

Agriculture Development in the Border and Non–Border Districts of Punjab : A Comparative Analysis

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Abstract

Agriculture development is regarded as a prerequisite for rapid transformation of an economy. Some regions on account of their location disadvantages face some inherent problem regarding development. The present study is an effort to compare the agriculture development in the border and non border districts of Punjab. The study compares the agriculture development in terms of input, output, technological changes and money other parameters. The study is comprehensive in nature and for a period of 1976-2002; which is further divided into three phases i.e. first phase from 1976 to 1984; second phase from 1985-1993 and the third phase from 1994-2002. The study revealed that the border factor does not seem to have large influence on agricultural development. The study revealed that the geographical terror appears to be more determining factor behind agriculture development in the state rather the border factor.

I. Introduction

THE CONCEPT OF equity and justice is based upon the principle that all the regions should develop equally leading to efficiency in allocation and distribution of resources in the economy. Some regions on account of their locational disadvantages face some inherent problems regarding development. The areas/ districts which fall on international border face lots of locational disadvantage. In the state of Punjab there are three districts i.e., Gurdaspur, Amritsar and Ferozpur which lie on the international border and of these Ferozpur has maximum area along the international border. These districts in the past faced two Indo-Pak wars and faced a long spell of cross border terrorism. Dawn to dusk curfew, lack of stability, sensitive international border, fear of evacuation, intermittent firing across the border area are some important factors leading to uncertainties and hardship of the masses and ultimately hindered agriculture development. Further the

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pace of agriculture has been the function of the pace of industrial productivity. But to the surprise of many development theorists, this path of development has eluded in Punjab. The Government of India as well as Government of Punjab through their various development programme have come up with different strategies and plans for the upliftment of border districts of Punjab. Starting from the years 1966-69 were a phase of Annual plan, during which the state received special funds for its transformation into a veritable 'bread basket' for the country facing a prolonged and massive food deficit. Two consecutive drought years of 1964-65 and 1965-66 had worsened the situation in India. This gave Punjab an opportunity to prove its mettle. It met the challenge and contributed 61 per cent of wheat and eight per cent of rice procured for the Public Distribution System at the national level in 1968-69. The fourth plan (1969-74) document highlighted that the state could take pride in having saved the country from a grave food crisis; and for itself, having successfully stabilized the strides made in the green revolution. Further, fifth (1974-79) and sixth plan (1980-85) has not given any special focus on agriculture development. The seventh plan (1985-90) promised 'growth with justice'. A major thrust was on correction of distortions that might have crept in during the preceding plan periods. As a result, this plan emphasized reclamation of degraded agricultural land and extension of irrigation in the submontane and other backward tracts. Augmentation of power supply and initiation of environmental improvement schemes were listed as priorities. Punjab has also been covered under 'Border Area Development Programme' from the year 1993-94 onwards. This programme too lays emphasis on the balanced development of remote and inaccessible border areas, ensuring effective administrative and people's involvement in development schemes to strengthen their resilience. Generation of additional employment was adopted as the core concern of the state in the Eight Plan (1992-97). The three border districts of Gurdaspur, Amritsar and Ferozepur, which were major victims of the state wide militancy during the eighties, were in special focus. Diversification of Agriculture, in general, and of cropping pattern in particular. Further, vigorous thrust to agriculture, irrigation and power sector were the major objectives of the ninth five year plan (1997-02). A major thrust was on correction of distortions that might have crept in during the preceding plan periods plan for the border districts, yet introduce a new idiom seeking transformation of Punjab into a model state, emphasizing over the diversification of the economy in favour of Agriculture. It was particularly from the year 1981 onwards that under development of backward area sub-plan, the border areas received a special focus. The major objective of this policy was to remove regional imbalances in the state by narrowing down the economic disparities by raising the level of income of inhabitants of the border areas. The border districts which were the major victims of the state-wide militancy came under special focus of development strategies. Again 'promotion of Agriculture' was identified as an effective route to the realization of this objective.

II. Objectives and Methodology

Here in view of this background it is important that an analysis of Agriculture sector development in the border districts of Punjab should be carried on. It is important to know that what is the level of agriculture sector development in these districts vis-à-vis the non-border districts of the state. How with the passage of time agriculture has responded with respect to Governments initiatives remains to be seen. How wide was the gulf between border and non-border districts with respect to various agriculture sector development indicators in the past and what the present position needs is an immediate analysis? It must be mentioned here that a comparison between the border and the non-border districts does not in any way implies that the selected non-border districts are the target or are the 'ideal', in fact a comparison between the two groups is just an effort to know that how the border districts are placed vis-à-vis the non-border districts. The time period selected for this purposes includes the years 1976-2002. This time period is further divided into three phases i.e., from the year 1976 to 1984 and is termed as first phase, and the second phase is stretched over the years 1985 to 1993. It was the period when terrorism was at peak in Punjab and the third period included the years 1994-2002. This is the post reform period and normalcy had returned by the beginning of this period in the state. Further the Border Area Development Programme was started by Punjab Government in the year 1992-93 and its impact must have started becoming apparent during the third phase.

