
Regional Dimensions in Crisis of Agriculture: A Case Study of Uttar Pradesh

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ABSTRACT

The agrarian economy of the state of Uttar Pradesh is in the grip of severe crisis. For the majority of the farming community, agriculture has become an unviable activity and consistent crop failure coupled with high cost and vagaries of market have made life worse for them. What is distressing is that over a period of time the intensity of crisis has increased and it has acquired regional nature with features, intensity, causes and complexities varying across regions within a particular state. The rising intensity of crisis along with regional inequalities and disparities create a gigantic problem for the countryside. It is very crucial for us to first understand and measure the extent of crisis and then explore its regional dimensions.

The main objective of this paper is to identify the regional dimensions of crisis of agriculture in the four regions of Uttar Pradesh and examine how the intensity of crisis differs across them. In order to explain regional dimension of crisis of agriculture we have chosen certain set of indicators, normalised them and computed district and region wise composite index of crisis of agriculture and done cluster analysis at district level.

The analysis suggests that there exists significant differences at regional level and thus no sweeping generalisation about existence of crisis can be drawn for whole Uttar Pradesh. A high level of crisis is prevailing in Bundelkhand region, while it is at moderate level in Eastern region. Although, in western region, the intensity of crisis is comparatively low, but the rate of deterioration, i.e., increase in intensity of crisis is high. It comes after Bundelkhand thereby indicating that things are changing fast and taking an alarming turn. The analysis also shows that even within a particular region significant differences exists between districts and districts of one region lie close to districts of other regions.

Key Words: Regional analysis, Agrarian crisis, Crop failure, Uttar Pradesh

JEL: D81, O18, Q18

I

For a vast majority of people living in rural areas where manufacturing growth is slow and alternative livelihood opportunities scarce, emerging crisis of agriculture is making life difficult and precarious. The claims of resurrection of agriculture and revitalisation and improvement in the economic condition of farmers have so far remained a rhetoric and been treated as sophistry by critics. As a matter of fact, the early signs of crisis of agriculture (hitherto limited to certain pockets of states like Maharashtra, Andhra Pradesh, Kerala, etc.) has begun to appear in northern states of Uttar Pradesh, Madhya Pradesh and Bihar. It is sending a warning signal to policy makers and planners telling them that if immediate steps are not taken, the decay of agriculture would lead to severe crisis in countryside that in turn

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can have catastrophic consequences. The problem is complicated as there are signs its intensification and also it acquiring very regional nature with features, intensity and complexities varying in different regions within a particular state. It is very crucial for us to first understand and measure the extent of crisis and then explore its regional dimensions before a broad region specific strategy for resurrecting agricultural sector and building rural economy could be adopted. It is precisely this that the present paper attempts to do. It analyses the regional dimension of crisis of agriculture in India's most populous state Uttar Pradesh.

Uttar Pradesh, despite having a huge growth potential still belongs to the category of backward states and is characterised by slow growth of manufacturing and crisis of agriculture. The highly volatile agriculture continues to remain critical to the state providing livelihood to more than 60 per cent of the population and generating about one-fourth of the gross state domestic product (GSDP). Agriculture is still the mainstay of life here and the living condition, fortune and survival of people depend on it. However, during the last two decades the condition of agriculture has deteriorated creating crisis like situation. For more than 80 per cent of the farmers belonging to the marginal and small category, agriculture has become unviable. There has been deceleration in growth of production and productivity, significant dip in return to agriculture, rise in indebtedness of farmers, surge in risk and uncertainty caused by rather frequent crop failures etc. The combined effect of these is a crisis like situation in agriculture. The declining capacity of the agriculture to absorb the growing manpower in rural economy and falling availability of food grains per capita have further aggravated the situation. What is very characteristic of Uttar Pradesh is that the agrarian structure and nature and magnitude (intensity) of the crisis of agriculture is differing significantly at regional level.

