RESEARCH ARTICLE

IMPACT OF SIZE OF HOLDING ON PRODUCTIVITY OF BALLIA DISTRICT OF UTTAR PRADESH

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ABSTRACT

In this study, impact of size of holding on productivity of Ballia district. The primary data were collected from Ballia district through personal interview methods by using a pre-tested schedules and questionnaire. Multi stage stratified random sampling technique was used to select the block, the villages and cultivars. Nawanagar Block was taken purposively on the criterion of higher population pressure on land. Finally 100 respondents were selected randomly for study purpose and the study showed that the small and marginal operational area increase day by day to large operation area from increasing population and the changed family system from joint to nuclear families in rural India, not increase in land because it is limited resources. To make full use of the available human labour on small farm size, low investment on big equipment. This study area showed that gross return was more on small and medium farm size of respondent as comprises to large size farm and also found cropping intensity was same situation on small and medium size of farm by choosing crop such as vegetables, oilseeds and pulses produces by small and marginal farm size which helps in improves the economic standard of the selected farmers.

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INTRODUCTION

Agriculture continues to hold the place of pride in our economy since time immemorial. It is well known that farming is the major portion of occupation and which is supporting to 54.60 per cent of the population work forced for their livelihood and about 14.4 per cent of Gross National Product is derived from agricultural sector to our developing national economy (Anonymous 2013). Due to the rapid increase in population, our country family system has been changed from joint families to nuclear families in rural –urban society as consequents occurrences of sub-division and fragmentation of land holdings and ending situation. India has made the size of holdings smaller and smaller. An operation holding is a techno-economic land unit used wholly or partially for agricultural production. The small and marginal farmers account for nearly 83.3 per cent of the total operational holdings in the country, cultivating about 44 per cent of the total area (Anonymous 2012). Thus, the numerically strong but economically weaker section of the rural community is having an average operational holding of about 1.41 hectares. This group is mainly embroiled in the vicious cycle of low savings and low investments and low returns.

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Besides this, the major problems of this group are surplus family labour, both under-nutrition and malnutrition and the possession of un-economic size of farm holdings, which keep these people below the poverty line. The average size of land holding has been continuously decreasing an account of increasing number of land holdings From an average of 1.41 hectares in 1995-96, to the average holding size of semi marginal, marginal and small farmers are only 0.26,0.72 and 1.31 ha .it went down to 1.15 hectares in 2010-11. After reviewing measurement issues and data quality matters, this paper looks at the relationship between farm size and productivity. Macroeconomists have tended to look at the aggregate level, noting large cross-country differences in average farm size (Adamopoulos and Restuccia, 2014, 2018). The district Ballia has a total reported area 299265 ha. out of which 215498 ha,(72%) is net sown area,42989 ha.(14.36%) under land utilized other than agriculture, 22419 ha.(7.49%) current and other fallow,1248 ha.(0.4%) cultivable waste land and 5792 ha.(1.94%) only under orchard, tree and shrubs with least forest land. The land under cultivable waste land , current and other fallow, Usar and uncultivable lands contributes about 13.58 per cent of total reported area is task for KVK to brings land under cultivation. The productivity of this area is also affected adversely due to floods needs attention. The large area of the district is under wheat followed by Paddy, Lentil, Potato, pigeon, Chick pea, Field pea, Sugarcane and Maize.

Very limited area is covered under Oil seeds and Zaid Urd and Moong. The cropping intensity of the district is only 160.6 percent needs attention to increase. The district has also very good scope for goat, Poultry, sheep and pig forming looking of their population. The potential of fish forming has also can take a good income source due to large water bodies / ponds / river Ganga, Ghagara, Tounce and other small tributaries existing in the district. This is backward district of Uttar Pradesh; it is economically and socially poor. His main occupation is agriculture.