Agriculture development is regarded as a prerequisite for rapid transformation of an economy. It is the agriculture sector which generates both labour and capital surplus for the growth of modern and dynamic sectors of the economy (Lewis, 1954; Syrquin, 1988). Agriculture development in fact is complementary to the development of industrial development. No industrial development can sustain without the agriculture development. Therefore, the fore-most priority of the government particularly in a developing economy should be to pay utmost importance to agriculture development.

During the seventies there had been a significant improvement in the technology of cultivation with spread of high yielding varieties and wider expansion of irrigation. The barriers of outmoded land tenure system, use of primitive technology and lack of infrastructure for raising productivity were overcome to a considerable extent (Kohli and Singh, 1997).

In most of the studies conducted in the field of agricultural development, the focus is generally centered around the analysis of technological input-output relationship. To depart from this traditional way of analyzing the situation, in the present paper efforts have been made to represent agriculture development by considering not only output and input indicators but also those relating to modernization and technological break through in agriculture. Thus with a view to analyze the level of agriculture development during different phases in the selected districts the following sixteen indicators, have been formulated and analyzed. Infact these indicators are

not just statistics rather they point out something more. The different agriculture based indicators are as follow

- A₁ Value of agriculture output per agriculture worker
- A₂ Value of agriculture output per rural worker
- A₃ Value of agriculture produce per hectare of net sown area
- A₄ Net sown area as percentage of total cropped area
- A₅ Cropping intensity
- A₆ Milch animal as percentage of total livestock population
- A₇ Percentage of area under commercial crops to gross cropped area.
- A₈ Fertilizer consumption per hectare of net sown area
- A₉ Number of electrified pumpsets per thousand hectare of net irrigated area
- A₁₀ Number of tractors per thousand hectare of net sown area.
- A₁₁ Percentage of net irrigated area to net sown area
- A₁₂ Percentage of gross irrigated area to gross cropped area
- A₁₃ Power consumption in agriculture as percentage of total power consumption
- A₁₄ Number of agriculture cooperative credit societies per 100 Sq.km.
- A₁₅ Number of agriculture cooperative credit societies per lakh of population
- A₁₆ Number of live stock population per veterinary institutions

Out of total 16 selected indicators, six relate to agriculture productivity (A₁ to A₆) and the remaining ten pertain to agriculture modernization (A₇ to A₁₆). Truly speaking these are only A₁, A₂ and A₃, which can be strictly termed as productivity based indicators, A₄, A₅ and A₆ are not exactly productivity based indicators, but are the main pillars on which agriculture productivity lies, effecting agriculture productivity in a major way, hence, termed as productivity related indicators here after. As far as indicators A₇ to A₁₆ are concerned, they basically reflect the extent of modernization, mechanization and agricultural institutional network in a district. In fact all these indicators are also promoting agriculture productivity, efficiency and performance, yet in the present context are termed as modernization based indicators here after.

The rapid adaptation of the Green Revolution technology in Punjab has led to a sharp increase the values of farm mechanization based indicators. The need of mechanization has further increased the requirement of financial infrastructure in the districts. Cooperative credit society do not simply meet the short term and long term credit requirements of the farmers but are also engaged in marketing and distribution of consumer goods and supply of inputs to the farmers.

Since the livestock acts as a complementary factor for the development of agriculture sector, A₆ and A₁₆ indicators reflecting the availability of productive livestock and the required basic infrastructure for their sustenance are framed.

Thus a large number of indicators relating to agriculture sector, covering diverse dimensions of agriculture development have been formulated to know about the status of agriculture sector in a district.

With a view to have a clear picture of agriculture development a comparison is made between the average values of agriculture sector indicators of border and non-border districts. For this purposes three non-border districts i.e., Patiala, Roopnagar, Sangrur are purposely selected as these are centrally located and did not have any direct proximity to the border.

Though there are certain other districts like Jullundhar and Ludhiana also which are centrally located but in view of their exceptionally high level of agricultural/ Industrial activity, they were not taken as the representative sample of non-border districts, with whom a fair comparison could be made. Thus, finally border districts covered the averages of agriculture sector indicators pertaining to Gurdaspur, Amritsar and Ferozpur taken together and non-border districts covered the averages of Roopnagar, Sangrur and Patiala.

