CHANGING PATTERN OF AGRICULTURAL PRODUCTIVITY IN HARYANA

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Abstract:

In the present paper an attempt has been made to find out the spatial and temporal changes of agricultural productivity. Land and Labour, the two major inputs in traditional agriculture are calculated to identify the major agricultural productivity(in rupees per hectares) in the four agro climatic region of Haryana. To explain the variability of agricultural productivity, nine variables viz. rainfall, irrigation, fertilizer use, literacy, number of agricultural worker, population density, land holding size, number of tube-well and pump-sets/ hectares been selected. On the basis of calculated productivity district has been categorized in to four categories i.e. very high, high, medium and low. Result of the foresaid analysis shows that the modern technological inputs have significant positive association with agricultural productivity in the study area.

Key Words: Agriculture, Productivity, Land, Labour, Explanatory Variables.

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Introduction:

Agriculture plays a vital role in economic development of Haryana as it still contributes 16.7% to State GDP and employs 51% of workforce. As total cultivable land is limited, only option left is to go vertical by out scaling farm innovation and by adopting well planned strategy in a "Mission Mode" approach. Agricultural Productivity is a multidimensional concept, which includes technological advancement, effective management of available resources and organizational set-up for the agricultural production. These factors in turn affect the relative production in any region. The term 'Productivity' is regarded as the measurement of production and inputs required for the production of that output is known as agricultural productivity. It is the interplay of a multitude of many factors, such as environmental, socio-economic and technological factors. The decadal analysis of productivity growth of major crops of *kharif* and *rabi* seasons showed considerably high fluctuation. Most of the *kharif* crops showed sharp decline in productivity growth after the decade 1986-96. *Bajra* and pulses showed improvement in growth after 1996-06. Similarly, sharp decline in decadal growth of productivity was also observed in major *rabi* crops after 1986-96 decade. However, it is satisfying that during 2006-12, all the rabi crops including wheat, barley and gram (chickpea) showed increase in decadal growth in productivity whereas there was decline in case of pulses. (Haryana Kishan Ayog Report, 2013).

The identification of productivity pattern and factor generating them can help improve agricultural production if development programs are focused on removing the constraints adversely affecting productivity in potentially good areas. Land and Labour are two major inputs in traditional agriculture. As the expression “productivity efficiency” implies making the best use of all inputs, it is important that productivity be measured in terms of both land labour inputs. The two indexes of productivity used in this study are land (market value of agricultural output per hectares of cropped area) and labour productivity (market value of agricultural output per agricultural worker).

Methodology:

Haryana consists of different agro climatic zones which are conducive for different variety of crops. To facilitate the analysis of data and to make the study more useful in planning and research for agricultural development, Haryana State has been divided into four homogeneous

agro climatic zones which are as under. The administrative division district is considered as an aerial unit to show agricultural productivity and also their changes within the agro climatic zones. :-

Sr. Zone	Districts included
1 Northern	Panchkula, Ambala, Yamunanagar, Kurukshetra,Karnal, Panipat
2. Central	Kaithal, Jind, Sonipat, Rohtak, Jhajjar
3 Western	Bhiwani, Hisar, Fatehabad, Sirsa
4. Southern	Faridabad, Palwal, Gurgaon, Mewat, Rewari, Mahendragarh.

The index of land productivity (Pl) (agricultural productivity per hectares) is defined as the market value of output of 10 crops per unit of area occupied by the crops and is given by the formula. Not that the crop price is used as 'converter' of crop production to put all crops on their uniform scale considering them at their market importance (Singh and Chauhan, 1977). Base year's crop prices are used as constant to observe the changes in physical production of agriculture over time.

Land productivity Formula:

$$Pl = \sum_{i=1}^{n} \left(\frac{OiPi}{Ai}\right)$$

Where

N= number of crops.

Oi= output of crop I in a district

Pi= regional average harvest price of crop i per unit weight

Ai= Aarea occupied by the ith crop in the district

Labour Productivity

The index of labour productivity (Pb) agricultural productivity per worker) is similarly obtained, and is given by the formula.

$$Pb = \sum_{i=1}^{n} \left(\frac{OiPi}{Wi}\right)$$

Where

N= number of crops.

Oi= output of crop I in a district

Pi= regional average harvest price of crop i per unit weight

Wi= is the labour input in agriculture in a district, in terms number of agricultural workers

OBJECTIVES:

To demarcate the agricultural productivity regions and changes there in;

To analyze the explanatory factors responsible for changes in agricultural productivity.

Changing spatial pattern of Land productivity:

Taking into account the crop area, production and prices of 10 principal crops of the state land and labour productivity has been calculated. As given above, agricultural productivity in rupees per hectares of total cropped area has been calculated for each district of all four agro climatic region of the study area for the early 1990s (1990, 91, 92) and early 2010 (2010, 11, 12) to visualize the changing productivity pattern. Calculated productivity values have been grouped into **four** categories for the sake of convenience to show its general pattern.