The state is huge in size and by no means a homogeneous entity. It consists of four regions Western, Central, Bundelkhand and Eastern with widely different natural endowments, varying levels of infrastructural development and undergoing differential long-term structural changes. The Western and Central regions riding high on proliferation of success of green revolution (from adjacent Haryana) are highly developed as compared to the other two regions in terms of economic and social indicators and relatively richly endowed in terms of irrigation facilities, infrastructure, access to agricultural credit, technology, etc. The Eastern region that is hugely dependent on agriculture faces the problem of fragmentation and sub-division of land holdings and despite having very fertile landscape is a classic case of subsistence farming. Bundelkhand region is deficient in most respects; with low irrigation and cropping intensity, low fertiliser, low productivity, high risk and frequent crop failures, it is the most backward region of the state. Agrarian reforms in the state too have failed and have been responsible for acceleration of the pace of regional imbalance (Diwakar, 2009).

The rising crisis of agriculture with unevenness and disparities in its regional spread is creating lot of problems in formulation and successful execution of policies.

It is imperative to understand and explain the regional dimension of crisis in the state. This is what is being attempted in this paper. Divided into three sections, Section II discusses the conceptual issues of crisis with its methodological aspect. Section III analyses the agrarian situation of the state at regional level and explains how the intensity of crisis varies from one region to others through the cluster analysis. Section IV comes up with policy recommendations and the final section concludes the paper.

II

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

Even though the fact that the agricultural sector is facing a crisis situation is well accepted in literature, there is lack of consensus as regards the meaning and indicator of this crisis. There are two different views- First, this approach of crisis accepts that the fast decline in the growth rate of agriculture and stagnation in agricultural production are important features of the present crisis (Chand *et al.*, 2007, Sidhu, 2002, Chand and Parappurathu, 2011, Pillai, 2007, Reddy and Mishra, 2009, Barah and Sirohi, 2011). Deshpande (2002), Galab *et al.* (2009), and a host of other researchers have also explained the performance of agricultural sector at the state level and examined how the growth rate of production of important food crops, which are critical to common people, drastically slowed down over the years, particularly after 2000s. The crisis of the agricultural sector is primarily caused by perhaps over dependence on water and cost intensive technology of production, a shift in cropping pattern and fall in private investment resulting from the growth and evolution of the economy. The second approach is a Marxist critique led by Patnaik (2003: Web), and others and treats the present crisis as *agrarian crisis*, i.e. the crisis of certain agrarian classes, arising out of the agrarian relationship that is becoming capitalistic. The view accuses the withdrawal of state in the neo-liberal era and the negative growth of agrarian economy (Pillai, 2007) as the prime reason. It locates crisis in the larger context of ambiguous path of capitalist development in India manifested in the neo-liberal policy or imperialist globalisation that linked the poor unprotected peasantry with the global market. The push to capital intensive high cost agriculture, commercial planning coupled with the policy of deliberate price deflation that the monopoly capitalism has induced has made agriculture an unviable occupation (Kalamkar and Narayanamoorthy, 2003, Deshpande and Arora, 2010, Sainath, 2010) and led to pauperisation of the peasantry. The view relates agrarian crisis also to reduced food absorption by all, a shift from food to cash crops even in the face of the adverse terms of trade shift; rapid and significant increase in indebtedness of farmers, squeezing of agricultural land in peri-urban areas because of expanse of urban centres and marginalisation of farmers and fall in private investment in agriculture (Patnaik, 2003).

The researcher of this paper sincerely believes that the present crisis is neither only crisis of the agricultural sector (first belief) nor only that of peasantry (second belief), it is rather a combination of the two. Though there is no denial of the fact that the agricultural policies in the nation over the years have created a conflict between agriculture and farmers especially the small and marginal ones and made agriculture an unviable occupation for bulk of them, yet it would be wrong to say that just by addressing the concern of small and marginal farmers the present crisis can be effectively handled and the agricultural sector can be put back on track. Similarly, it cannot be said that just by adopting policies that help rebuild the peasantry, the problem of agricultural sector can be resolved. The crisis is a mix of factors that have affected both the agricultural sector and the farmers depending on it. It is actually the crisis of agriculture and as such while making any attempt to measure it one need to include variables that affect both the agricultural sector (e.g., falling production, productivity etc.) and farmers (e.g., falling profitability, rising indebtedness etc.) which has been attempted in the paper.