The data for different agriculture sector indicators was mainly collected from the Department of Agriculture, Economic and Statistics Deptt. of Government of Punjab. In addition some of the relevant information was also collected from Punjab Development Report 2002 published by Government of Punjab.

Further with a view to make the indicator unit free, Z scores are calculated having mean value zero and standard deviation equal to unity. Z scores are calculated as follows:

$$z = \frac{X_{ij} - X_i}{S_i} \tag{1}$$

where, i, i= 1, 2, 3,...,100 refers to the indicator and j, j= 1,2, ...,6 Border district 'X_i' refers to the mean value of ith indicator and 'S_i' is the standard deviation.

Further, all the indicators were condensed and composite indices were obtained by assigning weights to each indicator. In the present study weight has been calculated for each indicator phase was with the help of principle component analysis the composite scores are obtained as follow.

$$Z_{bjt} = \sum_{z=1}^n W_{ib} Z_{ijt} \tag{2}$$

Where W_{ib} is the weight assigned to ith agriculture sector indicator and Z_{ijt} is Z score value of ith indicator of jth border district in year 't' where Z_{bjt} is the sum of weighted Z scores of agriculture sector indicators for jth district during the time period 't'.

Further to have a clearer picture of agriculture sector development exponential growth rate of different indicators, have also been calculated, repeatedly for the three periods.

$$Y_i = a_0 \cdot b_i^t \quad (3)$$

$$\ln(Y) = \ln(a_0) + t \cdot \ln(b) \quad (4)$$

$$G = (b-1) \quad (5)$$

Here, Y_i is the value of i^{th} indicator, a_0 is constant, b_i is the regression coefficient of i^{th} indicator and 't' is the time period. In the common log value and 'g' is the growth rate.

III. Analysis and Interpretations

In the present paper, an attempt has been made to analyze agricultural development in the border and non-border districts of Punjab during the period 1976 to 2002. The agricultural development is studied in terms of sixteen indicators.

It is clear from Table I and II that during the period immediately after the green revolution (1976-1984) the border districts on an average recorded higher/more favourable values than that of the non-border districts with respect to as many as nine indicators during the first phase of the study. Indicators related to agriculture productivity i.e., value of agriculture output per agricultural worker (Rs. 6,357) and per rural worker (Rs. 1,517) recorded higher values in the border districts than the non-border districts. However, the border districts taken as a whole recorded higher values with respect to these indicators not on account of high values recorded in all the three border districts but it was mainly on account of Ferozepur district, which due to cotton cultivation exhibited high values.

Further, indicators related to agriculture modernization i.e., percentage of area under commercial crops to gross cropped area (0.98 per cent), fertilizer consumption per hectare of net sown area (116 kg), number of electrified pumpsets per thousand hectare of net sown area (84), percentage of net irrigated area to net sown area (83.35 per cent), percentage of gross irrigated area to gross cropped area (88.36 per cent), power consumption in agriculture as percentage to total power consumption (50.59 per cent) and number of agriculture co-operative credit societies per 100 Sq. km. (15), also on an average recorded higher values in the border districts taken as a whole vis-a-vis the non-border districts.

In case, whole of the analysis of agricultural development centers around rate of growth recorded with respect to different indicators by the border and non-border districts, a mixed picture emerged. In seven indicators the border districts and in the remaining, the non-border districts recorded higher/more favourable (where lower or negative rate of growth is better) rate of growth during the first phase of the study.

Out of these, in which border districts recorded higher rate of growth, three related to productivity (net sown area as percentage to total cropped area i.e., 0.39 per cent, cropping intensity i.e., 2.64 per cent and milch animal as percentage of total livestock population i.e., 7.64 per cent) and the remaining five were modernization based indicators.

However, with respect to remaining three productivity related (value of agriculture output per agriculture worker i.e., 4.24 per cent, per rural worker 2.92 per cent and value of agriculture produce per hectare of net sown area i.e., 3.24 per cent) and five modernization based indicators, these were the non-border districts which recorded higher rate of growth vis-à-vis the border districts during the first phase of the study.

Further, it is important to mention that , insurgency had badly hit all kinds of economic activities in Punjab. Agriculture was also badly affected due to growing insecurity, lower mobility of workers, due to limited working hours, non availability of agriculture workers and so on. Here in this background an analysis of agricultural development during the insurgency phase in the border and non-border districts of Punjab is made.

