

Relationship of Farm-Size, Productivity and Profitability in Major Crops in Bhopal District

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Abstract: This paper explores the relationship between farm size, productivity and profitability in major crops in Bhopal District. The study is based on primary- data (2021-22), the study established the empirical evidence that there was no significant difference among size group in case of productivity in most of the crops. Due to high cost of cultivation and dependency on hired farm machinery the marginal and small farmers was founded significantly low profitable in most crops. As the small and marginal farmers used more labours as compared to other farmers they used their own family members as labours because they cannot afford. They receive less profitability because they are not aware from the Government Schemes. Large farmers use less labours by using new technological machines, used for sowing, cultivation and for irrigation purposes.

Keywords: farm-size, Productivity, Profitability, crops, Bhopal District.

INTRODUCTION

Agriculture is the main occupation for rural people it is well established fact that there is widespread variation in the level of agricultural development and overall economic development between different parts of the country Singh *et.al.*(2013), Singh and Kaur, 2018, Singh *et.al.* (2020). The Madhya Pradesh State had some noteworthy progress in agriculture front Gulati *et.al.* (2017); Singh *et.al.*(2018); Singh *et.al.* (2019). Arindam Banik (1994) there is either a positive or negative significant relationship between land productivity and farm size he used two important factors disguise unemployment and unequal distribution of factor markets.

Usha Rani (1971) There seems much lose in the agricultural development even small farmers receive more profit over large farmers in labour intensive techniques, but on the other hand large farmers receive more profit in terms of capital intensive technique.

Atanu Sengupta *et.al* (1997) the inverse relationship between farm size and productivity is more in agricultural developed regions than less

developed regions. Assuncao J. Juliano et.al (2003) if there is a given level of income the skill full peasants are more likely to became farmers than that of unskill full peasants. Ramesh Chand et.al (2011) high yield variety seeds is the main source of increasing agricultural productivity, crop intensity is the main source of growth in agriculture. Small farmers are superior in production process but they are inadequate in generating income and sustaining livelihood. Rao (1989) argued that small farmers not only put more labour cost per unit but also used more labour intensively and explained the difference in productivity due to over use of family labour and the qualitative difference in the means of labour. Shen Cheng et.al (2018), by examining the relationship between farm size and productivity first we determine the factor inputs by increasing the inputs it will lead to increasing production. Jagdeep Singh et.al (2020), by examining the relationship between farm size and productivity in Soyabean cultivation, it was found that use of animal, seeds and irrigation machines had a significant negative relation with productivity.

Sharma and Banoo (2020) exploring the growth performance of agriculture the reason for the increase in area under these crops is the availability of support price, reduced risk of yield. The relationship between farm size and productivity is exploring by everyone but no one explores the relationship between farm size, productivity and profitability. The relationship between farm size, productivity and profitability is a long process debate it had become a subject of controversy among the economists. So the present study is trying to establish the relationship between farm size, productivity and profitability in major crops in Bhopal District no doubt the State performed the outstanding growth performance, in agriculture during the last two decades. But taking small farmers in consideration we must take keen attention, everyone exploring the relationship between farm-size and productivity but no one exploring the relationship between farm-size, productivity and profitability. So the present study is trying to establish the relationship between farm-size, productivity and profitability so the present study is trying to establish the relationship between farm-size, productivity and profitability in major crops in Bhopal District.

Bhopal- District which is capital of Madhya Pradesh the State performed the outstanding growth performance in agriculture during the last two decades but taking small farmers in consideration we must took keen attention towards small farmers someone beautifully said that small is beautiful which is based on empirical observation that small farmers play an important role in removing poverty because of their old practices they produce more but receive less profitability. In some crops the marginal

and small farmers gain more profitability while in others receive less profitability than large farmers because of high cost of cultivation they are not able to buy new machines, equipments from the market so that not only their productivity should be increased but their profitability should also be increased if they are not exploited by intermediates and other market retailers. Small farmers need positive material and policy support by the Government by providing modern technology, information and knowledge for better skills and extended credit so that their productivity should be increased the small farmers face number of problems and challenges if small farmers are to have a viable future, there is need for a concerted effort by the Government and private sector enabling economic environment for their development.

DATA AND METHODOLOGY

The present study is based on primary data collected during the period of (2021-2022) in Madhya Pradesh of Bhopal District. The data collected for both inputs and output for the agriculture production. Farm size group wise average yield, value of output, cost of cultivation and profitability among different crops had been taken. Testing the relationship between farm-size, productivity and profitability among different crops. Analysis of mean difference has been calculated between different crops among land holding size groups by using Honestly Significance Difference test. A sufficiently large sample was taken 300 farmers by using stratified random sampling simple and relevant statistic technique has been used in order to draw authentic results.

