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Performance of agriculture sector in Uttar Pradesh, India: District level analysis

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Abstract

Farming is one of the most prominent sectors of the state of Uttar Pradesh. The state has an agricultural economy, with agriculture providing a living for more than of half population and one-fourth of its state gross domestic product. In the present scenario, agriculture in Uttar Pradesh has progressed substantially well and is becoming more and more efficient and effective over the time period. In this context, the present paper examines the recent trends of agriculture performance in Uttar Pradesh at district as well as regional levels. The regional level results of Uttar Pradesh revealed that Western UP had the highest growth followed by Eastern UP, Bundelkhand and Central UP.. The present paper suggests that the governmental assistance in the form of improved agricultural infrastructure, mitigation of susceptible climatic conditions, proper use of agricultural inputs, and appropriate technology to attain a greater level of agricultural efficiency while simultaneously increasing farmer income. Furthermore, the employment of technology breakthroughs through public-private collaboration in agricultural growing methods at the disaggregate level must be fostered for enhancing farmers welfare.

Keywords: Performance, agriculture, growth, regional level, Uttar Pradesh

Introduction

Agriculture has been a central concern of Indian policy makers for very two good reasons. First, a large proportion of the population derives the major part of their employment from agriculture and they are among the poorest. The second reason relates to food security. In Uttar Pradesh, Agriculture sector is the backbone of the economy and it is the prime mover of economic growth in Uttar Pradesh. It provides around 59.0 percent employment to the residents of the state. Uttar Pradesh has been the highest producer of some food grains and non-food-grains such as vegetables, fruits, sugarcane and potato throughout the country. It is therefore, commonly known as the “granary of the nation” or “bread-basket. The state accounts for 11.0 percent of India’s net sown area and contributes more than 41.1 million tonnes of food grain, which is about 20.0 percent of the total food-grain production of the country. Due to huge importance of agriculture in UP and the prevalence of high poverty in the state, agricultural growth assumes great significance in achieving sustainable economic growth in the state and development of its people. As per the Situation Assessment Survey (SAS) of Agricultural Households conducted by National Statistical Office (NSO), Ministry of Statistics and Programme Implementation during 77th round (January 2019- December 2019) with reference to the agricultural year July 2018- June 2019, the average monthly income per agricultural household of Uttar Pradesh is Rs.8061.

The performance of Uttar Pradesh agriculture sector depends on the available abundant resources, the sustainable strategies and methods espoused to face waterlessness due to the decrease in the rainfall, the agriculturist has to use the innovative strategies. The situation of Uttar Pradesh agriculture sector has been transforming a slow growth rate. Agriculture sector can play the emerging role for the development process of Uttar Pradesh and it have a significant role in the state livelihoods as well as in state domestic product. Due to high dependency of population on this sector, the average monthly income per agricultural household of Uttar Pradesh is very low in India as compared to other frontier states. It is in this context that the present paper seeks to examine the district level as well regional level performance of Uttar Pradesh.

Pandey & Reddy (2012) ^[1] found that the performance of agriculture in Uttar Pradesh has been vary considerably across districts and regions and has strong linkages and implications

for poverty reduction. Irrigation and fertilizer-use are the major determinants of the level and variations of agricultural productivity in the state. Econometric analysis has indicated strong linkages between agricultural productivity and poverty. An increase of 10 percent in land productivity would reduce poverty by 4.3 percent.

Kumar & Upadhyay (2021) [13] examines the sources and patterns of growth in crop sector in Uttar Pradesh and identifies the drivers through panel data from 2004-05 to 2015-16. The results reveal that yield and diversification found to be the sustainable sources of growth in crop sector in all regions except Bundelkhand. However, these sources have varied widely across the regions.

Gulati *et al.*, (2021) [8] analyses the performance of agriculture in Uttar Pradesh which indicates that the state's agricultural growth has been lower than the all-India average in most years. In the period between 2005-06 and 2018-19, the agricultural growth rate was 3.0% per annum (at 2011-12 constant prices) while the all-India average rate of growth was 3.6% per annum.

Jose *et al.* (2022) [10] examines the agricultural profile of the state, which reveals that the western region accounts for half the state's agricultural GDP followed by the eastern and central regions, with the Bundelkhand region's share being the lowest. The dominance of the western region in the state's agricultural output has been due to its distinct agrarian structure and better infrastructure and better irrigation facilities due to investment in private tube wells. However, the average annual agricultural growth rate of Bundelkhand, which has the lowest share in agricultural GDP among all the regions, has been 3.7 percent in the period from 2002-03 to 2015-16.

Material and Methods

The present research paper is primarily based on secondary database. The database is retrieved from various Uttar Pradesh government sources at regional level as well as district level. The data of the present chapter has been collected from UPDES database, Government of Uttar

Pradesh, Lucknow.