An analysis of agriculture development in the border and non-border districts during the period 1985-1993 (second phase) revealed that as compared to nine indicators during the first phase, it was with respect to seven indicators during the second phase, that the border districts marched ahead over the non-border districts (Table I and II). Out of these, none of the indicators pertained to productivity and all the seven related to agriculture modernization. Fertilizer consumption per hectare of net sown area (146 kg), percentage of net irrigated area to net sown area (91.1 per cent), gross irrigated area to gross cropped area (89.05 per cent), power consumption in agriculture as percentage to total power consumption (58.89 per cent), number of agriculture co-operative credit societies per 100 Sq. km (10) and number of electrified pumpsets per thousand hectare of net sown area (185), recorded higher mean values in the border districts than the non-border districts during the second phase too.

Out of these indicators, in two i.e., number of electrified pumpsets per thousand hectare of net sown area (from 24 per cent to 28 per cent) and power consumption in agriculture as percentage to total power consumption (from 14 per cent to 47 per cent), the gap between the mean of the border and non-border districts increased further during the second phase vis-à-vis the first. On the contrary, in case of indicators i.e., fertilizer consumption per hectare of net sown area (from 32 per cent in the first phase to 13 per cent in the second phase), percentage of net irrigated area to net sown area (from 19 per cent in the first phase to 10 per cent in the second phase), percentage of gross irrigated area to gross cropped area (from 10 per cent in the first phase to 7 per cent in the second phase) and number of agriculture co-operative credit societies per 100 sq. km (from 7 per cent in the first phase to 4 per cent in the second phase) the difference between the mean value recorded by the border and non border districts decreased during the second phase vis-à-vis the first

In contrast to the first phase, livestock population served per veterinary institution stood marginally more favourable in the border districts during the second phase. Whereas during the first phase, as compared to the non-border districts, one veterinary institution in the border districts was serving 65 per cent more livestock population, but in the second phase it served 3 per cent less.

The analysis revealed that whereas during the first phase as compared to non-border districts, border districts recorded higher value of agriculture output per agriculture worker and per rural worker, but in the second phase, the reverse was observed. Border districts trailed behind the non-border districts with respect to these two indicators by 28 per cent and 21 per cent respectively. This was mainly on account of big gains made by district Patiala and Sangrur with respect to these two indicators.

An analysis of rate of growth revealed that, like in the first phase during the second phase also the border districts registered higher rate of growth with respect to as many as eight indicators. Out of these, four were productivity and modernization based indicators.

Though percentage of agriculture workers to total workers (Table III) declined in the both border (from 59.72 per cent in the first phase to 59.63 per cent in the second phase) and non-border districts (from 60.02 per cent to 54.82 per cent), yet this fell at a higher rate in non-border districts (1.62 per cent) vis-à-vis the border districts (0.25 per cent). This simply suggests that in a way the process of structural change taking place was slightly faster in the non-border districts than the border ones. Further, percentage of net sown area to gross cropped area recorded a fall in the both border and non-border districts during the insurgency phase. However, this fall was observed to be more in the border districts (1.52 per cent) than the non-border districts (0.09 per cent). Concentration of militant activities in the border districts might have led to this fall. Though agriculture co-operative credit societies are heart and blood of agriculture development in a rural area, yet the number of these societies, in terms of both population and area also recorded a negative rate of growth in the both border (0.36 per cent and 1.13 per cent respectively) and non-border districts (1.13 per cent and 0.82 per cent respectively) during the second phase. Infact in all the districts, number of agriculture co-operative credit societies have declined in absolute terms. This is a very serious trend and may ultimately lead to growing indebtedness of the farmers by leaving them on the mercy of money lenders.

Another way to explain rate of growth can be that what happened to growth of various agriculture indicators in both border and non-border districts during the period of insurgency over the first one. In the border districts in eleven (three related to productivity and eight to agriculture modernization) and in the non-border in thirteen indicators (four related to productivity and remaining nine to agriculture modernization), the rate of growth turned out to be smaller/less favourable during the second phase vis-à-vis first. This falling rate of growth can be due to number of reasons firstly, due to insurgency the overall environment of security was adversely affected,

which in turn would have negatively affected mobility and thus led to adverse impact on agriculture development and secondly, that the initial impact of green revolution must have started slowing down subsequently in the selected districts of the study, leading to falling rate of growth.

Thus in brief, the analysis revealed that the rate of growth of agricultural development was adversely affected during the insurgency phase in both border and non-border districts.

In 1991, when India officially went along the structural adjustment path, there was apparently not much explicitly by way of reforms in agriculture. But very soon, atleast by mid 1990's when the WTO was in place, there did unfold many policy reforms directly addressed to agriculture (see Annexure).

