of Western region while Bulandsahar has been able to maintain its position, Shahjahanpur has shown remarkable progress climbing up 9 places from 11 overall in 1990-91 to 2 in 2008-09. Mainpuri, Etah and Farukkabad have also shown relative progress. The positions of Aligarh, Mathura and Meerut have deteriorated in the intervening period. Mathura was in 2008-09 standing at 44th

position out of 54 districts. This shows that although overall the Western region has made progress over time and the inter-district variation as judged by CV has gone down, but the gap in the performance of best performing districts and the lagging district within the region has widened.

The Bundelkhand region of the state has been the most lagging region in terms of agricultural development. All five districts of the region fell in the low performing category in both the time periods. The region had an average index score of 0.274 in 1990-91 and 0.248 in 2008-09. The highest rank district of the region was Jaluan which had a rank of 47 in 1990-91 that deteriorated to 49 in 2008-09. Obviously all other districts of the region had ranks below 47 in 1990-91 and 49 in 2008-09. Another noteworthy point is relatively high inter-district variation in this lagging region. The CV (Coefficient of variation) of index score for the region was 24.22% in 1990-1(20.57% in 2008-09) symbolising very high variation. If the best performing district of the region has a low average score of 0.335 the position of other districts with such high CV can be easily ascertained. Lalitpur district of the state the lowest overall had a score of only 0.18 in 1990-91, 3.45 times less than the best performing district of the state Bulandsahar.

The reasons for agricultural backwardness of Bundelkhand are not difficult to understand. We may mention some important ones here-

- The region's agricultural sector is heavily dependent on rainfall which has been erratic. It is supplemented by groundwater which has been receding. Agriculture here is diverse, complex, under-invested, risky and vulnerable. The region lacks alternate sources of water for irrigation. A depleted groundwater table and the high costs associated with building and operating irrigation infrastructure are putting the region in deep trouble.

- Further harsh and worsening biophysical conditions such as low soil fertility, combined with more frequent extreme events such as droughts caused by climate variability and change, further exacerbate the region's vulnerability. Of late, climate change that is being reflected in high rainfall intensity coupled with decrease in winter precipitation has resulted in high runoff and higher rivers flow making flood and erosion an eventuality.

- The region has a population of approximately 21 million, out of which82.32 per cent is rural and more than one third of the households in these areas are considered to be Below the Poverty Line (BPL). The condition of the farmers in the region is very bad; they are in debt which is mounting. They neither have the resources not adequate governmental assistance to take up the agricultural work well. Low resources here have forced farmers to go for solo cropping and cultivate only 20% of the net shown area in the Kharif season. About 60% of the gross cropped area remains irrigation less. Gradual decrease in the area cultivated during the Kharif season is also easily visible. It was around 33% of the gross

cropped area in the year 1977-78 and which got reduced to 26% in the year 1993-94 and remained only 23% in the year 1998-99 to around 20% at present.

- 75% of the farmers are small and marginal with average land holding of up to 2 hectares and most of them can only think of mere survival. Their continued existence is by and large reliant on the blend of produces of their own land and daily wage earning. Whereas gradual growing cost of the agriculture ingredients which is largely because of change in agricultural practices and adaptation of high water consuming varieties. This is also another critical component that is responsible for increasing vulnerability of the small and medium cultivators due to reason of entire control of big landlords on water in Bundelkhand.

- Land rights in the region are also not very clear. Land shown in records to be in the possession of weaker sections, or as part of the village commons, has been encroached upon by big landowners. Many landless families have been given land on paper, but, for various reasons, have not been able to occupy the land. There are several allottees who do not know exactly which plot of land has been allotted to them. They cultivate a plot only to be told later that it is not their land.

All these factors taken together make the situation of agriculture in Bundelkhand really precarious and increase the inter-region variation substantially.