RESULTS AND DISCUSSION

The difference of production technology creates the difference in productivity of the same piece of land. The responsiveness to adoption of new technology was observed significantly different among land holding size. As a result of labour intensive technology, small and marginal farmers

Table 1: Farm-Size and productivity (yield in Kg/ ha) among different crops

Size-Group	Cotton	Gram	Maize	Masur	Paddy	R and M	Soyabean	Urad	Wheat
Marginal	1573	1403	3464	1000	1908	1878	1276	687	3815
Small	1675	1199	3581	1260	2599	1200	1279	625	4075
Semi medium	1782	1186	2031	1075	2750	1631	1320	677	4129
Medium	1798	1309	2235	1109	2155	1771	1301	765	4000
Large	1938	1386	2657	1159	2410	1872	1339	747	4057
All	1796	1310	2629	1134	2423	1778	1312	722	4029

Source: Estimated base on primary survey data, collecting during 2021-22.

having low productivity in agricultural advanced regions. However, in initial stage of agricultural development, labour intensive technology performing better than the capital intensive.

Table 1 shows average yield and productivity among different crops. It is clear from the table that medium and large farmers show more yield of cotton as compared to other farmers. Yield of cotton among marginal and large farmers is more as compared to other farmers. While yield of maize among marginal and small farmers is more as compared to other farmers, Yield of masur among small and large farmers is more as compared to other farmers. Yield of paddy among small and semi medium farmers is more as compared to other farmers. Yield of rape seed and mustard among marginal and large farmers is more as compared to other farmers. Yield of soyabean among large and semi medium farmers is more as compared to other farmers, yield of urad among medium and large farmers is more as compared to other farmers. Yield of wheat among small and semi medium farmers is more as compared to other farmers.

Table 2: Farm- size and value of output (in Rs/ha) among different crops.

Size- Group	Cotton	Gram	Maize	Masur	Paddy	Rand M	Soyabean	Urad	Wheat
Marginal	86937	56337	52264	34353	50549	64895	38274	22877	76357
Small	92751	48951	53958	46424	58932	41700	38324	20512	82123
Semi medium	99054	46426	32501	40703	50040	56543	39583	21760	84011
Medium	99739	50001	35114	41953	48895	61942	39161	25606	80041
Large	108205	56900	40964	43403	43999	65780	40293	24243	813791
All	99838	52294	40644	42338	48291	62151	39441	23680	81008

Source: Estimated base on primary survey data, collecting during 2021-22.

Table 2 shows farm size and value of output among different crops. It is clear from the table that medium and large farmers show increase in value of output of cotton as compared to other farmers. In Gram value of output among marginal and large farmers is more as compared to other farmers. The value of output of maize among marginal and small farmers is more as compared to other farmers, in masur value of output among small and large farmers is more as compared to other farmers. Value of output of paddy among marginal and small farmers is more as compared to other farmers, in Rape seed and mustard value of output among large and marginal farmers is more as compared to other farmers. In soyabean medium and large farmers had more value of output as compared to other land holding size groups. Value of output in urad among medium and large farmers is more as compared to other farmers. In wheat value of output among semi medium and large farmers is more as compared to other farmers.

Table 3: Farm size and cost of cultivation (in Rs/ha) among different crops.

Size Group	Cotton	Gram	Maize	Masur	Paddy	R & M	Soyabean	Urad	Wheat
Marginal	36222	31511	44236	23835	32295	30098	26795	22280	35162
Small	41726	30440	29589	26661	36271	30477	27343	21707	34393
Semi medium	52504	27573	24974	21023	30197	28475	27956	20282	33816
Medium	40467	26089	24516	19392	32818	26770	25232	20395	30317
Large	47682	25644	27592	19756	26907	26772	24091	19786	28784
All	44337	27087	28042	20858	30150	27461	25756	20525	31564

Source: Estimated base on primary survey data, collecting during 2021-22.

Table 3 shows farm size and cost of cultivation among different crops it is clear from the table that cost of cultivation of cotton among semi medium and large farmers is more as compared to other farmers. In Gram cost of cultivation among marginal and small farmers is more as compared to other farmers. Cost of cultivation of maize among marginal and small farmers is more as compared to other land holding size groups. Cost of cultivation of masur among marginal and small farmers is more as compared to other farmers. In paddy cost of cultivation among marginal and small farmers is more as compared to other farmers. Cost of cultivation of Rapeseed and mustard among marginal and small farmers is more as compared to other farmers. Cost of cultivation of soyabean among small and semi medium farmers is more as compared to other farmers. In urad cost of cultivation among marginal and small farmers is more as compared to other farmers. Cost of cultivation of wheat among marginal and small farmers is more as compared to other farmers.

Table 4: Farm- size and profitability (Rs/ha) in different crops.