The Compound annual Growth Rate (CAGR) of various parameters of the performance of agriculture sector at regional level as well as district level in Uttar Pradesh has been estimated by using an extensively accepted exponential model, $y = ab^t e^u$.

The Compound annual Growth Rate (CAGR) is usually estimated by using the following semi-log functional form;

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

Where, y represents dependent variable whose growth rate is to be estimated; t represents independent variable (time) and u represents disturbance or error term. Moreover, 'a' and 'b' are the parameters to be estimated. The CAGR in percent term is estimated as:

$$CAGR = \{Antilog(b) - 1\} * 100$$

Result and Discussion

Sectorial Growth Performance of Uttar Pradesh Economy:

Table 1, shows the performance and share of different sector in the economy of Uttar Pradesh from 2011-12 to 2019-20 which reveals, the agriculture sector has least growth and secondary sector has highest growth. Compound Annual Growth Rate (CAGR) is 2.84 percent, 5.42 percent and 5.14 percent of agriculture sector, secondary sector and tertiary sector respectively from 2011-12 to 2019-20. CAGR of Net State Domestic Product (NSDP) and Per capita Income (PCI) is 4.68 percent and 3.10 percent respectively over the period. Tertiary sector share in Net State Domestic (NSDP) is 44 percent, which is highest among the other sectors of the economy. It followed by secondary sector, which has 25 percent share in NSDP. Agriculture sector contribution declines over the years and currently has least share in NSDP. Crop sector has highest share in Gross Value Added of Agriculture, i.e. is 62.92 percent whereas share of livestock sector is 28.16 percent during the period.

Table 1: Performance across Different Sectors of Uttar Pradesh from 2011-12 to 2019-20.

Year	Share of sectors in Net State Domestic Product			Share of allied sector of agriculture in Agriculture.		NSDP at Market Price	Per capita Income (Rs.)
	Agriculture sector	Secondary	Tertiary	Crop	Livestock		
2011-12	26.24	24.22	42.11	65.82	25.44	645131.6	32002
2012-13	26.24	23.90	42.80	66.07	25.56	673552.2	32908
2013-14	24.64	24.36	43.37	64.51	27.08	707469.1	34044
2014-15	23.19	22.79	45.60	61.66	29.45	729686.3	34583
2015-16	22.28	24.14	45.09	62.09	29.32	792048.8	36973
2016-17	21.13	28.89	41.99	62.32	28.52	888453	40847
2017-18	21.09	26.12	43.88	62.16	28.95	922457.5	41771
2018-19	21.42	25.39	44.66	62.25	28.89	949184.5	42333
2019-20	20.88	25.21	46.02	60.29	30.24	979334.1	43019
Average	22.98	25.02	44.01	62.92	28.16	835782.2	38209
CAGR	2.84	5.42	5.14	2.24	3.93	4.68	3.10

Source: Author's own calculation based on UPDES database.

Regional Growth Performance of Agriculture Sector in Uttar Pradesh: The table 2 and figure 1, shows that the share of Western UP was 51.6 percent in agriculture of Uttar Pradesh followed by Eastern UP, Central UP and Bundelkhand region. The share of western UP has declined from 51.6 percent to 48.67 percent and the share of Central UP and Bundelkhand region has increased from 15.07 percent to 17.85 percent and 6.09 percent to 6.44 percent in 2019-20 from 2011-12 in GVA of Agriculture. Average

regional share from 2011-12 to 2019-20 shows that Western UP has highest share, followed by Eastern UP and Central UP and Bundelkhand has least share in agriculture of Uttar Pradesh. The dominance of the western region in the state's agricultural output has been due to its distinct agrarian structure and better infrastructure and better irrigation facilities due to investment in private tube wells (Jose *et al.*, 2022) [10].

Table 2: Regional share of agriculture in the agriculture sector of Uttar Pradesh.

Regions	TE (2011-12)	TE (2019-20)	2011-12 to 2019-20
	Regional share (%)		
Western UP	51.6	48.67	50.77
Eastern UP	27.23	27.04	26.84
Central UP	15.07	17.85	16.3
Bundelkhand	6.09	6.44	6.09

Source: Author’s own calculation based on UPDES database.