In 1990-92, the average land productivity was 5237.19 rupees per hectares in the state. It is increased to 6334.96_rupees per hectares in 2010-12. Table 1.1 shows the district wise land productivity in the four agro climatic region of the study area in 2010-12.

Table 1.1 shows that the land productivity had increased in most of the districts in the state. During 1990-92 the **very high category** of land productivity in rupees per hectare had been recorded in the **western** agro climatic region which include the districts Hisar, Sirsa and in Rohtak district of the **central** agro climatic region of the state. Hisar and Sirsa districts had higher land productivity, 9980.24 and 8913.58 rupees per hectares respectively. Kurukshetra district of **eastern agro** climatic region had very high land productivity.

During1990-92, the **high c**ategory confined in the Jind and Kaithal districts of the central agro climatic region and Ambala and Bhiwani districts of the eastern and western agro climatic region of the study area. The districts of eastern agro climatic region are agriculturally developed and

also have costly bashmati rice growing belt of the state which resulted high land productivity in rupees per hectares.

Table 1.1: Land and Labour Productivity change in Haryana: 1990-92 and 2010-12.

State/ Agro climatic region/ District	Land Productivity (in rupees per hectares)		Labor productivity (in rupees per worker)	
	1990-92	2010-12	1990-92	2010-12
Northern Agro Climatic Region				
AMBALA	5871.26	4475.07	9.28	16.09
PANCHKULA	-	3737.01	-	7.74
YAMUNANAGAR	3768.09	4620.64	7.95	13.61
KURUKSHETRA	6546.93	4191.87	15.41	17.6
KARNAL	4056.42	6044.6	13.11	16.32
Northern Agro Climatic Region			-	
KAITHAL	5502.95	8806.77	14.62	19.04
JIND	6087.61	9770.28	11.94	19.23
PANIPAT	4965.43	4653.21	11.46	14.56
SONIPAT	3981.78	4338.34	7.81	13.39
ROHATAK	6689.87	10261.79	9.04	15.79
JHAJJAR	-	8258.36	-	16.99
Northern Agro Climatic Region				
FARIDABAD	4345.04	4397.93	7.27	10.21
PALWAL	-	4499.46	-	13.75
GURGOAN	3933.99	4791.35	8.64	15.56
MEWAT	-	5069.31	-	11.52
REWARI	3527.68	9463.11	14.94	21.83
MEHANDERGARH	3157.18	8461.77	12.93	23.71
Northern Agro Climatic Region			-	
BHIWANI	5559.3	11696.69	15.27	19.58
HISAR	7738.77	9426.42	21.74	24.45
FETAHABAD	-	10285.07	-	29.78
SIRSA	6773.73	11901.13	27.56	40.58
HARYANA	5156.62	7102.39	13.19	19.27

Source: Statistical Abstract Haryana, 1990-92, 2010-12,

During 1990-92, with 5049.42 and 4056.42 rupees per hectare land productivity respectively, Panipat and Karnal districts of **northern agro climatic region** and Sonipat district of **central agro climatic region** with 4089.16 rupees per hectares land productivity had confined in the **medium c**ategory. In the **southern agro climatic region** Faridabad district also existed in this category of land productivity. These districts are well developed network of transport, high extent of irrigation, high degree of mechanization, diffusion of agricultural innovations, fertile soil; availability of sub-soil water, high degree of crop commercialization etc compel the farmers to grow mainly wheat during *Rabi* and rice during *Kharif* season which resulted in medium level of land productivity.

In 1990-92, **low level of category** mainly confined in the **southern agro** climatic region. In the south-eastern part of the southern agro climatic region which comprised the districts Gurgoan, Palwal and Faridabad were also existed in this category.

During 2010-12, appreciably increase has witnessed in all the agro climatic region of the study area. In the category of **very high** land productivity (in rupees per hectares) has mainly confined in **the western** and **south-western** part of the **southern agro climatic region** of the state.

Panipat, Yamunanagar, Ambala and Kurukshetra districts of the eastern agro climatic region have confined in the **moderate** category. Only Panchkula district of the eastern agro climatic region remained in the **low land** productivity category.

Changing spatial pattern of Labour Productivity:

In 1990-92, the average labour productivity was 13.06 output per worker in the state. It is increased to 18.16 output per worker in 2010-12. Table 5.1 shows the district wise labour productivity in the four agro climatic region of the study area in 2010-12.

Table 5.1 depicted spatial pattern of the labour productivity (output per worker) in 1990-92, 2010-12 respectively. It is evident from the figure 5.3 that during 1990-92 the **very high category** of labour productivity in output per worker had been confined in the western agro climatic region which include the districts Sirsa, Hisar and Bhiwani and in Kurukshetra district of the eastern agro climatic region of the state. Sirsa and Hisar districtss had higer land productivity, 27.56 and 21.74 output per worker respectively.

Whereas, **high category** of labour productivity confined in the Kaithal and Karnal districts of **the northern agro climatic** region and Rewari and Mehandergarh districts of the **southern agro climatic region** of the study area.