DATA AND METHODOLOGY

The primary data for the study were collected from Ballia district eastern region of Uttar Pradesh. A survey of farmers was conducted through personal interview technique using a pre-tested schedules, questionnaire was adopted of relevant information from heads of household. For selecting the household three stages stratified random sampling technique was used during present study to select the block, the villages and cultivars or households. A list of the 17 block of Ballia district was prepared arranged in ascending order of area under production holding size. Nawanagar Block was taken purposively on the criterion of higher pressure of people on land. Finally 100 respondent were selected randomly from fives selected villages namely Koth, Sikiya, Mahro, Isar and Mudera for the study purpose and total number of the sample farms were equally distributed on the farms size i.e. 50 on small farm groups (0 to 2 ha) 30 medium farms group(2 to 4 ha) and 20 on large farms group(more than 4 ha.) Secondary data was collected from the Government records, newspapers, magazines, journals etc. the present study is pertaining to the Agricultural year July 1, 2016- to June 30 2017.

Regression Analysis

To study the effect of various in depend variable on the output various forms of production function have been dealt. The C D production was best suitable to the data and was used for measuring the resources use efficiency .The mathematical form of production function is as fallow.

(A) The function $y = a. x_1^{b1}. x_2^{b2}. x_3^{b3}. x_4^{b4}. cu$
Where,
Y = Gross value of farm product(output) per hectare (Rs.) ,
factor $x_1, x_2, x_{3 \text{ AND } X4}$ represented the explanatory variable

X_1=Fertilizer
X_2= irrigations
X_3= seed
X_4= labour

b_1, b_2, b_3 and b_4 are elasticity of explanatory variables on resultant a is an intercept.

(B) Multiple regression models

$C = a + b_1 v_1 + b_2 v_2 + b_3 v_3 + b_4 v_4$

Where,
C =   represents resultant factor
a =   represent   intercepts v_1, v_2, v_3, v_4 represent explanatory variables
b_1, b_2, b_3, b_4 represent coefficient of multiple regressions

RESULTS AND DISCUSSION

 Ballia district, the eastern part of the state of Uttar Pradesh is situated in central portion of the Ganges basin. The geographical extent of the district lies between latitude from 25°23" to 26°11" north and at longitudes from 83°38" to 84°39" east with elevation of about 27 to 115 meter above the sea level. The mean annual rainfall ranges from 950 to 1150 mm. The district Ballia has a total reported area 299265 ha. Hence agriculture is the predominant occupation of the people here. Cereals such as paddy, Wheat and maize are grown in the arable areas of this region, while sugarcane is grown in the river belt of Ganga. Other cereals oil crop, leguminous crop such as lentil, Mustard, pigeon peas, beans and chickpeas are grown as a rotational crop in the area. The pattern of cropping is a picture of allocation of cultivable land resource on different crop enterprises. It presents the importance of different crop in cropping scheme on one and the intensity of resources use on the other. In the present context the pattern of cropping was examined on three size group of farms that is small, medium and large.

 The table 1 Presents that paddy in kharif and wheat in rabi are the two importance crop which have occupied the place of crop centrality having more than 27 per cent area under crop on all farm size groups. Potato seems to be the next importance crop grown on small farms having about 8.32 per cent and barley is in medium farms having about 8.67 per cent area under crop on respective farms. Whereas the next best crop on small farms 6.65 per cent barley, 4.43 per cent vegetable, 4.20 per cent maize, 3.56 per cent gram, 2.45 per cent mustard, 2.20 per cent pea, 2.18 per cent sugarcane and 8.45 per cent other crops. In case of medium farms in the same situation was observed where 4.87 per cent potato, 4.39 per cent gram, 3.24 per cent maize, 3.22 per cent pea, 3.20 per cent sugarcane, 2.70 per cent mustard, 2.59 per cent other crops respectively.As for as the cropping pattern fallowed by the large sample farm is concerned. It has also exhibited the same trend like small and medium sample farms,Wheat again considered as a main crop covering 33.45 per cent of total cropped area fallowed by rice 31.18, Barley 8.24, Sugarcane 5.74, Maize 4.04, Gram 3.29, Potato 3.14 per cent of total cropped area. The area covered by mustard, vegetable and pea were 2.99, 1.21, 1.01 and other crops 5.71 per cent of total cropped area respectively. Analysis of the cropping pattern followed by all categories of the sample farms in study area shows that wheat was first rank crop covering a maximum area 32.71 per cent in overall average area of cropping pattern.

