Viability of Small and Marginal Farmers and its Determinants: A Comparative Analysis of Karnataka and Punjab

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Abstract

The present study has identified various factors in influencing the viability of small and marginal farmers in Punjab and Karnataka. By using multi-stage random sampling technique, a total 120 small and marginal farmers, 60 each from two study states was taken for the analysis. The reference period of the study is 2017-18. The farmers were grouped into viable and non-viable classes based on the economic surplus left with them and the factors influencing viability were identified through applying the linear discriminant function. It has been found that the proportion of viable farmers in Punjab was relatively higher than to that in Karnataka. While in Karnataka, only off-farm income and family size were observed to be the important factors in determining the viability, in Punjab along with these the farm size, income from dairy and the domestic expenditure on non-food items were also the significant factors responsible for viability of small and marginal farmers. Therefore, on the policy front, in both states all efforts should be made to create income supplementing off-farm employment opportunities near the rural areas. In Punjab, besides emphasizing on judicious use of farm inputs which will help in raising farm profitability, the farmers need to curtail their domestic expenditure on non-food items.

Keywords: Small and marginal farmers, economic viability, determinants, viability

JEL Classification: D31, E21, E22

Introduction

India is an agriculture based economy with the majority of working population in the country still being engaged in agriculture and related activities directly or indirectly. Besides providing livelihood for farmers, agricultural labourers and other people involved in agriculture related activities, it also addresses the food security of the nation. Agriculture sector accounts for 15.87 per cent of India's Gross Value Added (GVA) at current prices and employs more than 50 per cent of the total workforce (GoI 2018a). Thus, the progress in the agriculture plays a strategic role in the development of country's economy. In India, there is a decline in the average size of operational land holding, indicating enormous pressure of the population on the finite land resource which is accessible for cultivation. As per the Agricultural Census, the average size of operational land holdings came down to 1.08 ha in 2015-16 from 1.15

ha in 2010-11. As a result of it, the landholdings in the marginal category increased by about seven million and the small categories by about one million during the same period. In 2015-16 the landholdings of marginal category (less than 1 ha) and small category (1 ha to 2 ha) accounted for 68.5 per cent and 17.7 per cent of the operational holdings in the country, respectively. The share of marginal holdings in terms of area operated has increased to 24.1 per cent in 2015-16 from 22.5 per cent in 2010-11. During the same period, the share of small farm holdings has increased to 23.2 per cent from 22.1 per cent in terms of operated area. Therefore, Indian agriculture is dominated by small and marginal farmers as they collectively account for 86.2 per cent of the total number of operational holdings and the area operated by them constitute 47.3 per cent of the total cultivated area in the country (GoI 2018b).

Punjab is well-known for its agricultural performance. Punjab state accounting for only 1.54

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per cent of the total geographical area of the country is the largest contributor towards the central pool of food grains. As per the agricultural census of 2015-16, out of 10.93 lakh total holdings in the state, the number of marginal and small holdings was 1.54 lakh (14.13 %) and 2.07 lakh (18.98%) respectively. The marginal and small farm holdings respectively account for only 2.36 per cent and 7.33 per cent of total operated area in the state. On the other hand, Karnataka is one of the largest states in India with a geographical area of 1.92 lakh square km accounting for 6.3 per cent of the geographical area of the country. Agriculture stays as the principal activity and the key source of livelihood for the rural population in the Karnataka. Over 56 per cent of the state population depends on agriculture for their livelihood. A majority of these are marginal and small farmers comprising 54.9 per cent and 25.51 per cent of total operational holdings with respective share in total operated area in state at 17.61 per cent and 26.33 per cent (GoI 2018b). The small and marginal farmers of Punjab and Karnataka play a vital role in the progress of agricultural economy in both the states. But, these sections of farmers face economic hardships due to poor resource position, which causes unemployment, under employment and poverty (Saikia and Goswami 1992). The small and marginal farmers are trapped in the vicious cycle of low saving, even dis-saving, low investments, low returns, etc. (Pandey and Kaushal 1980). In this background it is very important to have the knowledge of relative viability of the vulnerable section of agricultural households falling in these different socio-geographical regions.Thus, the present study was undertaken to analyze the economic viability and its determinants on small and marginal farms in two states *viz.,* Punjab and Karnataka.

Data Sources and Methodology

Multi-stage random sampling technique was used to draw the representative sample for the study. At the first stage, two districts namely Moga and Tumakuru were selected randomly from Punjab and Karnataka, respectively. At the second stage, two blocks were selected randomly from each of the selected districts of two states. At third stage, two villages again were selected randomly from each such block. From each selected village, 15 small and marginal farmers were selected randomly. Thus, a total 120 small and marginal farmers, 60 each from two study states form the ultimate sample of the study. The primary data was collected

from the selected farmers through personal interview method on the variables relating to the farm and non-farm income and expenditure. The sample farmers were categorized into two groups on the basis of economic surplus left with the farm family after deducting the domestic expenditure from the disposable income of the farm family. The farmers who have the sufficient income to meet the domestic requirements of their families were considered as viable farmers and those farmers who do not have the sufficient income to fulfill the domestic expenditure of their families were categorized as non-viable farmers.