The paper thus attempts to measure crisis at district and regional level using this broader concept of crisis as well as using certain set of indicators and then classify districts and regions according to intensity of crisis. Further, in order to dissect the issue we have attempted cluster analysis and tried to explain how districts spread in different regions have commonality. In other words how some of the districts of one region are closer to districts of other region and away from districts of the same region. The regional and district level figures regarding crisis of agriculture have been computed on the basis of secondary data taken from the Directorate of Economics and Statistics, Government of Uttar Pradesh.

Secondary data has been used for computation of crisis index and also for cluster analysis of districts of the state to understand how different districts of Uttar Pradesh are placed in terms of major indicators of crisis of agriculture and the extent to which they are close to each other. For in-depth analysis we have developed crisis index at regional level based on secondary data. The indicators chosen are depicted in Table 1.

TABLE 1. LIST OF INDICATORS FOR CLUSTER ANALYSIS AND COMPUTATION OF CRISIS INDEX

SN (1)	Indicator (2)	Unit (3)	SN (4)	Indicator (5)	Unit (6)
1.	Percentage of net area sown in the total cultivable land	Per cent	5.	Per head agricultural loan	Rs.
2.	Yield of foodgrain	(qtl./ha)	6.	Profitability of cultivation	Rs./qtl.
3.	Cropping intensity	Ratio	7.	Average size of land holdings	ha
4.	Per head foodgrain production	Kg			

Source: Economics and Statistics Division, Planning Department Government of Uttar Pradesh.

In order to minimise fluctuation in agricultural data, triennium ending (TE) data has been taken. For the calculation of crisis index, each indicator has been first normalised. Minimum and maximum values (goalposts) have been set in order to normalise data.

III

AGRARIAN ECONOMY OF UTTAR PRADESH: REGION-WISE COMPARATIVE STUDY

Agrarian economy of Uttar Pradesh is one of the most backward segment/sectors of the Indian economy. It is characterised by high percentage of marginal land holdings, low productivity and production, high cost of credit, and declining profitability of cultivation. The indicators showing basic features and status of agriculture such as land use pattern, marginalisation of holdings, production and productivity of food grain, Indebtedness of the farming community, etc. vary significantly across regions.

Land use pattern and per capita land availability influence the crisis of agriculture through the cropping intensity, production and availability of foodgrain and cost of cultivation. For the Western region, the cropping intensity and net area sown are higher than other three regions of Uttar Pradesh. An important fact is that the net area sown (85.47 per cent of culturable land) of Bundelkhand region is greater than eastern (84.74 per cent) and Central (82.35 per cent) regions, but despite having large land size, the cropping intensity is the lowest in the region. This is due to low land fertility, insufficient resources with the farmers to carry on with multiple cropping, inadequate of irrigation facilities etc. The intensity of marginalisation is high in central and eastern regions. Here more than 80 per cent farmers come under small and marginal category and cover more than 60 per cent area. It is true that in many cases small holdings are more intensively cultivated but it is at the same time true that the marginal farmers face a number of problems arising out of lack of resources. For maintaining high cropping intensity, the marginal and small farmers are using high level of fertilisers and technique. As a result, the cost of production is escalating very fast as compared to their output. Thus, the agriculture has become un-remunerative activity and the farming community has come under debt trap in these regions.