 Productivity is a measure of the relationship between the area and output in physical terms. The relative efficiency of different farms group is commonly known as yield. Productivity on sample farms presented in the table 2 It is clear from that the table that in food crops , average productivity shows small groups of farms of paddy crop is 63.51 quintal per hectare and wheat crop occupied 33.56 quintal per hectare which is found highest productivity as comprises medium and large groups of farmers. But in case potato vegetables and sugar crops productivity was found higher as 184.80, 388.18 and 528.83 quintal per hectare respectively. With an overall average 116.00 quintals per hectare. Productivity of paddy crop and wheat crop in case of medium size groups and large size groups, medium size groups have paddy crop 63.42 quintal per hectare and wheat crop 33.23 quintal per hectare,

Table 1. Cropping pattern on different size groups

Crops	Small groups		Medium groups		Large groups	
	Area in ha.	Percentage of total cropped area	Area in ha.	Percentage of total cropped area	Area in ha.	Percentage of total cropped area
Paddy	26.10	27.37	28.45	30.16	32.16	31.18
Wheat	29.07	29.44	32.23	34.16	34.50	33.45
Gram	3.56	3.73	4.15	4.39	3.40	3.29
Pea	2.10	2.20	3.04	3.22	1.05	1.01
Barley	6.34	6.65	8.18	8.67	8.50	8.24
Potato	7.93	8.32	4.60	4.87	3.23	3.14
Sugarcane	2.08	2.18	3.02	3.20	5.9	5.74
Vegetable	4.22	4.43	2.45	2.59	1.25	1.21
Mustard	2.45	2.57	2.55	2.70	3.08	2.99
Maize	4.20	4.40	3.06	3.24	4.17	4.04
Other	8.45	8.87	2.60	2.80	5.88	5.71
Total	95.34	100.00	94.33	100.00	103.13	100.00

Source- Field Survey (A case study)

Table 2. Productivity on sample farms

Crops	Small	Medium	Large	Total Average Productivity / crop
	Productivity/hect. in quintal	Productivity/hect. In quintal	Productivity/hect. in quintal	
Paddy	65.93	63.42	61.20	63.51
Wheat	35.34	33.23	32.11	33.56
Gram	14.52	16.23	13.42	14.72
Maize	12.69	11.01	10.73	11.48
Pea	9.24	8.10	7.85	8.40
Potato	208.56	178.32	167.53	184.80
Barley	14.30	15.24	15.03	14.85
Sugarcane	454.10	536.65	595.75	528.83
Vegetable	478.94	395.76	289.84	388.18
Mustard	10.64	11.32	11.93	11.29
Other	21.04	14.82	13.52	16.46
Total Average Productivity	120.48	116.73	110.81	116.00

Table 3. Cropping intensity on sample farms

Size of farms ha.	No. of sample farms	Net area ha.	Gross cropped area	Cropping intensity %
0-2	50	59.241	95.34	160.93
2-4	30	64.25	94.33	146.81
4 and above	20	79.510	103.13	129.70

Table 4. Gross income on sample farms

Size in ha.	No. of families	Total gross income (in Rs.)	Gross income per ha. (in Rs.)	Average of per farm gross income (in Rs.)
0-2	50	16629046.00	174418.37	332580.92
2-4	30	12893076.00	136680.56	429769.20
4 and above	20	13981748.00	135574.20	699087.40
All farms	100	43503870.00	446673.13	1461437.52
Average of all farms size		14501290.00	148891.05	487145.84.00

Source- Field Survey (A case study)

Table 5. Production elasticity of different size of holding on the sample farms in study area

Size of farms	Manure Fertilizers X_1	Irrigations X_2	Seeds X_3	Human Labours X_4	Sum of elasticity's return to scale	R^2
Small	0.160961**	0.215971**	0.102416**	0.174201**		
	(0.93885)	(0.02972)	(0.79613)	(0.05981)	0.653549	0.717
Medium	0.205995**	0.306661*	0.107915*	0.308745*		
	(0.96275)	(0.98435)	(0.85867)	(0.75480)	0.929316	0.835
Large	0.243290**	0.206394**	0.239342**	0.182241*		
	(0.45376)	(0.97332)	(0.83987)	(0.89828)	0.871267	0.952

