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AN EMPIRICAL ANALYSIS OF FARM SIZE AND PRODUCTIVITY RELATIONSHIP IN AGRICULTURE IN HARYANA

Economics

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ABSTRACT

Farm size-productivity relationship has been great significance in the Indian context due to its far reaching theoretical and policy implications. The inverse farm size-productivity relationship not only contradicted the well-established view about the economies of large-scale production being available to big farms, but also indicated some sort of advantages of small scale production in traditional agriculture that favor in small farms and they enable get higher output per unit of land cultivated after green revolution. The present study examine the farm size and yield relationship in the case of wheat, rice and cotton crops and decompose the impact of various factors influencing the relationship between farm size and productivity. The result of the present study revealed that positive relationship between farm size and yield per hectare of crops, but coefficient are not significant.

Introduction:-

Farm size-productivity relationship has been great significance in the Indian context due to its far reaching theoretical and policy implications. The inverse farm size-productivity relationship not only contradicted the well-established view about the economies of large-scale production being available to big farms, but also indicated some sort of advantages of small scale production in traditional agriculture that favor in small farms and they enable get higher output per unit of land cultivated after green revolution. But Green Revolution technology was adopted only by the big farms. However, with the passage of time, small farms started adopting the new agriculture technology more than half part of Haryana and farmers (big and small) were using HYV seeds, chemical-fertilizers and tube-wells irrigation to almost the same extent. The impact of the Green Revolution technology on farm size-productivity indicated the inverse relationship. In this regard, most of the economists were of the view that the inverse relation between farm size and productivity prevailed Indian agriculture.

Objectives of the study:-

1. To analyze the farm size and yield relationship in the case of wheat, rice and cotton crops.
2. To decompose the impact of various factors influencing the relationship between farm size and productivity.

RESEARCH METHODOLOGY:- The present study has been used secondary data, which was collected 'Comprehensive scheme for studying the cost of Cultivation of Principal crops' in Haryana in 2014-15. This data is collected at the micro farm level for a random sample of 300 farm households selected from 30 Tehsils of Haryana. The present study has used different statistical and econometric techniques e.g dummy variable, linear, log-linear and semi-log-linear regression models to analyze the relationship between farm size and productivity.

Result and Discussion:-

Farm Size-Productivity Relationship at the State Level:- The data pertaining to the sample farms are tabulated on the basis of farm size groups, i.e., small, medium and large farms (each with a class interval of 2.0 hectares). The study has instead of investigating the farm size-productivity relationship by simple comparison of the mean productivity level among different farm size groups.

Table 1
Mean Productivity of Farm Size in Haryana

Farm Size Group (in hectares)	Mean Productivity		Number of Farms
	Value of output per hectare of Net Area Sown (in Rs.)	Value of output per hectare of Gross cropped area (in Rs.)	
Small Farms (≤ 2.0)	85084.91	43962.37	121
Medium Farms (between 2.0 - 4.0)	87197.03	46587.42	63
Large Farms (> 4.0)	89116.06	47869.20	116
of which, > 4.0-6.0	85301.96	45417.27	57
> 6.0-8.0	91197.44	49628.96	51
> 8.0	103022.70	54120.70	8

Source: Cost of Cultivation 2014-15

The result of the study in table 1 revealed that both value of output per hectare of net area sown as well as value of output per hectare of gross cropped area increase gradually with farm size. On the basis of these results there exist a strong and positive relation between farm size and productivity. The result shows that existence of inverse relationship between farm size and productivity in Haryana agriculture. Further, it also reveals from that the number of small farms size is high in Haryana.

Regression Results of Relationship between Farm Size-Productivity in Haryana:- The study has used the simple linear form and semi log linear form in analyzing the relationship between farm size and productivity.

Table 2:
Regression Results of Relationship between Farm Size-Productivity in Haryana

Eq. No.	Dependent Variable (Productivity in Rs.)	Independent variable (Farm Size in hectares)	Estimated Coefficients		R^2
			Intercept term	Coefficient of farm size	
1	2	3	4	5	6
1	Value of output per hectare of Net area sown	Net Area Sown	82189.4	1394.845** (2.22) {0.027}	0.0163
2	Value of output per hectare of Gross cropped area	Gross Cropped Area	42295.02	568.3388*** (3.45) {0.001}	0.0385
3	log (Value of output per hectare of Net area sown)	Net Area Sown	11.24464	0.0199989** (2.29) {0.023}	0.0173
4	log (Value of output per hectare of Gross cropped area)	Gross Cropped Area	10.58617	0.01475*** (3.38) {0.001}	0.0369

Source: Cost of Cultivation, 2014-15

The results of both these regression models are presented in table 2 shows that coefficient of farm size variable is positive and statistically significant at 5 per cent and 1 per cent level in both the productivity variables respectively, i.e., which are defined as output per hectare of net area sown as well as gross cropped area and farm size variable as net area sown as well as gross cropped area. One may infer from this positive and significant relationship between farm size and productivity that the inverse farm size productivity

relationship has completely disappeared in the most recent period in Haryana. In other words, there are strong evidences of the existence of a positive farm size-productivity relationship in Haryana agriculture. The result shows that there is no existence of an inverse relationship between farm size and productivity in the recent period in Haryana.

Farm Size-Cropping Pattern Relationship:-The study analysis the cropping pattern and farm size relationship in the state. For this net area sown is the independent variable and per cent of gross cropped area under each of the three major crops (wheat, rice and cotton) is the dependent variable.