Beginning in 1997 all Indian product lines have been placed under the generalized system of preferences (GSP). By 2000, all agricultural products were removed from quantitative restrictions and brought under the tariff system. Canalization of trade in agriculture commodities through state trading agencies was almost removed and most of the product brought under open general licensing (OGL). The average tariff on agriculture products, which stood at over 100 per cent in 1990, were brought down to 30 per cent by 1997 and targeted to come down further. Internally the fiscal reforms had much greater effect on the agriculture input support system and institutions than even the provisions of the Agreement on Agriculture (AOA) of WTO (Reddy, 2006).

Here in this backdrop the growth of agriculture sector in the selected districts of Punjab in the post-reforms period is discussed.

The performance of various border and non-border districts revealed that in contrast to nine indicators in the first, eight in the second it was only in six indicators (two related to productivity and remaining four to modernization) during the third phase that the border districts on an average recorded higher/more favourable values vis-a-vis a the non-border districts taken as a whole (Table I and Table II).

Out of indicators in which border districts performed better in both (second and third) phases, whereas in case of three indicators, the absolute difference between the border and non-border districts widened further, in case of the other three (one of productivity and two of modernization) opposite was observed.

The analysis of productivity based indicators revealed that though net sown area as percentage of total cropped area in the border districts stood 7 per cent less than the non-border districts during the second phase yet turned out to be 4 per cent more than non-border districts during the third phase. Similarly, though in the border districts milch animals as percentage of total livestock population also stood 7 per cent less during the second phase, yet turned out to be 3 per cent more than the non-border districts in the third phase.

Table I
Indicators Relating to Agriculture Productivity

	Value of Agriculture Output per Agriculture Worker (Rs)		Value of Agriculture Output per Rural Worker (Rs)		Value of Agriculture Output per Hectare of Net Sown Area (Rs.)		Net Sown Area as Percentage to Total Cropped Area		Cropping Intensity		Milch Animal as Percentage to Total Live Stock Population	
First Phase	\bar{X}	g		g		g		g		g		g
Mean of Border District	6357	3.26*	1517	2.07*	4779	2.89**	59.48	0.39	163	2.64	23.96	1.02
Mean of Non-Border District	5623	4.24*	1407	2.92*	4961	3.24*	60.53	0.09	164	1.32**	26.94	0.32
Second Phase												
Mean of Border District	8557	2.96*	2137	2.92*	6521	3.64*	55.10	-1.52*	176	0.32	27.63	4.01**
Mean of Non-Border District	10964	2.64	2592	2.87*	7227	2.89*	59.00	-0.09	177	1.22	29.09	3.26*
Third Phase												
Mean of Border District	10121	2.36*	2310	0.32	8013	2.00*	53.70	-0.17	181	0.08	36.42	3.74*
Mean of Non-Border District	10532	1.04*	2379	0.89	9471	1.82*	53.11	-0.36	183	0.05	35.48	2.64*

Note: * Significant at 1% Level

** Significant at 5% Level

Mean

g Growth (in %)

Source: Compiled from Various Relevant Issues of Statistical Abstract of Punjab Published by Economic Advisor to Govt., Punjab

Table II
Indicators Relating to Agriculture Modernization During the Different Phases

	Percentage of area under commercial crops to gross copped area		Fertilizer consumption per hectare of net sown area (Kg.)		Number of electrified pumpsets per thousand hectare of net sown area		Number of tractors per thousand hectare of net sown area		Percentage of net irrigated to net sown area		Percentage of gross irrigated to gross cropped area		Power consumption in agriculture as percentage to total power consumption		Number of agriculture cooperative credit societies per 100 Sq. km.		Number of agriculture cooperative credit societies per lakh of population		Number of Livestock population per veterinary institution		
	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	
First Phase																					
Mean of Border District	0.98	0.64	116	4.64*	84	7.04*	18	8.62*	83.35	1.34*	88.36	2.64**	50.59	1.64*	15	7.32*	43	-4.4*	9241	7.64**	
Mean of Non-Border District	0.77	0.84	88.67	3.28*	68	9.34*	20	12.39*	70.38	2.84*	80.66	1.32	44.95	-2.04	14	5.34*	46	-2.9*	6066	3.89*	
Second Phase																					
Mean of Border District	1.53	1.34*	146	0.84	185	3.52*	33	4.32*	91.1	1.72*	89.05	0.28	58.89	1.05*	10	-1.13	23	-0.36	5208	-1.23*	
Mean of Non-Border District	1.76	0.89	129	1.02*	144	3.05	41	4.89*	83.56	1.84**	83.39	0.14	40.15	-0.09	9	-0.82	25	-1.13	5388	-0.45	
Third Phase																					
Mean of Border District	1.86	1.37**	167	2.05*	221	2.04*	41	4.64*	89.92	0.36	92.74	0.28	54.65	-3.3	9	-1.6	17	-3.3*	4159	-2.85	
Mean of Non-Border District	2.02	1.64*	175	2.86*	192	1.98*	59	6.87*	89.71	0.89	89.84	0.48	34.97	-3.0	8	-0.6	19	-2.3*	3969	-4.64*	