Size- Group	Cotton	Gram	Maize	Masur	Paddy	R & M	Soyabean	Urad	Wheat
Marginal	36536	8898	4181	8463	10975	11817	5864	-1409	25686
Small	75463	17050	21360	17750	13438	11223	15689	1536	56368
Semi-medium	130362	27927	12475	25259	31761	35204	19060	4078	72612
Medium	156279	40821	20038	25441	32161	62297	30057	9278	90622
Large	219509	62440	45237	40687	32752	66373	37391	9512	105975
All	146508	41541	26281	29520	29121	53468	26391	6440	79988

Source: Estimated base on primary survey data, collecting during 2021-22.

Table 4 shows farm- Size and profitability in different crops it is clear from the table that semi medium, medium and large farmers show increase in profitability of cotton. In gram cultivation profitability of medium and large farmers is more as compared to other farmers. In cultivation of maize small and large farmers show more profitability as compared to other land

Table 5: Farm-Size and Productivity (Rs/ hectare) testing- results:

Land Holding Size	Cotton	Gram	Maize	Masur	Paddy	R & M	Soyabean	Urad	wheat
Marginal- Small	-5815	7386	-1694	-12071	-8384	23195	-50.3	2365	-5766
Marginal- Semi- medium	-12117**	9911	19763	-6350	508	8352	-1309.4	1117	-7655
Marginal-medium	-12802**	6336	17151	-7600	1653	2953	-887.1	-2729	-3685
Marginal-Large	-21269**	-563	11300	-9050	6550	-885	-2019.6	-1366	-5022
Small-Semi- medium	-6303	2525	21457***	5721	8892	-14843	-1259.1	-1248	-188
Small-Medium	-6987	-1050	18845***	4471	10037	-20242***	-836.8	-5095	2082
Small- Large	-15454	-7949	12994	3021	14933	-24080***	-1969.2	-3731	744
Semi- medium- medium	-685	-3575	-2612	-1250	1145	-5399	422.3	-3846	3970
Semi-medium- Large	-9151	-10474	-8463	-2700	6041	-9237**	-710.1	-2483	2633
Medium- large	-8467	-6899	-5851	-1450	4896	-3838	-1132.4	1363	-1338
No. of observations	14	149	23	27	48	47	359	116	383
F Statistics	16.38***	1.81	4.28***	2.2	1.82	4.56***	0.78	1.05	1.97*

Source: Estimated base on primary survey data, collecting during 2021-22.

Note: Difference of two mean estimated through Tukey (HSD) method, *, **, *** shows the significance at 10, 5, and 1 percent level of significance.

Table 6: Farm –Size and Cost of cultivation (Rs./ha) in different crops

Size- Group	Cotton	Gram	Maize	Masur	Paddy	R and M	Soyabean	Urad	Wheat
Marginal-Small	-5504	1070.1	14647	-2826	-3976	-379	-547.8	574	768.9
Marginal-Semi- medium	-16282	3937.9**	19263	2812	2098	1623	-1161.2	1998	1345.9
Marginal-Medium	-4245	54216***	19720**	4443	-523	3328	1563.4	1885	4844.8***
Marginal-Large	-11460**	5866.2***	16644**	4079**	5388	3326	2704.1**	2494	6378.2***
Small-Semi-Medium	-10778	2867.9	4615	5638	6073	2001	-613.4	1425	577.0
Small-Medium	1259	4351.5**	5072	7268**	3452	3707	2111.2***	1312	4076.0***
Small-Large	-5956	4796.1**	1996	6905**	9364	3704	3251.9***	1921	5609.3***
Semi-Medium- Medium	12037	1483.7	457	1631	-2621	1706	2724.6***	-113	3499.0***
Semi-Medium-Large	4822	1928.2	-2619	1267	3290	1703	3865.3	496	5032.4***
Medium-Large	-7215	444.6	-3076	-364	5911	-3	1140.7	609	1533.4
No. of observations	14	149	23	27	48	47	359	116	383
F Statistics	16.38***	11.30***	2.78**	4.27***	0.98	0.97	6.01***	0.65	13.23***

Source: Estimated base on primary survey data, collecting during 2021-22.

Note: Difference of two mean estimated through Tukey (HSD) method, *, **, *** shows the significance at 10, 5, and 1 percent level of significance.

holding size groups. Semi medium and large farmers show increase in profitability of masur. In cultivation of paddy medium and large farmers show increase in profitability. Medium and large farmers show increase in profitability of Rape seed and mustard, in cultivation of soyabean medium and large farmers show increase in profitability as compared to other land holding size groups. In cultivation of urad medium and large farmers show increase in profitability as compared to other farmers. Medium and large farmers show increase in profitability of wheat as compared to other land holding size groups.

Testing the relationship between farm-size, productivity and profitability among different crops:

By testing the relationship between farm- size, productivity and profitability among different crops, the mean difference of productivity, cost of cultivation and profitability has been estimated.