Table 3
Regression Results of Cropping pattern by Farm Size in Haryana

Eq. No.	Dependent Variable	Independent variable	Estimated Coefficients		R^2	No. of observations
			Intercept term	Coefficient of farm size		
1	%age of wheat area in total cropped area	Net Area Sown	38.94547	0.261162 (0.81) {0.418}	0.0022	295
2	Log (%age of wheat area in total cropped area)	Net Area Sown	3.600269	0.001033 (0.09) {0.925}	0.003	
3	%age of rice area in total cropped area	Net Area Sown	34.29744	-0.233761 (-0.52) {0.603}	0.0018	141
	Log (%age of rice area in total cropped area)	Net Area Sown	3.598936	-0.0262* (-1.74) {0.084}	0.021	
4	%age of cotton area in total cropped area	Net Area Sown	28.67068	-1.197** (-2.43) {0.017}	0.0597	95
	Log (%age of cotton area in total cropped area)	Net Area Sown	3.282191	-0.0583*** (-2.62) {0.01}	0.0688	

Source: Cost of Cultivation, 2014-15

The results in table 3 revealed that coefficients for wheat turn positive and for rice and cotton they are negative of the farm size variable (net area sown). But, coefficients for cotton and rice turn statistically significant. These results are indicative of the fact that the area under wheat growing increase with the farm size. But its coefficients are not significant. However, in case of cotton their coefficients turn out to be negative and significant. This indicates that as the farm size (in term of net sown area) increase the proportion of growing cotton and rice decrease. In other words, the rice and cotton crops are growing high in the small and medium farms. Therefore, important feature of Haryana agriculture is that cropping pattern (particularly for rice and cotton) vary significantly with the farm size.

Regression Result of Farm Size and Crop Yield Relationship in Haryana:-After comparing and testing the differences in the yield of wheat, rice and cotton crops among the small, medium and large farms, the relationship between farm size and crop yield is examined with the help of standard regression analysis.

Table 4
Regression Results of Farm Size- Crop Yield Relationship in Haryana

Eq. No.	Dependent Variable	Estimated Coefficients		R^2	No. of observations
		Intercept term	Coefficient of farm size		
1	Wheat yield	44.41219	0.064 (0.400) {0.691}	0.0005	295
2	Log (wheat yield)	3.774821	0.003 (0.580) {0.562}	0.0012	
3	Rice Yield	38.09627	0.504 (1.030) {0.307}	0.0075	141
4	Log (Rice yield)	3.5619	0.014 (1.130) {0.260}	0.0091	
5	Cotton Yield	21.21901	0.033 (0.070) {0.941}	0.0001	95
6	Log (cotton yield)	2.959345	0.003 (0.130) {0.900}	0.0002	

Source: Cost of Cultivation, 2014-15

The result in table 4 has observed that coefficient of farm size variable (i.e., net area sown) are positive, though not statistically significant even at 10 per cent level. However, some of the t-values are greater than one, this result does allude to a weak positive relationship between farm size and three crops yield per hectare. When the log form of the dependent variable (i.e., for all the three crops) is used, then almost similar results were obtained. On the basis of these results it may be appropriate to say that in the case of wheat, rice and cotton yield the advantage seems to have in favour of big farms in the post-Green revolution period (i.e., in the recent period) in Haryana.

Conclusion:- The forgoing analysis indicated that value of output per hectare of net area sown as well as value of output per hectare of gross cropped area increase gradually with farm size shows the strong and positive relation between farm size and productivity. The results indicate that farm size and crop yields (i.e., wheat yield, rice yield and cotton yield) are not inversely related in the recent period in Haryana agriculture. The small farms do not get higher wheat, rice and cotton yield per hectare compared to the medium and large farms. Out of the three major crops considered in the present study, in the case of cotton the results show a positive farm size yield relationship. It means, the large farms were having an edge over the smaller ones, in terms of cotton yield per hectare. Although cotton is not a Green revolution crop, but the amount of modern inputs and technical knowledge are needed for successful cultivation of cotton. It is possible owing to this reason that the large farms seem to have an edge and are able to get higher yield per hectare in this crop compared to the small farms. To sum up, it may be said that a positive relationship between farm size and yield per hectare is indicated by the results in all the three crops, but coefficient are not significant. In other words, one can s says that these results indicate that the small farms have lost their edge over the large farms, so far as the yield per hectare of wheat, rice and cotton are concerned. Thus there is need to analyse the farm size and productivity relationship.

Reference:-

1. Battacharya , N. and G.R. Saini (1972) "Farm size and productivity – A fresh look", Economic and Political Weekly, June 24, 1972, pp.63-72.
2. Ghosh, M(1986) "Farm Size – Productivity Nexus under Alternative Techniques", Indian Journal of Agricultural Economics, Vol.41, No.1, 1986 pp.17-27.
3. Ministry of Agriculture, Government of India (2014-15) 'Comprehensive Scheme for studying the Cost of Cultivation of Principal Crops.
4. Rao, Hanumantha C.H(1966) "Alternative explanations of the inverse relationship between farm size and output per acre in India", India Economic Review, Vol. I, 1966, pp.1-12.
5. Singh, R and Patel,R.K(1973) "Returns to Scale, Farm Size and Productivity in Meerut district", India Journal of Agriculture Economics, April – June. 1973. Pp. 43-49.
6. Toufique, K. A(1998) "The Relationship between Farm Size and Productivity in Bangladesh Agriculture: The Role of Transaction Cost in Rural Labour Market",
7. Bangladesh Institute of Development Studies, 1998, pp.55-71