Note.: * Significant at 1% Level

** Significant at 5% Level

Mean

g Growth (in %)

Source: Compiled from Various Relevant Issues of Statistical Abstract of Punjab Published by Economic Advisor to Govt., Punjab

An analysis of modernization based indicators revealed that, though during the second phase, number of electrified pumpsets per thousand hectare of net sown area in the border districts recorded 13 per cent higher value than the non-border districts, yet during the third phase this gap increased marginally to 15 per cent. Similarly, whereas during the second phase, net irrigated area as percentage of net sown area and power consumption in agriculture as percentage of total power consumption stood 1 per cent and 45 per cent more in the border districts vis-a-vis the non-border districts, but during the third phase turned out to be to 9 per cent and 59 per cent more respectively. Percentage of power consumption in agriculture in the border districts stood more due to low industrial activity.

Whereas during the second phase as compared to the non-border districts, the border districts recorded 13 per cent higher fertilizer consumption per hectare of net sown area, but during the second phase vice-versa was observed. During the third phase, non-border districts recorded 5 per cent higher fertilizer consumption per hectare of net sown area than that of the border districts.

Further, though, like in the second phase, during the third phase also the border districts continued to score higher value with respect to percentage of gross irrigated area to gross cropped area (92.74 per cent in border as against 89.84 per cent in non-border districts) and number of agriculture co-operative credit societies per 100 Sq. km (9 as against 8 in non-border districts), yet the absolute difference between the border and non-border districts declined vis-à-vis the second phase. Percentage of gross irrigated area to gross cropped area which stood 7 per cent more in the border districts vis-a-vis the non-border districts in the second phase, turned out to be only 3 per cent more in the third phase. Agriculture co-operative credit societies in terms of area also, which stood 4 per cent more in the border districts during the second phase and stood only 2 per cent more during the third phase. Thus with respect to these indicators the border districts recorded just a nominal edge over the non-border districts.

Table III
Percentage of Agricultural Workers to Total Workers during the Different Phases

Districts	First Phase		Second Phase		Third Phase	
	g		g		g	
Mean of Border Districts	59.72	0.36	59.63	-0.25*	43.48	-3.20
Mean of Non-Border District	60.02	-1.34**	54.82	-1.62*	38.53	-2.98**
Average Value of Punjab State	58.03	-1.29*	53.64	-0.84**	40.00	-3.81*

Note.: * Significant at 1% Level

** Significant at 5% Level

Mean

g Growth (in %)

Source: Compiled from Various Relevant Issues of Statistical Abstract of Punjab
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An important observation made during the liberalization period was that, percentage of workers employed in agriculture to total workers recorded almost similar fall in the both border and non-border districts (16 points) over the second phase (Table III). But like in the earlier phases during the third phase also, probably due to lack of diversification in the border districts, higher percentage of workers continued to be engaged in agriculture sector (43.48 per cent) vis-à-vis the non-border districts (38.53 per cent).

It was further observed that, though as compared to the second phase, the rate of growth of net sown area as percentage of gross cropped area, declined in the both border and the non-border districts, yet this rate of fall was more pronounced in the latter group (0.36 per cent) than the former (0.17 per cent). Lately the scarce agriculture land has been used for non agriculture purposes like for shopping malls, marriage palaces and for other economic and recreational activities, thus leading to a fall in net sown area. Since the cost of cultivation of foodgrains over a period of time has tended to increase and agriculture prices are also not sufficiently remunerative, the farmers during past few years have been increasingly going for floriculture and horticulture and some fast growing species of trees like poplar eucalyptus, shoo-babool etc. Otherwise also because of falling water table and growing fertilizer prices the agriculture sector is losing its charm in Punjab. This is a very serious trend and may lead to agriculture crisis in the days to come.

Further, in contrast to ten indicators in the first and second phase. There was six indicators (each three related to productivity and modernization) in the third phase that the border districts registered higher / more favourable rate of growth than the non-border districts. Value of agriculture produce per hectare of net sown area recorded 3.07 per cent rate of growth in the border districts in contrast to 1.82 per cent rate recorded in the non-border districts. Similarly, number of electrified pumpsets per thousand hectare of net sown area and milch animal as percentage of total livestock population recorded 2.04 per cent and 3.74 per cent rate of growth in the border districts in contrast to 1.98 per cent and 2.64 per cent rate recorded in non-border districts respectively during the third phase. Further, though power consumption in agriculture as percentage of total power consumption recorded a fall in both the groups of districts, yet border districts recorded (3.28 per cent) marginally lower rate of fall than the non-border districts (3.02 per cent) during the third phase.