The regions also differ in terms of indebtedness of farmers. In Uttar Pradesh the average loan distribution to primary activities has increased during last couple of years. It has increased from Rs. 943.26 in triennium ending (TE) 2004 to Rs. 3664.82 in TE2011. After the advent of green revolution, the agricultural activity has become more capital intensive in the western region. Thus, entire farmer groups of this region invest a large of amount of money on using modern technology to maintain a high level of production and productivity. Therefore, the indebtedness of the farmers in absolute terms is very high in this region as compared to other regions (UP Planning Department). But indebtedness in absolute terms presents a very hazy picture, thus the present researcher has computed the debt-asset (land is not included) ratio and debt to income ratio to get a real picture. As per data, these two ratios for western region are considerably lower than other regions, which implies that the farming community is relatively well-off and most of the farmers own all the required instruments which are necessary for the cultivation, whereas the farming community

of Bundelkhand and Eastern regions hire most of the agricultural equipment at higher rent.

The Western region is highly inspired by its neighbouring states like Punjab and Haryana, where, farmers use latest technology and agricultural resources. Therefore, the performance of the agricultural sector is quite good in this region. As per secondary sources (Uttar Pradesh planning department), the percentage growth rate of foodgrain productivity was low for Bundelkhand region followed by eastern region, whereas western region, recorded high growth rate. But during the last one decade, the growth rate of foodgrain productivity has sharply declined due to technological fatigue and other factors. Unfortunately, the growth rate of productivity has been much lower than population growth rate. Thus, the per capita food grain production has declined across the regions.

The potential of foodgrain productivity and production depend upon the profitability of cultivation, which is highly influenced by land use pattern, investment and market price volatility. Although, the profitability of agriculture has declined nationwide, but the position of farmers in Uttar Pradesh has become more critical, especially for Bundelkhand region (Bhalla and Singh, 2012). During the last few of years, the gap between minimum support price (MSP) and cost of production is either very narrow or even negative, thereby making the cultivation of the crop unremunerative or less profitable. Despite having this condition, the western region has some advantage because the farmer gets some benefit from their economies of scale.

A brief description is sufficient to draw forth the point that different regions differ. In fact there exists difference among districts within the same region. In order to understand this the study has attempted to examine two things - First, based on indicators given in Table 1 has constructed district and region level crisis of agriculture index. Secondly, In order to draw forth the point that although there is by and large some commonality between districts located in one region, they are by no means identical; cluster analysis has been done. There has been a general tendency to club districts of different regions together into a unit and then frame common policy for the whole unit. The approach is not valid as it could be seen that despite remaining in one region different districts vary significantly and in fact some of them are more close to districts lying in some other region.

(1) Crisis of Agriculture in Uttar Pradesh: Region and District Level Crisis Index

We have prepared crisis index to analyse regional dimension of crisis in broader perspective. Using the methodology explained in Section III we have computed district level crisis of agriculture index. The results presented in Table 2 show that, at district level significant variations exist. In different part of Uttar Pradesh some districts obtain very high crisis index. For example all 7 districts of Bundelkhand region show very high crisis intensity in 2011. A number of districts of Eastern region also show high crisis. Besides, the crisis of agriculture in the state has

witnessed an increasing trend. When we divide crisis index of different districts into five classes of equal spread and ranking them into very high, high and likewise it is noted that in TE2004 out of a total 69 districts, 14 districts came under very high crisis category, the number jumped to 28 (about 40 per cent of total districts) in TE2011. Only one district of the state has reported very low intensity crisis in TE2011 coming down from four districts in TE2004.