The factors responsible for viability and non-viability of farmers were identified by applying the discriminant function analysis. With the discriminant function, it is possible to measure the net effect of the variable in differentiating two groups by holding the other variables constant. The linear discriminant function employed to know the relative importance of different variables in discriminating between viable and non-viable group of farmers is of following form:

Let X_{ij} variables (j = 1 to p variables) in two groups, with N_1 observations in first group and N_2 observations in the second group and the total number of observations be N ($N_1 + N_2$).

The mean of the jth variable in the first group is given by

$$\overline{X}_{ij}^1 = \sum_{i=1}^{N1} X_{ij}^1 / N_1$$

Where,

i = 1 to N_1 observations

j = 1 to P variables

The mean of the jth variable in the second group is given by

$$\overline{X}_{ij}^2 = \sum_{i=N1+1}^{N2} X_{ij}^2 / N_2 \qquad \text{N}$$

Where,

i = N_{1+1} to N_2 observations

j = 1 to P variables

The mean differences of the jth variable between two groups are given as;

$$D_1 = \overline{X}_{i1}^1 - \overline{X}_{i1}^2 \text{ where, } j = 1 \text{ to p variables}$$

$$D_2 = \overline{X}_{i2}^1 - \overline{X}_{i2}^2$$

$$D_P = \overline{X}_{ip}^1 - \overline{X}_{ip}^2$$

The estimated discriminant function can be represented as

$$\hat{Z} = L_1 X_1 + L_2 X_2 + \dots + L_p X_p$$

Where,

$\widehat{Z}$ = Discriminant scores for viable and non-viable small and marginal farms

L_j = Linear discriminant coefficients of the variables (X_j) estimated from the data (j = 1, 2 ... p)

Mahalnobis D^2 (Radha and Chowdry 2005) statistics was used to find out the contribution of each factor to the discriminating distance between the two groups.

$$D^2 = L_1D_1 + L_2D_2 + L_3D_3 + \ldots\ldots + L_pD_p$$

Where,

L_j = Linear discriminant coefficient

D_j = Difference in the means of variables between viable and non-viable farms

P = Number of variables

Contribution of variable (X_i=X_1, X_2, X_3,.....X_p) was worked out by multiplying the L_jD_j by 100 and dividing by D^2 value. The significance of D^2 value was tested by calculating the F value using the formula;

$$F = \frac{N1N2\,(N1 + N2 - P - 1)D2}{P(N1 + N2)\,(N1 + N2 - 2)}$$

F values follows the degrees of freedom (d.f.) at P and ($N_1 + N_2 - P - 1$). If calculated F value is greater than the table F value, then D^2 is significant, otherwise it is non-significant.

The variables included in discriminant function were based on the magnitude of the absolute value of D in descending order.

Variables tested to arrive at final discriminant function analysis were as under follows;

X_1 = Family size (numbers)

X_2 = Farm size (hectares)

X_3 = Education (years)

X_4 = Domestic expenditure on food items (Rs)

X_5 = Domestic expenditure on non-food items (Rs)

X_6 = Variable expenditure on crops (Rs)

X_7 = Variable expenditure on dairy (Rs)

X_8 = Off-farm income (Rs)

X_9 = Farm business income from crop (Rs)

X_{10} = Farm business income from dairy (Rs)

X_{11} = Farm investment (Rs/farm)

X_{12} = Dairy investment (Rs/farm)

X_{13} = Household investment (Rs/household)

In order to find out the contribution of different variables which were significantly discriminating the two groups of farms, step-wise discriminant function analysis was carried out by deleting the least discriminating factor step by step. In this way, nine variables were finally selected for discriminant function analysis.

Results and Discussion

Viability of Small and Marginal Farmers

The farm family income is comprised of the income earned by the farmer from both the farm and non-farm sources. Economic surplus of respondent farmers was derived by subtracting all the farm and domestic expenses from the farm family income. The farmers were classified into viable and non-viable groups based on the economic surplus left with them. The farmers who had positive economic surplus were grouped as viable farmers, whereas those having negative economic surplus were grouped as non-viable farmers and the average economic surplus of marginal and small farmers in Punjab and Karnataka has been presented in Table 1.