Another way to explain rate of growth can be that what happened to it (growth rate) in the both border and non-border districts in the third phase over the second one, As compared to the second phase, in the border districts the rate of growth declined in as many as fourteen indicators. Most of the productivity based indicators recorded lower rate of growth during the third phase vis-à-vis the second.

On the other hand, in the non-border districts the rate of growth declined in seven indicators. Out of these, four indicators related to productivity and

three pertained to modernization. The rate of growth of value of agriculture produce per hectare of net sown area declined from 2.89 per cent in the second phase to 1.82 per cent in the third phase. Similarly, the rate of growth of value of agriculture output per rural worker also declined from 1.87 per cent in the second phase to 0.89 per cent in the border districts in the third phase. This was mainly because during the year 1995-96 and 1997-98, these indicators recorded negative rate of growth in both the groups under study, and thus affecting the overall rate of growth of these indicators during the third phase.

In view of financial sector reforms, the priority sector lending by commercial banks to agriculture have also declined. The commercial banks with a view to avoid their NPAs are reluctant to lend to the farmers (Shetty, 2006). Otherwise also, frequent crop failures, growing problem of water logging, uncontrolled attacks by American bollworm and degradation of soil due to deficiency of micro nutrients have been adversely affecting productivity of agriculture in Punjab. Lately the woes of agriculturist of Punjab have increased further. The experience of globalization of agriculture has not been favourable for farmers. They are facing greater uncertainties in terms of prices and returns. The period of globalization has witnessed a decline in prices of agricultural products leading to low prices received by farmers, both for growing cereals as well as commercial crops (Acharya, 2004)

Further, due to faulty import and minimum support prices and because of slow withdrawal of agriculture subsidies in the era of reforms, agriculture seems to be losing its charm. There has been a steep increase in the cost of farming in the era of globalization, as evident from the fact that the fertilizer price index increase from 99 in 1990-91 to 228 in 1998-99 at a compound annual rate of 11 per cent (Acharya, 2004). Falling capital expenditure as an aftermath of fiscal reforms have also started having negative impact on agriculture infrastructure, and thus affecting agriculture productivity. Frequent power cuts in agriculture sector are also responsible for present state of affairs in Punjab agriculture. Otherwise also agriculture productivity has come to a saturation point in the state due to absence of any fresh breakthrough in agriculture technology during the past few decades.

Infact the state has already realized the potential realizable yield for wheat and paddy to the extent of 77 per cent and 75.45 per cent respectively (Gill and Ghuman, 2002). Hence there is very little potential of increase in the per acre yield at the level of present technology available. Slow shift in workforce from agriculture to non-agriculture and increasing pressure of population on land, has also led to fragmentation of holdings and making them unviable leading to further problem in agriculture sector. Not only that even the marketing difficulties have also made the life of the poor peasant miserable (PAU, 1998). Hence, these factors combined together in turn have been adversely affecting rate of growth of different agriculture indicators in the selected districts.

Table IV
Weights Assigned to different Indicators of Agriculture Sector Development

Phases	Value of Agriculture Produce per	Value of Agriculture Produce per Rural Worker	Value of Agriculture Produce per Hectare of net shown area	Net shown as percentage of total cropped area	Cropping Intensity	Milch animal as percentage of total livestock population	percetate of area under commercial crops to gross cropped area	Futilizer consumption per heactare of net shown are
First Phase	0.99249	0.99595	0.77097	0.97941	0.93255	0.94915	0.66035	0.39026
SecondPhase	0.87228	0.97636	0.83668	0.99623	0.97203	0.84897	0.98001	0.68616
Third Phase	0.68502	0.99888	0.92291	0.90805	0.95835	0.45678	0.85830	0.67635

Phases	Electrified pumpset per ten thousand hectare of net irrigated area	Number of tractors per thousand hectare of net sown area	Net irrigated area as percentage of net sown area	Gross irrigated area a percentage of net irrigated area	Power consumption in agriculture as percentage of total consumption	Agriculture co-operative credit societies per hundred sq. Km.	Agriculture co-operative credit societies per lac of population	Live stock population per veterinary institution
First Phase	0.92182	0.78463	0.78344	0.87215	0.75462	0.99752	0.77525	0.88600
SecondPhase	0.99380	0.97428	0.88701	0.89905	0.99011	0.97528	0.96349	0.94534
Third Phase	0.65929	0.94283	0.83294	0.89873	0.84372	0.48779	0.94838	0.94876

In brief, crisis in agriculture was well underway by the late 1980's and the economic reforms beginning in 1990's have only deepened it. The crisis in agriculture in the post reform period has become all pervasive. The manifestation of the crisis is felt in different forms in different districts and institutional context.