TABLE 2. CLASSIFICATION OF DISTRICTS ON THE BASIS OF CRISIS OF AGRICULTURE INDEX

Index Score (1)	Crisis index (TE2004)		Crisis index (TE2011)	
	Region (2)	Districts (3)	Region (4)	Districts (5)
Very High 0.439 and above	W=1 C=1 B=5 E=7 T=14	Sonebhadra, Lucknow, Gautam Budha Nagar, Sant Ravidas Nagar, Lalitpur, Allahabad, Mirzapur, Kaushambi, Pratapgarh, Jhansi, Chitrakoot, Mahoba, Varanasi, Banda	W= 6 C=3 B=7 E=12 T=28	Sonebhadra, Lucknow, Gautam B. Nagar, Sant R. Nagar, Lalitpur, Allahabad, Mirzapur, Kaushambi, Pratapgarh, Jhansi, Chitrakoot, Mahoba, Varanasi, Banda, Kanpur Nagar, Jalaun, Kushinagar, Agra, Faizabad, Meerut, Bijnor, Hamirpur, Ballia, Basti, Ghaziabad, Raebareli, Balrampur, Saharanpur,
High 0.376 To 0.438	W=3 C=5 B=2 E=13 T=23	Balrampur, Kanpur Nagar, Hamirpur, Gorakhpur, Raebareli, Ballia, Faizabad, Bijnor, Jaunpur, Sultanpur, Agra, Fatehpur, Farrukhabad, Saravasti, Basti, Unnao, Azamgarh, Mau, Gonda, Sitapur, Jalaun, Ghazipur, Siddarth Nagar	W= 8 C=4 B=0 E=10 T=22	Muzaffar Nagar, Gorakhpur, Jaunpur, Sultanpur, Fatehpur, Farrukhabad, Saravasti, Unnao, Mau, Gonda, Sitapur, Ghazipur, Behraich, Kheri, Firozabad, Mahamaya Nagar, Kannauj, J. P. Nagar, Deoria, Mathura, Moradabad, SantKabir Nagar,
Moderate 0.312 to 0.375	W=9 C=3 B=0 E=6 T=18	Firozabad, Deoria, Kannauj, J. P. Nagar, Kushinagar, Saharanpur, Hardoi, Behraich, Ghaziabad, Kheri, Sant Kabir Nagar, Etah, Muzaffar Nagar, Meerut, Ambedkar Nagar, Barabanki, Barely, Chandauli	W= 6 C=2 B=0 E=5 T=13	Hardoi, Etah, Ambedkar Nagar, Barabanki, Barely, Chandauli, Azamgarh, Siddharth Nagar, Baghpat, Etawah, Aligarh, Buland Shahar, Maharajganj
Low 0.249 to 0.311	W=9 C= 0 B=0 E=1 T=10	Auraiya, Mahamaya Nagar, Budaun, Mainpuri, Etawah, Baghpat, Mathura, Moradabad, Aligarh, Maharajganj	W= 5 C=0 B=0 E=0 T=5	Auraiya, Budaun, Mainpuri, Shahjahanpur, Rampur
Very Low Below 0.248	W= 4 T=4	Buland Shahar, Shahjahanpur, Rampur, Pilibhit	W=1 T=1	Pilibhit

Source: Authors' computation (W=Western, C=Central, E=Eastern & B=Bundelkhand Region).

The region wise comparative analysis clearly indicates that (i) there exists inter-regional variations in the intensity of crisis and (ii) although the intensity of crisis is very high in Bundelkhand region (0.498) and low for Western region (0.370) but the rate of growth in crisis of agriculture is significantly high in western region (14.91 per cent) followed by Bundelkhand (10.91 per cent) and eastern region (9.23 per cent). This result shows that though the present position of western region is good but there is fast deterioration in the condition of agriculture. The reasons for high intensity of crisis in Bundelkhand and eastern regions are not difficult to understand.

TABLE 3. REGION-WISE CRISIS INDEX

Regions (1)	Crisis index (TE2011) (2)	Crisis index (TE2004) (3)	Per cent growth rate of crisis index (4)
Western	0.370	0.322	14.9
Central	0.433	0.397	9.1
Bundelkhand	0.498	0.449	10.9
Eastern	0.438	0.401	9.2

Source: Authors' computation.