(Figures in parenthesis indicates standard errors of respective variables) ** 1% level of significance. * 0.5 % level of significance.

large groups have paddy crop 61.20 quintal per hectare and wheat crop 32.11 quintal per hectare. Productivity of small groups of farms followed by gram, maize, pea, potato, barley, sugarcane, vegetable, mustard and other crop is 14.52, 12.69, 9.24, 208.56, 14.30, 454.10, 478.94, 10.64 and 21.04 quintal per hectare respectively. From the table seen that in case of medium groups of farms productivity followed by gram, maize, pea, potato, barley, sugarcane, vegetable, mustard and other crop is 16.23, 11.01, 8.101, 178.32, 15.32, 15.24, 536.65, 395.76, 11.32, and 14.82 quintal per hectare. And last, case of large size of farms productivity followed by gram, pea, potato, barley, sugarcane, vegetable, mustard, and other crops is 13.42, 10.73, 7.85, 167.53, 15.03, 595.75, 289.84, 11.93 and 13.52 quintal per hectare respectively. Crop intensity is a major source of productivity increase. It may be concluded from the table that small size farmers were grown maximum crops in a cropping year by choosing crop such as vegetables, oilseeds and pulses produces as compare to other group size of farmers. It is clear from the table 3 Cropping intensity on small sample size group(0-2 hectare) is 160.93 per cent, medium size group (2-4 hectare) the cropping intensity is observed 146.81 per cent and large size group is(4 hectare and above) 129.70 per respectively.

Gross crops income of different size group in study area
Value of gross income of produce of sample farms given in table 4 Per farm average gross income is varies from farm to farm. In case of small size farms gross income was more due to high cropping intensity in small size of holding which are covered by vegetables, oil seeds and others crops during the agriculture year. Small size holding respondent was full use of family labour where large size farms depend on machine and hired labour which are very costly and agriculture is main occupation of the small size holding. The Cobb-Douglas production function was applied to find out the efficiency of various resources used in the production on different size of holding. The value of elasticity of production, standard error, co-efficient of multiple determination and return to scale for size of holding on different size group of farms are presented in table 5 The high value of R^2 of the fitted function indicated that sufficient and large proportion of the total variation in the dependent variable is explained by the included input in the function.

The table further raveled that four independent variable viz., manure fertilizer, irrigation, seeds and human labour, jointly explained 71.70, 83.50 and 95.20 per cent variation of the dependent variable on small, medium and large farm respectively.It is also cleared from the table that the manure & fertilizers (X_1) was statistically significant at 1 per cent level of probability in all size group of farms where as irrigation (X_2) was found statistically significant at 0.5 per cent level of probability in medium and large size group of farms where as in small farm group irrigation was observed 1 per cent of level of significant. As for as seed (X_3) as a importance input is concerned it was found statistically significant at 1 per cent level of probability in case of small and large size groups and 0.5 per cent in medium category of farms, while human labour (X_4) as basic important factor of production was also statistically significant at 1 per cent probability level in case of small size group of farms and statistically significant at 0.5 per cent probability level in case of medium and large size group of farms. Return to scale on small, medium and large farms were found 0.6535, 0.9293 and 0.8712 respectively.

It is therefore concluded that production on size of holding is characterized by decreasing return to scale on each farm situation viz., small, medium and large farms; It is therefore, inferred that increasing all the factors by 1 per cent simultaneously results in increase of the returns by less than 1 per cent on each farm situation and increasing of all size group of family members the holding is observed in decreasing situation of par family members.

Conclusion

The present study analyzes the impact of size of holding on productivity in Ballia district. The study showed that from the observation that small and medium farmers are more productive per hectare and large size of farms less productive compare to small, medium size farms. From study evidence that crop intensity remained the highest in small size holding (by choosing crop such as vegetables, oilseeds and pulses) and declined with an increase in farm size holding. Comparisons of crop cuts with farmer reports suggest that small farmers may systematically over-report yield and production. Small size holding was maximum use of manure and fertilizers and minimum losses in harvesting time where more loss in harvesting time on large size farms. The conclusion that land ceiling leads to higher outputs on the large scale, decreases in the yield gap (compare with Bhalla and Roy, 1988).

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