The weights assigned to various indicators have been presented in Table IV. It is observed that weights assigned to different indicators changed over the selected years.

Agriculture co-operative credit societies per 100 km² (0.99752) followed by value of agriculture output per worker (0.99595) and value of agriculture output per worker (0.99249) registered the highest weight in the first phase.

However, during the second phase, net sown area as percentage of total cropped area and number of electrified pumpsets per thousand hectare of net sown area (0.99280) occupied the maximum weights.

Further in the third phase, value of agriculture output per rural worker (0.99888) and cropping intensity (0.95835) recorded the maximum weight. On the other hand, fertilizer consumption per hectare of net sown area registered lowest weight in all the phases under study.

IV. Composite Index of Agriculture Development

In Table V composite indices of agricultural development over a period of time is exhibited. During the first phase, value of composite indices for the border districts stood at 3.2713 and for the non-border districts stood at -0.909. During the second phase the value of index of agriculture sector for the border districts stood at -2.216 and that for the non-border districts stood at 2.2053. Further, it was observed that non-border districts managed to score highest rank on account of high value of agriculture output per worker and per rural worker, number of tractors per thousand hectare of net sown area and number of agriculture co-operative credit societies per lakh of population.

Table V
Composite Indices for Agriculture Development

Composite Index	1 st Phase C.I.	2 nd Phase C.I.	3 rd Phase C.I.
Border Districts	3.2713	-2.216	-0.8845
Non-Border Districts	-0.9090	2.2053	0.9976

Source: As per Annexure.

Further during the third phase for the border districts the value of composite index decline to -0.8845 and that for the non-border districts also decline to 0.9976. It is important to mention that Border districts was placed at this low position mainly due to poor performance with respect to productivity based indicators.

Thus the analysis revealed that the 'border factor' does not seem to have large influence on agriculture development, as evident from the fact that as compared to the first phase, the non-border districts appear to have made exhibits gains in terms of value of agriculture sector indices by the third

phase. In order to achieve optimum resource allocation and productivity gains agriculture sector for both the groups of districts require further development efforts but for the border districts the need is to have these efforts with a redoubled force. Further in place of 'border factor', it is the geographical terrain which appears to be more determining factor behind agriculture development of a district.

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Annexure

Important Measures of Economic Liberalization in Indian Agriculture

Area of Liberalization	Policy Changes and Measures of Implementation
1. External Trade Sector	a. In tune with the WTO regime, since 1997 all Indian product lines placed in GSP. b. In 1998, QRs for 470 agricultural products dsmald. In 1999, further lproducts brought under OGL and canalization of external trade in agriculture almost reversed. c. Average tariffs on agricultural imports reduced from 100 per cent in 1990 to 30 per cent in 1997. d. Though India is in principle against Minimum Common Access, but actually already importing 2 per cent of its food requirements.

2. Internal Market Liberalization

- (i) Seeds
 - a. Since 1991, 100 per cent foreign equity allowed in seed industry.
 - b. More liberalized imports of seeds.
- (ii) Fertilizers
 - a. Gradual reduction of fertilizer subsidies since 1991.
- (iii) Power
 - a. Since 1997, power sector reforms were introduced at the behest of the World Bank in states such as Andhra Pradesh and Power charges increased.
 - b. Power sector opened to the private sector.
- (iv) Irrigation
 - a. Water rates increased in some states.
 - b. Participatory water management was sought to be introduced through water users' associations (WUAs).
- (v) Institutional Credit
 - a. Khursro Committee and Narasimham Committee (1992) undermining the importance of targeted priority sector lending by commercial banks.
 - b. The objectives of regional rural banks' (RRBs) priority to lending to weaker sections in rural areas diluted since 1997.
- (vi) Agricultural Marketing
 - a. Changes in the provisions of the Essential Commodities Act.
 - b. Relaxation of restrictions on the inter-state movement of farm produce.
 - c. Model Agricultural Market Act.
 - d. Encouragement of contract farming.
 - e. Agricultural commodity forward markets.

3. Fiscal Reforms

- a. Fiscal reforms with an emphasis on tax reduction and public expenditure turned to reducing fiscal deficit as priority (gave implications for public investment in agriculture and rural infrastructure).

Source: Acharya (2004) ; Chand (2006); Dorin and Jullian (2004); and Vakulabharanam (2005).