Historically, the western and other regions of Uttar Pradesh had different systems of landholdings. Patnaik (1988) clearly indicates that how the agrarian economy in western region is different from eastern and Bundelkhand regions. She argues that Haryana, Punjab and the western parts of Uttar Pradesh are characterised by a dynamic agrarian capitalism, driven by a strong middle/rich peasantry. Opposed to this, a static, oppressive 'semi-feudal' capitalism, or 'Junker style agrarian capitalism of the landlords' is dominant in rest of the Uttar Pradesh. Stokes (1978) has also presents similar view and he quoted that in western, the bhaichara system allowed for peasant proprietorship, which gave tenants greater incentive to invest in land and improve productivity, as is reflected by changes in cropping patterns, increases in yield and capital accumulation. Unfortunately no similar system worked in Eastern and Bundelkhand regions.

Although the eastern and western regions are both part of the same Gangetic plain, the two regions are distinct from one another. Eastern Uttar Pradesh is flood prone, less developed than the west. Flooding not only damages and/or destroys crops and waterlog swathes of land, but this problem makes it more difficult for farmers to effectively use fertilisers. The rainfall in Bundelkhand region has been declined during last decade; therefore the availability of rainfall water is not sufficient for agricultural activity. Overall the agricultural sector in Bundelkhand region has become risky and vulnerable.

The above study clearly indicates that the crisis of agriculture in Uttar Pradesh over the years has intensified and covered all the regions of Uttar Pradesh. The condition of Bundelkhand and Eastern region has become worse over the periods. The empirical evidence suggests that all parameters of agriculture are quite good in the Western and Central regions. It means the intensity of agrarian distress is comparatively low in these two regions. The unfortunate part, however is that the rate of deterioration, i.e., increase in intensity of crisis is high in western region. It comes after Bundelkhand thereby indicating that things are changing fast and taking an alarming turn. For comprehensive analysis of regional dimension of crisis of agriculture and explaining how the indicators of crisis varies at district as well as regional level, a cluster analysis has been made.

(2) Cluster Analysis

In order to find the commonality of features in districts spread in different regions we have done cluster analysis. For this purpose we have chosen seven main indicators, i.e., Percentage of net area sown in total Cultivable land, Yield, Crop Density, Per Head food Production, Profitability of Production, Loan distribution of primary field per person (Rs.), Average Size of Holdings. There are three clusters demarcated on the basis of cluster analysis. Cluster-1 covers 8 districts (Western=7, Central=1) which are highly advanced in terms of socio-economic development whereas, Cluster-3 is the group of all 7 backward districts of Bundelkhand with Mathura. Cluster-2 consists 53 districts of Uttar Pradesh and covers 3 regions of i.e., Eastern, Western and Bundelkhand.

TABLE 4. CLUSTER OF DISTRICTS OF UP BASED ON THE INDICATORS CHOSEN

S.No. (1)	Cluster-1 (2)	S.No. (3)	Cluster-2 (4)	S.No. (5)	Cluster-2 (6)	S.No. (7)	Cluster-2 (8)	S.No. (9)	Cluster-3 (10)
1	Saharanpur	1	Moradabad	19	Lakhimpur	37	Deoria	1	Jalaun
2	Muzaffar N	2	Rampur	20	Sitapur	38	Mau	2	Jhansi
3	Bijnor	3	Jyotiba Ph	21	Hardoi	39	Azamgarh	3	Lalitpur
4	Meerut	4	Gautum Bud N.	22	Unnao	40	Jaunpur	4	Hamirpur
5	Baghpat	5	Buland Sha	23	Raebareli	41	Ballia	5	Mahoba
6	Ghaziabad	6	Firozabad	24	Kanpur Nag	42	Ghazipur	6	Banda
7	Agra	7	Mainpuri	25	Fatehpur	43	Varanasi	7	Chitrakoot
8	Lucknow	8	Aligarh	26	Barabanki	44	Mirzapur	8	Mathura
		9	Mahamaya N	27	Pratapgarh	45	Sonebhadra		
		10	Etah	28	Allahabad	46	Sant Ravid		
		11	Budaun	29	Behraich	47	Kushinagar		
		12	Barely	30	Gonda	48	Ambedkar N		
		13	Pilibhit	31	Faizabad	49	Kaushambi		
		14	Shahjahanp	32	Sultanpur	50	Chandauli		
		15	Farrukhaba	33	Siddarth N	51	Saravasti		
		16	Etawah	34	Maharajgan	52	Balrampur		
		17	Kannauj	35	Basti	53	Sant Kabir		
		18	Auraiya	36	Gorakhpur				