In Punjab, the sample farmers had relatively higher economic surplus at Rs 29726.56 as compared to that of Karnataka with Rs 24301.68. Though, farmers in Punjab have significantly higher per annum average income than Karnataka, there was not much difference in the economic surplus of farmers in the two states, reason being comparatively higher farm and non-farm expenditure in Punjab. Category-wise, in Punjab, the average economic surplus of marginal and small farmers was almost same, whereas in Karnataka, the small farmers were having significantly higher economic surplus at Rs 29337.35 as compared to their marginal counterparts with Rs 19265.96. In Punjab, crop sector accounted for nearly half (49.59%) of the total income followed by dairy (31.46%) and off-farm income sources (18.95%). Contrarily, in Karnataka, the off-farm sources accounted for the highest share (53.58%) in the total income of farmers followed by crops source and dairy (29.37%) and dairy (17.05%). The domestic expenditure constituted the major part of total expenditure of farmers and it accounted for 60.50 per cent and 52.74 per cent in Karnataka and Punjab, respectively.

Table 2 shows the proportion of viable and non-viable farmers under marginal and small categories in Karnataka and Punjab. In Karnataka, the proportion of

Table 1. Income, expenditure and economic surplus of marginal and small farmers, 2017-18 (Rs/annum/household)

Particulars	Karnataka			Punjab		
	Marginal	**Small**	**Overall**	**Marginal**	**Small**	**Overall**
Income						
Crops	37626.83 (22.84)	79552.33 (33.96)	58589.58 (29.37)	120426.69 (39.04)	278085.02 (56.15)	199255.85 (49.59)
Dairy	27937.73 (16.96)	40099.64 (17.12)	34018.69 (17.05)	88972.416 (28.85)	163854.288 (33.09)	126413.35 (31.46)
Off-farm	99200.00 (60.21)	114600.00 (48.92)	106900.0 (53.58)	99033.33 (32.11)	53300.00 (10.76)	76166.66 (18.95)
Overall	164764.56 (100)	234251.97 (100)	199508.3 (100)	308432.43 (100)	495239.31 (100)	401835.87 (100)
Expenditure						
Crops	29043.78 (19.96)	64897.65 (31.67)	46970.72 (26.81)	58369.09 (20.92)	141175.39 (30.34)	99772.24 (26.81)
Dairy	19205.39 (13.20)	25277.20 (12.34)	22241.30 (12.69)	56496.64 (20.25)	95678.25 (20.57)	76087.45 (20.45)
Domestic	97249.43 (66.84)	114739.77 (55.99)	105994.60 (60.50)	164111.37 (58.83)	228387.80 (49.09)	196249.62 (52.74)
Overall	145498.60 (100)	204914.62 (100)	175206.62 (100)	278977.10 (100)	465241.44 (100)	372109.31 (100)
Economic surplus						
Overall	19265.96	29337.35	24301.68	29455.33	29997.87	29726.56

Note: Figures in the parentheses are percentages of total

viable farmers was relatively low at 46.67 per cent of the total sample households, whereas the other 53.33 per cent were observed to be non-viable. On the other hand, in Punjab, the proportion of viable farmers was relatively more accounting for 61.67 per cent of the total farmers as compared to that of non-viable farmers being 38.33 per cent. In Karnataka, the proportion of viable farmers was relatively higher among small farm category accounting 53.33 per cent of total small farmers, whereas only 40 per cent marginal farmers were found to be viable. In comparison, the proportion of viable small and marginal farmers in Punjab was relatively higher accounting 76.67 per cent and 46.67 per cent of the total farmers in the respective categories.

Factors Affecting Viability

The shares (L_jD_j) of individual factors in total distance (D^2) revealing their respective contribution in discriminating the viable and non-viable farms in Karnataka is presented in Table 3. The estimated Mahalnobis Distance (D^2) between viable and non-

viable farms on the basis of various factors came out to be 3.32 and it was observed to be significant at 1 per cent level of significance.

The off-farm income and family size came out to be the significant factors in discriminating the viable and non-viable farms. These factors contributed 88.55 per cent and 1.49 per cent, respectively to the total discriminating distance between viable and non-viable farms. The average off-farm income on viable farms was observed to be significantly higher by Rs 171616.07. Similarly, the family size was higher by 0.78 on viable farms as compared to that on non-viable farms.