- The Eastern Region of the state where a bulk of population resides also fair badly in terms of agricultural development. Table-4 shows that the region had an average score of 0.422 in 1990-1(0.4.24 in 2008-09) with a CV of 16.39%. Only two districts Mau and Ghazipur of the region could find a place in the high performing districts in 1990-91. The number however increased to 05 in 2008-09. Most of the districts were placed in moderate performer category with the exception of Sonebhadra and Mirzapur which in both time periods stood in the category of low performers.

- The Central Region of the state that comprises of Kanpur, Kheri, Sitapur etc. have been by and large moderate performers over the years.

Regional Disparity in terms of Key Indicators of Agricultural Development

Table-5 & Table-6 provide variation among different districts of Uttar Pradesh in terms of key indicators of agricultural development and how the variation has changed since the launching of period of reforms. The table is split into two parts- the upper part shows the indicators in terms of which over the intervening period disparity has widened while the lower half shows indicators in terms of which it has gone down. There are some very interesting things to note-

First, For a number of indicators the disparity across the districts has widened over a period of time. A deeper look reveals that in terms of indicators that work as proxy for technology such as distribution of fertilizer per hectare of gross area sown, tractor use, electricity use etc., the gap has widened (coefficient of variation of these

indicators among districts has increased with time). This means that in terms of technology used while the advanced regions are marching ahead the backward ones are lagging further behind.

Second, While there has been increase in the average value of a number of indicators, for some other decline has been witnessed. For example there is decline in percentage of electricity consumption in agriculture sector to total consumption, number of regulated mandies per lakh of population, percentage of net area sown to cultivable land, per-capita food-grain production, percentage of area under commercial crops to gross sown area etc. This shows that because of poor performance of the backward regions of the state, the overall position of the state has worsened over a period of time. This calls for immediate attention to be paid on the backward regions and more appropriate measures for the particular indicator where the performance of the state is sliding down.

Table 5 Some Statistical facts about Regional Disparity in Agricultural Indicators

Indicators	1990-91			2008-09		
	Mean	S.D.	C.V.	Mean	S.D.	C.V.
Declined						
PCFP	270.73	87.6	32.35	220.93	112.52	50.92
AGAST	241.43	311.1	128.85	171.54	249.41	145.39
DTFGAS	89.15	34.42	38.61	153.39	64.79	42.23
NRASRA	1.47	0.6	40.72	1.71	0.71	41.9
PNASCL	84.88	8.4	9.9	69.22	10.22	14.77
PECASTE	47.79	21.7	45.4	22.49	11.9	52.89
Improvement						
GIA	59.89	19.62	32.76	46.18	13.01	28.18
PCCGSA	19.67	14.36	72.99	17.85	12.87	72.09
PNASRA	69.03	10.45	15.14	69.22	10.22	14.77
CI	148.19	15.63	10.55	155.64	16.26	10.44
PAUFTRA	6	9.04	150.63	5.48	8.15	148.54
DPDPPT	1.83	1.08	59.17	1.56	0.83	54.64
DPDGT	1.84	1.1	59.81	1.52	0.83	54.64

Table 6 Top and Bottom Ranking Districts in Agriculture Development in Uttar Pradesh

Indicators	1990-91		2008-09	
	Two Top Districts	Two Bottoms	Two Top Districts	Two Bottoms
PCFP	Pilibhit, Shahjahanpur	Kanpur Nagar, Lucknow	Pilibhit, Shahjahanpur	Ballia, Badaun
GIA	Meerut, Ghaziabad	Bahraich, Sonebhadra	Mainpuri, Bulandsahar	Sonebhadra, Hamirpur
PCCGSA	Meerut, Muzafarnagar,	Banda, Siddarthnagar	Muzzafernagar, Bijnor	Siddarthnagar, Mau