Source: Authors' computation.

In order to understand the basis on which the difference between the clusters is significant, we have conducted a one-way ANOVA. The ANOVA table which offers F values and significance levels show whether any of these mean differences are significant. The table clearly shows that there is significant difference in means of four indicators (except first indicator) between the three clusters. It is however not clear whether significant difference lies between means of cluster-1 and 2, or cluster 2 and 3 or cluster 1 and 3.

- The Tukey test shows that in terms of yield of foodgrain, loan distribution and average size of land holdings, there lies significant difference among all clusters, but in case of cropping intensity, only between cluster 2 and cluster 3 presents significant difference.

TABLE 5. ANOVA

Variables		Sum of squares	Sig.	Variables		Sum of squares	Sig.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Per cent of net area sown in total cultivable land	Between groups	0.093	0.15	Profitability	Between groups	0.316	0.00
	Within groups	1.543			Within groups	1.527	
	Total	1.636			Total	1.843	
Yield	Between groups	0.828	0.00	Loan Distri. of primary field per person (Rs)	Between groups	1.850	0.00
	Within groups	1.113			Within groups	1.241	
	Total	1.941			Total	3.091	
Cropping intensity	Between groups	0.446	0.00	Size of land holdings	Between groups	2.625	0.00
	Within groups	1.536			Within groups	1.218	
	Total	1.982			Total	3.843	
Per head foodgrain production	Between groups	0.791	0.00				
	Within groups	2.274					
	Total	3.065					

Source: Authors' computation.

- In terms of profitability again there is significant difference between districts of different clusters (Except cluster 1 and 3). Profitability is an important constituent of viability and difference in viability means that the profitability of agriculture varies significantly across regions. In this case cluster-2 is in better position and because of high cost of production, low and uncertain yield and lack of proper marketing facilities in districts of cluster-3 and cluster-1, the profitability condition are poor.
- If we analyse the position of three clusters in terms of per head food grain production there exists significant difference between cluster-1 and 3 and 1 and 2. But for cluster 2 and cluster 3 the difference is insignificant due to low productivity and large size of HHs.

If we attempt to conclude our discussion we can say that (i) the huge state of Uttar Pradesh is classified into 3 clusters with significant difference lying between these clusters. (ii) The difference between cluster 1 and 2 on majority of parameters is strongly insignificant. It means these two clusters are lying very close to each other. (iii) In terms of crisis of agriculture, cluster- 3 (all districts of Bundelkhand fall in this cluster) is in the distress condition, (iv)The policy making in the state has to take into consideration the similarities and differences between different clusters. It can go for similar set of policies for all districts of cluster-3, but between cluster-1 and 2, it has to make distinction. We propose that for particular segment (yield, marginalisation of the holdings, indebtedness, etc.) the policy making has to take into consideration the similarities and dissimilarities between different clusters. (v) Coming to our main area crisis, we can conclude that extent of crisis is expected to be different in different regions and districts.

The study tries to conclude by saying that significant differences exist between different districts of Uttar Pradesh and thus no sweeping generalisation about existence of crisis can be drawn for whole of Uttar Pradesh. It is true that the crisis

here has not reached the level as it exists in Maharashtra, Tamil Nadu etc. but it is gradually assuming alarming proportion. If appropriate farmer-centric policies are taken in the state and considering the difference in a situation of different regions (as the cluster analysis suggests) emphasis is made on formulating region specific policies the problem can be controlled and severe crisis can be avoided.