The relative contribution of different factors (L_jD_j) to the total discriminating distance between viable and non-viable farms in Punjab is depicted in Table 4. The estimated D^2 at 2.8173 was observed to be significant at 1 per cent level of significance. The results revealed that farm-size, domestic expenditure on non-food items, off-farm income, farm business income from dairy, family size, and farm business income from crops were the major factors in discriminating the viable

Table 2. Distribution of marginal and small farmers into viable and non-viable classes on the basis of overall economic surplus, 2017-18 (Number)

Particulars	Karnataka			Punjab		
	Marginal	Small	Overall	Marginal	Small	Overall
Viable	12 (40.00)	16 (53.33)	28 (46.67)	14 (46.67)	23 (76.67)	37 (61.67)
Non-viable	18 (60.00)	14 (46.67)	32 (53.33)	16 (53.33)	7 (23.33)	23 (38.33)
Total	30 (100)	30 (100)	60 (100)	30 (100)	30 (100)	60 (100)

Note: Figures in the parentheses are percentages of total

Table 3. Particulars of discriminant function on marginal and small farms of Karnataka

Particulars	Mean difference (D_j)	Discriminant coefficient (L_j)	Discriminating distance $(L_j)(D_j)$	% contribution to the total distance
Family size (Number)	0.78	0.06358677***	0.0494	1.49
Farm size (Ha)	0.10	2.98545273	0.2989	9.00
Domestic expenditure on food-items (Rs)	5562.42	0.00000667	0.0371	1.12
Domestic expenditure on non-food items (Rs)	-9289.91	-0.00002407	0.2236	6.73
Variable expenditure on crops (Rs)	2803.52	-0.00005456	-0.1530	-4.61
Variable expenditure on dairy (Rs)	4358.93	0.00000176	0.0077	0.23
Off-farm income (Rs)	171616.07	0.00001713*	2.9397	88.55
Farm business income from crop (Rs)	-4448.89	0.00002820	-0.1254	-3.78
Farm business income from dairy (Rs)	4762.18	0.00000881	0.0420	1.26
Total			3.3199 (D^2)	100.00

*, ** and *** indicates level of significance at 1%, 5% and 10% respectively

and non-viable farms. These factors contributed 52.47 per cent, 37.12 per cent, 16.11 per cent, 15.08 per cent, 3.19 per cent, and -14.57 per cent to the total discriminating distance between viable and non-viable farms, respectively. Thus, in Punjab the higher family size and the domestic expenditure on non-food items contributed significantly in making the farm households non-viable. On the other hand, the larger farm size, off-farm income, farm business income from crops and the farm business income from dairy helped the farm household in achieving the viability.

Conclusion and Policy Implications

It can be concluded from the study that the proportion of viable farmers in Punjab was relatively higher as compared to that in Karnataka. In Karnataka,

the off-farm income and family size came out to be the significant factors in discriminating the viable and non-viable farms. Whereas in Punjab, farm-size, domestic expenditure on non-food items, off-farm income, farm business income from dairy, family size, and farm business income from crops were the significant factors in discriminating the viable and non-viable group of farmers.

The off-farm income has emerged as a major source for supplementing the income of marginal and small farmers in both the states. Its potential should be further exploited to raise the level of economic surplus of marginal and small farmers in Punjab and Karnataka. For this, off-farm employment opportunities should be created in the rural areas which may help the farmers to raise their total incomes significantly and, thus, make

Table 4. Particulars of discriminant function on marginal and small farms of Punjab

Particulars	Mean difference (D$_j$)	Discriminant coefficient (L$_j$)	Discriminating distance (L$_j$)(D$_j$)	% contribution to the total distance
Family size (Number)	-1.47	-0.06128815**	0.0899	3.19
Farm size (Ha)	0.33	4.51202764**	1.4781	52.47
Domestic expenditure on food-items (Rs)	-13405.94	0.00000630	-0.0844	-3.00
Domestic expenditure on non-food items (Rs)	-69252.67	-0.00001510*	1.0457	37.12
Variable expenditure on crops (Rs)	22913.66	-0.00001534	-0.3515	-12.48
Variable expenditure on dairy (Rs)	-17708.78	-0.00000967	0.1713	6.08
Off-farm income (Rs)	61821.39	0.00000734***	0.4538	16.11
Farm business income from crop (Rs)	43824.48	-0.00000936*	-0.4103	-14.57
Farm business income from dairy (Rs)	39171.07	0.00001084**	0.4248	15.08
Total			2.8173 (D^2)	100.00

*, ** and *** indicates level of significance at 1%, 5% and 10% respectively

them viable. Dairying being the major agricultural allied activity needs to be promoted as in both of the states it contributes in a major way towards the farm incomes. As farm size is one of the important determinants of viability in Punjab, there is need to have some policy interventions in liberalizing the land leasing market, the only way this group of farmers can increase the size of operational holdings. Farm business income being important determinant of viability in Punjab state, rational use of farm inputs will increase the farm profitability and thus, help in raising the viability status of small and marginal farmers. This calls for strengthening of the existing agricultural extension services to sensitize the farmers regarding judicious use of farm resources. Domestic expenditure has been found to exceed the disposable income, turning the economic surplus towards the negative on marginal and small farms. Therefore, the farmers should rationalize their domestic expenditure pattern and should avail additional income earning opportunities from off-farm activities to meet the farm and family needs.

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