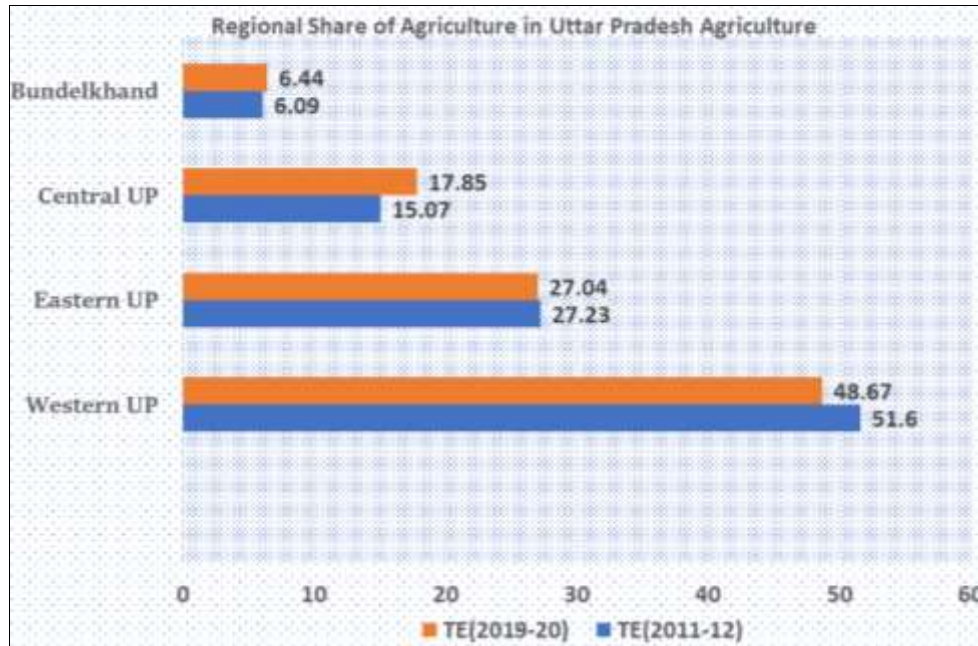


Fig 1: Trends of Regional Share of Agriculture Sector in Uttar Pradesh Agriculture

Performance of Agriculture Output by Sub-Sectors and Administrative Regions: Table 3, shows the CAGR of output by sub sectors and Administrative Regions from 2004-05 to 2019-20, which reveals that the western region performed the best in the Agriculture, Forestry and fishing with a CAGR value of 3.73 percent. It is followed by the Eastern region with a CAGR value of 2.34 percent while the least CAGR accounted for the central region i.e. 0.29 during the study period respectively. Livestock sector performs

well across all the regions except Bundelkhand region during the period. Livestock sector has shown much growth in Western region of Uttar Pradesh i.e. of 3.66 percent followed by Eastern and Central region (3.29 and 2.68 percent respectively). Agriculture sector performs least among the other sectors of the economy. Primary sector grows at 2.80 percent CAGR whereas secondary and tertiary sector grows with 6.48 and 6.39 percent CAGR. Western UP performs best across these sectors among other regions.

Table 3: CAGR of Output by Sub-Sectors and Administrative Regions from 2004-05 to 2019-20

Sub sectors	Western Region	Eastern Region	Central Region	Bundelkhand Region	Uttar Pradesh
Agriculture, forestry and fishing	3.73	2.34	0.29	2.13	2.66
Crops	4.00	1.97	0.76	2.46	2.76
Livestock	3.66	3.29	2.68	-0.57	3.30
Forestry & Logging	1.29	1.46	-5.02	1.21	-0.66
Fishing	6.92	6.14	5.39	5.96	6.04
Mining & Quarrying	7.67	1.53	8.92	18.12	5.89
Primary	3.80	2.29	0.46	3.69	2.80
Secondary	7.99	4.15	4.84	4.84	6.48
Tertiary	10.37	8.66	8.42	9.46	9.39
Gross District Domestic Product	7.61	5.83	5.23	6.40	6.61

Source: Author’s own calculation based on UPDES database.

In case of Mining and Quarrying, Bundelkhand region has performed the best with a CAGR of 18.12 percent, followed by the Central region with a CAGR value of 8.92 percent. The CAGR value of Bundelkhand is however higher than the overall UP CAGR value of 5.89 percent during the study period. CAGR of Gross District Domestic Product is also high in the Western UP followed by Bundelkhand, Eastern and Central UP.

District wise share of Agriculture in GVA of Uttar Pradesh: Table 4, shows the district wise average share of agriculture in GVA of Uttar Pradesh from 2004-05 to 2019-20. All districts are categorised in three groups based on the share of agriculture in their GVA. They are as Low share districts where agriculture has 0 to 23.47 percent share in the GVA, Moderate share districts where agriculture has 23.48 to 27.99 percent share in the GVA and High share

districts where agriculture has 27.99 percent and above share in the GVA. Low share districts are eighteen in which Gautam Buddha Nagar, Kanpur Nagar has lowest share. Moderate share districts are twenty -one and High share

districts are thirty-one, in Lakhimpur Kheri agriculture sector has highest share. Most districts of Uttar Pradesh has high agricultural share in its GVA.