AGAST	Mau, Rae Bareilly	Agra, Meerut	Maharajganj, Ballia	Varanasi, Agra
PNASRA	Siddarth Nagar, Moradabad	Sonebhadra, Mirzapur	Muradabad, Rampur	Sonebhadra, Lalitpur
NRASRA	Bulandsahar, Saharanpur	Basti, Azamgarh	Rampur, Saharanpur	Azamgarh, Mathura
PNASCL	Rampur, Saharanpur	Lalitpur, Sonebhadra	Meerut, Ghaziabad	Sonebhadra, Jhansi
CI	Bulandsahar, Mau	Hamirpur, Jhansi	Mainpuri, Rampur	Hamirpur, Banda
DTFGAS	Kanpur Nagar, Pilibhit	Sonebhadra, Hamirpur	Varanasi, Kanpur Nagar	Lalitpur, Hamirpur
PAUFTRA	Sonebhadra, Mirzapur	Varanasi, Azamgarh	Sonebhadra, Kheri	Ballia, Ghazipur
PECASTE	Hamirpur, Azamgarh	Sonebhadra, Lalitpur	Ghazipur, Badaun	Kanpur Nagar, Lucknow
DPDPPT	Moradabad, Basti	Jalaun, Sonebhadra	Pratapgarh, Sitapur	Lalitpur, Sonebhadra
DPDGT	Varanasi, Allahabad	Lalitpur, Mathura	Badaun, Allahabad	Mathura, Lalitpur

**Table 7 Agro-Climatic Zones of Uttar Pradesh & Performance of Districts in Agriculture**

SN	Agro-Climatic Zones	Districts	1990-91		2008-09	
			Mean	S.D	Mean	S.D
1	Central Plain	Kheri, Sitapur, Hardoi, Farrukhabad, Etawah, Kanpur Nagar, Kanpur Dehat, Unnao, Lucknow, Rae Bareilly, Fatehpur, Allahabad, Pratapgarh	0.401	0.051	0.443	0.05
2	Southern Western Semi Arid Zone	Aligarh, Etah, Mainpuri, Mathura Agra, Firozabad	0.47	0.031	0.481	0.06
3	Bundelkhand Zone	Jhansi, Lalitpur, Banda, Hamirpur and Jalaun	0.273	0.66	0.247	0.55
4	Eastern Plain Zone	Barabanki, Faizabad, Sultanpur, Pratapgarh, Jaunpur, Azamgarh, Ballia, Ghazipur , Varanasi, Mau	0.443	0.058	0.453	0.02
5	North-Eastern Plain Zone	Gonda, Bahraich, Basti, Gorakhpur, Deoria, Siddarth Nagar, Maharajganj,	0.43	0.034	0.427	0.04
6	Vindhyan Zone	Mirzapur, Sonebhadra	0.285	0.078	0.289	0.07
7	Bhabhar & Tarai Zone	Bijnour, Rampur, Bareily, Pilibhit	0.529	0.354	0.533	0.02
8	Western Plain Zone	Muzzafar Nagar, Saharanpur, Meerut, Ghaziabad, Bulandsahar	0.582	0.047	0.541	0.03
9	Mid Western Plain Zone	Budaun, Shahjahanpur, Moradabad	0.547	0.043	0.555	0.1

Third, Table-6 that gives top two and bottom two districts in terms of major indicators at the two pints of time chosen indicate that while the leading districts have by and large maintained their position over the period of eighteen years (between 1990-91 and 2008-09), the bottom place districts have been changing their position. Apart from few exceptions here and there, normally the districts from Western region have occupied the top two positions in all the indicators.

Fourth, The table reveals that over the years the government has been to some extent successful in providing irrigation facility in backward regions. The disparity in terms of all the indicators of irrigation facility such as district-wise percentage distribution of private and government pumping set/tube wells, gross irrigated area as percentage of gross sown area etc. has gone down. This is indeed a welcome sign. However, explored more intensively we could notice that the expansion is not so high in the most deficient region i.e. Bundelkhand.