And the **high category** of labour productivity has been observed in the Kaithal and Karnal districts of the eastern agro climatic region and Rewari and Mehandergarh districts of the southern agro climatic region of the study area. This is because of high land productivity in rupees per hectares in these areas. Whereas, **the medium category** mainly confined in the Panipat and Ambala districts of the eastern agro climatic region and Jind and Rohtak districts of the central agro climatic region of the study area.

In 1990-92, the **low labour** productivity in (output per worker) category mainly confined in the southern agro climatic region which had included the districts Gurgoan, and Faridabad. Yamunanagar and Sonipat district of the eastern and central agro climatic region was also in the **low labour productivity.**

The period from 1990-92 to 2010-12, has witnessed appreciably increase of labour productivity in output per worker in all the agro climatic region of the study area. In the category of **very high** labour productivity output per worker has mainly confined in the **western agro climatic** region which comprised the districts Sirsa and Fatehabad, Hisar and Bhiwani districts of western agro climatic region of the state and Kathail, Karnal, Kurukshetra and Ambala districts of the **eastern agro** climatic region also have very high level of labour productivity. These districts had low population density and large landholdings. In the southern region, districts Mehandergarh and Gurgoan and in the central agro climatic region and districts Jind, Rohtak and Jhajjar also recorded very high level of labour productivity in the state. During post reform period land productivity has increase which has also resulted increase in the labour productivity.

The area under **high category** increased in the state. This category comprised Panipat and Yamunanagar districts of eastern agro climatic region, Sonipat of the central districts of the central agro climatic region, Palwal district of the southern agro climatic region of the study area. During 2010-12, the **medium category** of land productivity with 24.56 and 23.62 labour productivity output per worker has been registered in Mewat and Faridabad districts of southern

agro climatic region. Whereas only in Panchkula district of the eastern agro climatic region of the study area confined in the **low category** of labour productivity.

Explanatory Variables:

Eight explanatory variables depicted various character of districts are used which are selected to represent environment condition, characteristics of agriculture representing level of inputs and technology and social and demographic characteristics.

Table:5.3 Simple Correlation Coefficient of Nine Explanatory Variables.

Sr.	Explanatory Variables	Land Productivity (in rupees per Hectares)	Labour Productivity (in rupees per worker)
1	Rainfall	-0.312	-0.605**
2	Irrigation	0.506*	0.346
3	Rural Literacy	-0.205	-0.469*
4	Fertilizer Use per hectare	0.523*	0.246
5	Average land Holding Size	0.533**	0.570**
6	Number of Tractor	0.497*	0.554**
7	Number of agricultural workers	0.602*	0.483*
8	Tubewell and Pumpset/Hectares	0.169	0.517*
9	Population density	0.155	-0.660
	*. Correlation is significant at the 0.05 level (2-tailed).		
	**. Correlation is significant at the 0.01 level (2-tailed).		

Average land holding, numbers of tractors and number of agricultural workers are strongly associated with both the measures of agricultural productivity, whereas irrigation is positively associates with land productivity measures only, and positively associated with labour productivity but not significantly. Irrigation affects productivity by helping to avoid crop failure, by increasing the yield per hectares, by making possible the cultivation of more lucrative crops, and by allowing multiple cropping. The intensification of cultivation is also accompanied by size of land holdings. Frequent use of land necessitates an increase in the level of inputs, because natural fertility of soil is no longer good enough to satisfy increased demand. One more variables, namely tube well and pumpsets is significant with labour productivity but not with land productivity, whereas one variable, fitilizer use is significantly associated with land

productivity not with labour productivity (table 1.1). Fertilizer use is the most important variable in explaining land productivity.

In general the direction of relationship is as anticipated, with the exception of two variables. Rural literacy, and rainfall are both negatively associated with land and labour productivity respectively, but in both cases the co- efficient are so weak that they are of no analytical significance. Whereas population density is positively but insignificantly correlated with land productivity and negatively correlates with labour productivity. The only notable exception is rainfall, which contrary to expectations, has a significant negative association with both the measures of agricultural productivity.

Conclusion and Suggestion:

There is a vast variation in productivity of crop sector across districts in the state. This clearly calls for a regionally differentiated strategy for future growth and development of agriculture sector in the state. Cross classification of districts according to their productivity levels and other characteristics presented in the study would help to understand the link between productivity and other factors. The analysis highlights important features of those districts that have been stuck in low productivity. High productivity of agriculture takes place under two different situations. In the western agro climatic region, districts Hisar, Sirsa, and Fatehabad, it occurs in association with good irrigation, high level of purchased inputs, relatively larger holdings and low level of density of population.

In the southern part of the central and south western part of the southern agro climatic region it occurs in association with somewhat different conditions, high level of labour inputs, varying level of purchased inputs, small holdings and medium density of population. In the second situation physical environment is not good but the man made environment is more faviorable. The districts that are in very low or low productivity range offer immense opportunities for raising agricultural production. The study provides snapshot view of productivity regimes across whole of the state which can be used effectively to delineate various districts for effective and specific interventions.

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