The table 5 shows the farm- size and productivity testing results. Farm-size and productivity testing results show that significance difference between marginal and semi medium farmers is more in cotton, as compared to marginal and small farmers and is significant at 5% level of significance. Also marginal and medium farmers show more significant difference as compared to other farmers and is significant at 5% level of significance. Marginal and large farmers show more significant difference in cotton as compared to other farmers and is significant at 5% level of significance. In Rapeseed and mustard semi- medium and large farmers show significance difference at 5% level of significance.

Table 6 shows farm-size and cost of cultivation in different crops across farm- size it is clear from the table that marginal and large farmers are significant in cotton cultivation at 5% level of significance as compared to other farmers. Analysis of mean difference in cost of cultivation of gram shows that marginal and semi medium farmers are significant at 5% level of significance. Small and medium farmers show more significant difference in cost of cultivation of gram and is significant at 5% level of significance. In maize marginal and medium farmers show more significant difference in cost of cultivation and is significant at 5% level of significance. Marginal and large farmers show more significant difference in cost of cultivation and is significant at 5% level of significance. In cultivation of masur small and medium farmers show more significant difference in cost of cultivation and is significant at 5% level of significance. Small and large farmers show significant difference at 5% level of significance. In soyabean cultivation marginal and large farmers show more significant difference as compared to other farmers and are significant at 5% level of significance. In cultivation

Table 7: Farm-Size and profitability (Rs/hectare) testing results

Land- Holding Size	Cotton	Gram	Maize	Masur	Paddy	R and M	Soyabean	Urad	Wheat
Marginal- Small	-38927	-8152	-17179	-9287	-2462	594	-9825	-2944	-30682***
Marginal-Semi-medium	-93826	-19030	-8295	-16796	-20786	-23386	-13196***	-5486	-46927***
Marginal- medium	-119743**	-31923	-15857	-16978	-21186	-50480**	-24193**	-10687**	-64937***
Marginal- large	-182973**	-53542***	-41056**	-32224***	-21777	-54556**	-31527**	-10921**	-80289***
Small- Semi- medium	-54899	-10877	8884	-7509	-18323	-23980	-3371	-2542	-16245
Small- Medium	-80816	-23771	1322	-7691	-18724	-51073	-14368***	-7742	-34255***
Small- Large	-144046**	-45390***	-23877	-22937***	-19315	-55150	-21702***	-7977	-49607***
Semi- Medium-Medium	-25917	-12894	-7562	-182	-401	-27093**	-10997***	-5200	-18010***
Semi- Medium- Large	-89147	-34512***	-32762	-15428*	-991	-31170**	-18331***	-5435	-33362***
Medium- Large	-63230	-21619***	-25199	-15246	-591	-4076	-7334***	-235	-15352***
No. of observations	14	149	23	27	48	47	359	116	383
F Statistics	10.96***	10.88***	2.02*	2.94**	1.39	11.01***	28.60***	268**	42.78***

Source: Estimated base on primary survey data, collecting during 2021-22.

Note: Difference of two mean estimated through Tukey (HSD) method, *, **, *** shows the significance at 10, 5, and 1 percent level of significance.

of urad there is significant difference between all land holding size groups but shows no level of significance. In cultivation of wheat maximum number of land holding groups show 1% level of significance.

The farm-size and profitability testing results show that significant difference for profitability of cotton among marginal and medium farmers is more as compared to marginal and semi medium farmers and is significant at 5 percent level of significance. Marginal and large farmers show more significant difference for profitability of cotton and is significant at 1 percent level of significance. Small and large farmers show more significant difference and is significant at 5 percent level of significance. In rape seed and mustard marginal and medium farmers show more significant difference and is significant at 5 percent level of significance. In soyabean marginal and medium farmers show more significant difference at 5 percent level of significance. Marginal and large farmers also show more significance difference at 5 percent level of significance. In urad marginal and medium farmers show significant difference at 5 percent level of significance, marginal and large farmers show significant difference at 5 percent level of significance.

CONCLUSION

Thus, we conclude that relationship between farm size and productivity is positive but the relationship between farm size and profitability is negative. Marginal and small farmers produce more than semi- medium, medium and large farmers, but their cost of cultivation is more, profitability is less than that of semi- medium, medium and large farmers. Small is beautiful which is based on empirical observation that small farmers play an important role in poverty elevation, marginal and small farmers produce more than semi- medium, medium and large farmers, but their cost of cultivation is more, profitability is less than that of semi- medium, medium and large farmers. Small farmers are not aware about the government policies they exploited by large retailers, they produce more but they receive less profit they are not provided all facilities by the Government so that their production of crops reach quickly to the market, Govt. should take such steps for marginal, small farmers so that their profitability must be increased, there should be availability of transport, communication and organizing such programs and melas so that not only productivity should be increased but profitability should also be increased.

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