Fifth, A look at the Table-7 shows the variation among the different agro-climatic zones of the state. It reveals that there exists wide variation among the zones, with Western Plain Zone and Mid-Western Plain Zone leading and Bundelkhand and Vindhya Regions lagging behind. However, there has been no perceptible increase in disparity if judged from this angle. Chart-2 given below plots the coefficient of variation among districts of the zones between the two time periods. The primary reason for backwardness of the lagging regions is that the climate of both these regions is dry sub-humid and soil mixed red and black and medium black respectively that require more water. Non-availability of assured irrigation facilities in the regions chiefly accounts for the poor performance of agriculture there.

Chart-2 Coefficient of Variation Among the Districts of Agro-Climatic Zones of Uttar Pradesh & Performance of Districts in Agriculture between 1990-91 & 2008-09
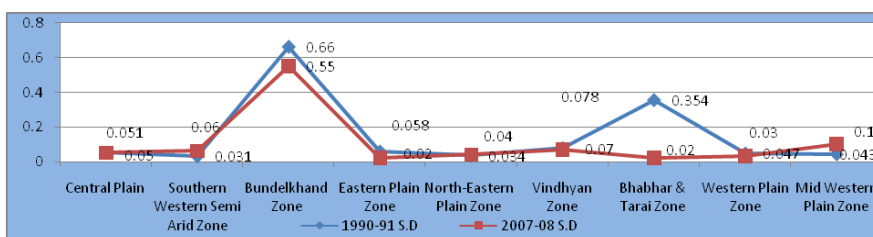
Conclusions and Suggestions

The study has shown that development of agriculture in Uttar Pradesh over the year has remained polarised in Western region followed by Central region. Bundelkhand region has been the least developed over the periods 1990-1991 to 2008-09. The empirical evidence suggested that maximum number of district have scored best record in the attainment, located in western and central region of the state, where agriculture is commercialised, technology is also advanced. This was the region that was much influenced to green and technical revolution, resulted high contribution in export and food production of the state. The disparity existing in agricultural development is high and alarming. A series of measures are needed on the part of the government to bridge the yawning gap. We give three suggestions to alleviate the problem-

First, There is need for region specific policies in this state which is huge in size. For the high density eastern regions where excessive dependence of population is causing adoption of backward technology and small size of holding, more that resurrecting agriculture we need to create alternative employment opportunities in rural areas in form of Rural Non Farm Sector. Once, the surplus population shifts in the non-agricultural sector and is able to generate some surplus there, it would be possible to pool back the surplus in agriculture and higher farm-nonfarm linkages which work in both the direction would pull the agricultural sector up. For Bundelkhand region, long term policy and planning is required. Apart from shifting the population away from agriculture, the government need to provide cheap finance and dependable source of irrigation in the region. Agriculture extension activities are required to educate farmers to adopt cheap, suitable and effective technology and crop variety. In the Western region where the signs of crisis of the nature in Andhra Pradesh and Vidarbha are gradually appearing, suitable interventions in form of future trade in agriculture through involvement of banks, less water intensive agricultural technology etc. are required.

Second, Despite all efforts by the RBI on promoting financial inclusion and all toll claims of its success, non-availability of cheap, dependable and easy finance remains a chief concern for farmers in the backward regions. Micro-finance has its own limitations which are well known. We need to develop a mechanism that ensures credit and subsidy to the neediest region.

Third, There is need to identify the agro-climatic zones that have problems. Table-7 clearly reveals that the two most backward zones are Bundelkhand and Vindhya. Specific efforts should be made for these regions.

Agriculture in Uttar Pradesh has stagnated and grown in uneven fashion. Since for most part of the next couple of decades agriculture is going to remain as the mainstay of population and so if this unevenness and disparity are allowed to persist it will be putting bulk of the population of the state under duress. The state government in consultation with experts and the Central government should adopt a long term policy for giving a direction to the state's agriculture. Formulation of area/region specific plans with emphasis on direct assistance to the most needy and plugging the leakages in government sponsored schemes are going to be the key in this regard. We all hope that the present government of Uttar Pradesh under the stewardship of a young and energetic leader would take appropriate steps to bridge the disparity and resurrect the backward sectors.

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