IV

THE INTERVENTIONS: PUTTING THE CART ON TRACK

As we have already proved that the agrarian economy of Uttar Pradesh is in grip of crisis but its intensity is varying at regional as well as district level. Three clusters of the districts have been demarcated on the basis of crisis index, thus government should take specific action plans for different clusters. We have suggested here cluster specific policies to overcome crisis situation. First Cluster presents highly advance districts of Uttar Pradesh in terms of all socio economic parameters. The irrigation facilities access to modern agricultural technology and credit are quite good. Market imperfection is the main problem of crisis of agriculture in these areas. Sugarcane is the main commercial crop and covers more than 80 per cent of the sown area in this region except Lucknow. But sugarcane growing farmers do not receive sufficient returns from their cultivation because they are selling their crop at a lower price in a monopoly market. Thus sugar mills owner are exploiting farmers at own cost. The State should break up the tendency of monopoly and put a check on corruption. A Market Risk Mitigation Fund should be established at micro as well as macro level in order to minimise price fluctuations in product market and financial institutions and agencies should protect farmers during such market fluctuations.

Intensive and misuse of ground water in western region are responsible for falling water table. Therefore, the cost of irrigation has escalated rapidly and as a result, the cost of production has increased significantly. The government should insure the irrigation facilities equally available for all farmers and misuse of ground water should be restricted. Surface water irrigation potential should be increased through water harvesting and private irrigation activity must be rationalised. Government should promote practice of sprinkle irrigation technique like the state of Madhya Pradesh. The farming community of advanced areas is claiming that during the last few years the wage rate of labour has increased (150 per cent-200 per cent) due to National Rural Employment Guarantee Scheme (NREGS) and other social welfare schemes. In view of this it is suggested that all the employment generation programmes and crisis alleviation programmes must work together.

Third cluster comprise seven districts of the state and among them 6 districts are related to Bundelkhand region which is highly backward and has become more risky due to vagaries nature of environment. For minimising risk factors and providing a safety net, a comprehensive crop insurance scheme must be announced by the state government in this region and an awareness programme for the farming community

should be launched. *Crop insurance* should be linked with yield risk and implementation of this should be at the village and block level. Due to insufficient availability of institutional sources, the farming communities in Bundelkhand regions are forced to take financial assistance from informal sources at very high rate of interest (60 per cent to 110 per cent annually) which creates an unbearable burden. There is need to spread the networking of rural banks and co-operative societies in the region and reinforce close coordination between the district and block development authorities and banking institutions operating in the district and block levels. Further, there is need to ensure that the agricultural loan is used for productive purposes to be ensured by lenders through systematic monitoring.

Second cluster shows moderate level of crisis of agriculture and 53 districts of the state fall in this cluster. Marginalisation of the holdings emerged as a main obstacle to improve the livelihood of the farming communities. The small and marginal farmers have been suffering from highly insecure and vulnerable working conditions since reform period. There are few and weak social security measures available which provide risk coverage and ensure maintenance of basic living standards in time of crisis, but there is need for further strengthening of the programme and taking appropriate efforts for effective implementation at ground level and increasing participation of local bodies like panchayat level. There is need to ensure good coordination between social security programmes and crisis alleviation programmes.

V

CONCLUSION

The policy makers need to pay special attention to the Eastern and Bundelkhand regions of the state devise curative policies while for the Western region they can go for a preventive policy, i.e., a policy that prevents the occurrence of crisis. The policy makers should not address the state as a whole and government should pay more attention for eastern and Bundelkhand region. By and large the state agriculture needs a sustainable farming system which is economically viable, where money flows into the pockets of tillers, where farmers do not think of abandoning farming, and a rural set-up which provides ample livelihood opportunities to the farmers.

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