Table 4: District wise average share of Agriculture in GVA of Uttar Pradesh from 2004-05 to 2019-20

Share of Agriculture	Districts.
Low agricultural share (0 to 23.47 percent)	Gautam Buddha Nagar, Kanpur Nagar, Lucknow, Ghaziabad, Prayagraj, Sonbhadra, Varanasi, Agra, Sant Ravidas Nagar, Mau, Moradabad, Raebareli, Gorakhpur, Kaushambi, Mirzapur, Meerut, Sultanpur, Deoria.
Moderate agricultural share (23.48 to 27.99 percent)	Jhansi, Kanpur Dehat, Jaunpur, Kannauj, Faizabad, Etawah, Banda, Rampur, Firozabad, Ghazipur, Basti, Pratapgarh, Azamgarh, Ballia, Jyotiba Phule Nagar, Fatehpur, Chandauli, Mathura, Ambedkar Nagar, Mahoba, Bareilly.
High agricultural share (Above 27.99 percent)	Hamirpur, Unnao, Aligarh, Auraiya, Farrukhabad, Maharajganj, Chitrakoot, Hardoi, Siddharthnagar, Sitapur, Sant Kabir Nagar, Kushinagar, Bijnor, Shahjahanpur, Budaun, Jalaun, Pilibhit, Shrawasti, Bulandshahr, Gonda, Saharanpur, Barabanki, Bahraich, Muzaffarnagar, Balrampur, Mainpuri, Lalitpur, Hathras, Etah, Baghpat, Kheri.

Table 5: District wise growth rate of agriculture sector from 2004-05 to 2019-20.

Levels of Growth Rate	Districts.
Low Growth Rate (< 2.0 percent)	Ghaziabad, Bareilly, Moradabad, Mau, Sonbhadra, Shrawasti, Jaunpur, Auraiya, Pilibhit, Ghazipur, Hathras, Mahoba, Siddharthnagar, Firozabad, Chandauli, Banda, Agra, Maharajganj, Mathura, Gautam Buddha Nagar, Deoria.
Moderate Growth Rate (2.0 to 4.0 percent)	Rae Bareli, Ballia, Gonda, Jhansi, Etawah, Mirzapur, Basti, Lalitpur, Etah, Aligarh, Ambedkar Nagar, Muzaffarnagar, Faizabad, Budaun, Eastern, Sultanpur, Uttar Pradesh, Hardoi, Saharanpur, Bulandshahr, Azamgarh, Varanasi, Sant Kabir Nagar, Mainpuri, Baghpat, Bundelkhand, Unnao, Sitapur.
High Growth Rate (above 4.00 percent)	Farrukhabad, Balrampur, Jalaun, Prayagraj, Pratapgarh, Meerut, Jyotiba Phule Nagar, Kheri, Bahraich, Kanpur Dehat, Lucknow, Rampur, Kanpur Nagar, Bijnor, Gorakhpur, Hamirpur, Sant Ravidas Nagar, Kannauj, Shahjahanpur, Kaushambi, Fatehpur, Kushinagar, Chitrakoot, Barabanki.

Above table 5, shows district wise growth rate in agriculture sector from 2004-05 to 2019-20. Districts are categorised in three groups low growth rate districts (Below two percent), Moderate growth rate districts (Between two to four percent) and high growth rate districts (Above four percent). The result indicates that Ghaziabad has lowest growth rate in agriculture sector. There are twenty-one districts in Uttar Pradesh, which has low growth rate below two percent. There are twenty-six districts in Uttar Pradesh, which has moderate growth rate between two to four percent and there are twenty-four districts in Uttar Pradesh with high growth rate above four percent. Barabanki has the highest growth rate in agriculture sector during the period followed by Chitrakoot, Kushinagar, Fatehpur and others.

Conclusion

Agriculture sector in Uttar Pradesh performs least among the other sectors of the state; agriculture sector witnessed the growth rate of 2.66 percent during the period whereas secondary and tertiary sector witnessed the CAGR of 6.38 and 9.39 percent respectively. In Uttar Pradesh, performance of agriculture sector varies considerably across districts and regions. Western UP has the highest share in the agricultural production of Uttar Pradesh. Agriculture sector grows with highest growth rate in Western UP followed by Eastern UP, Bundelkhand region and Central UP during the period. The dominance of the western region in the state's agricultural output has been due to its distinct agrarian structure and better infrastructure. Livestock sector contributes more to the growth of agriculture sector in Uttar Pradesh. It grows with higher growth rate than crop sector and overall agriculture sector in Uttar Pradesh. Hence, Livestock sector has significant role in the growth of agriculture sector across all regions except Bundelkhand region as it witnessed negative growth rate during the period. Uttar Pradesh has extensive potential to increase farmer's income and enhance agricultural growth and to do

so, there is need to focus on region-specific policies for balanced agricultural development across the regions and districts. The state should ensure a better road network, power supply to the agricultural sector, investment in agro processing and value-chains, and irrigation projects, particularly in the backward regions of the state.

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