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A Micro Level Study on Resource Use Efficiency of Small Farms

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ABSTRACT

The production patterns in small farms reflect their resource structure. In this study, an attempt is made to assess the resource levels of the small farms and their use efficiency. Certain measures at the macro level are indicated, which while augmenting for increased farm incomes contribute for aggregate out put.

INTRODUCTION

Small farmers have come to occupy a pivotal status in the Indian agrarian structure. Though numerically they constitute, according to 1971 census, 60 per cent (44 million) of the farming community, they are economically in the lower rungs of the income due to inadequate employment opportunities, low resource base and institutional imperfections. The low living conditions of this vulnerable section of population received recognition only recently culminating in action programmes to help them to raise themselves by their own efforts.

A number of special public works programme like SFDA, MFAL and CSRE designed to uplift the weaker sections came to be implemented during the Fourth Plan and are to be intensified in the Fifth Plan. These programmes can be operationally successful, only when they are specifically related to the resource availability and socio-economic conditions of the small farmers under given ecosystem. In the present study an attempt is made to identify the existing situation in respect of resource structure and use-pattern of land, labour and capital as obtaining in small farms of Karamadai Block of Coimbatore District.

MATERIALS AND METHODS

The study was conducted in five villages of Karamadai Block of Coimbatore district. The sample size consisted of 75 small farmers selected at random from five villages with probability proportion to the number of small farmers. For the purpose of the study, a small farmer is defined as one who cultivates 3 to 4·5 acres of garden land or its equivalent. For the purposes, as specified in Madras Cultivating Tenant (Payment of Fair Rent) Act, 1956, two acres of dry land are equated with one acre garden land. The period of study was 1972–'73. The Cobb-Douglas type of production function was fitted to examine the resource-use efficiency.

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RESULTS AND DISCUSSION

I. RESOURCE BASE

i. Farm size and irrigation: The average size of a small farm holding excluding area under buildings, wells, thrashing floor and other structures was 3·81 acres, of which the operational area i. e., area actually under cultivation was 2·84 acres. The villagewise position was as in Table 1.

TABLE 1. Villagewise holding sizes

(Unit in acres)

Name of Village (1)	No. of farms (2)	Average size of farm (3)	Actual cultivated area (4)	Area remained fallow* (5)	Percentage of Col. (5) to Col. (3) (6)
Marudur	18	3.78	2.41	1.37	36.24
Karamadai	19	3.91	3.03	0.88	22.51
T. K. Patty	16	3.82	3.18	0.61	16.75
Belladhi	11	3.61	2.75	0.86	23.82
C. K. Dasampalayam	11	3.84	2.81	1.03	26.82
Aggregate average		3.81	2.84	0.96	25.20

* Primarily due to lack of irrigation facilities

Though the area which remained fallow in each of the village seemed small, in terms of their relationship with the total farm area, it accounted for a significant proportion. Failure of timely rainfall, inadequacy and complete absence of irrigation facilities were reported to be the main reasons for allowing 25·20 per cent of these lands to remain fallow. This area was classified under current fallows in village records. But on enquiry, it was observed that invariably this area though ploughed once or twice, remained unseeded successively for two years due to failure of rainfall. Kaseem (1969) in his enquiry into the problem of small farmers also found that percentage of land remaining uncultivated due to lack of irrigation in small farms was 23·31.

Farm sizes by themselves remaining were extremely limited and small farmers could not put them to full use due to poor irrigation base. This was one of the major barriers for efficient use of the limited land available. There were 72 open wells of which 54 were of varying depths ranging from 40 to 60 feet and remaining were over 80 feet. The average size of an open wel was 60′ × 40′. On an average, the area commanded by a well during rainy months was three to four acres and it dropped to two acres or even less in summer. The condition became more serious, when rains fail as it happened in the past two years, resulting in sharp reduction in area irrigated to one acre and even less. Another feature noted on the farms was the joint ownership of irrigation sources. The details are presented in Table 2. All the 72 wells were fitted with power lifting appliances. Fifty five of the 72 wells were jointly owned by two or more farmers, of which 29 were shared by four and more members.

TABLE 2. Pattern of ownership of wells and irrigation facilities

Particulars	Single ownership	Two ownership	Three ownership	Four ownership	Five ownership	Six ownership	Without wells
Observed number	17	13	13	19	5	5	3
Percentage	23	17	17	25	7	7	4

The proposition of multiple ownership is a consequence of the size of the small farms and poor capital base. In practice, it was observed that, due to interpersonal differences over allocation decisions the joint ownership of wells limited freedom of farmers for making rational decisions on crop pattern which rendered the farm enterprise uneconomical.

The use of land and water resources is measured sometimes by an index of cropping intensity. The degree of crop intensities and the crop mix, among other things, decide the farm business income and profit levels. The villagewise information on crop intensity are given in Table 3.

TABLE 3. Cropping intensity

(Unit in acres)

Name of Village	Gross area sown	Net area sown	Percentage of cropping intensity
Marudur	88.19	68.07	130
Karamadai	108.43	74.29	146
T. K. Patty	103.81	61.14	170
Belladhi	67.72	39.73	171
C. K. Dasampalayam	56.30	42.20	133
Average	56.59	38.05	150

The inter-village variations were mainly due to favourable irrigation situation permitting high crop intensities in Belladhi and T. K. Patty and a crop pattern designed for better resource-use and high level of employment. Normally, a two crop sequence of cholam and cotton or a three crop sequence of cholam, cumbu and tobacco were followed. Ragi substitutes cumbu in case of better irrigation facilities.

II. Labour : (a) *Human Labour :* The average size of the family of a small farmer was 4.1. All the adult members invariably contributed their labour to all farming activities and substituted hired labour to the extent possible. However, peak season operations demanded employment of hired labour and the proportional sharing between family labour and hired labour being dependent on the nature of crop

and the type of operations. Per farm and per acre labour use was as in Table 4.

Large share of family labour is the characteristic feature of small farms. Of the 70 man day units used per acre, on an average, 27 units come from farm families. The labour used per acre was sufficiently high in Belladhi due to high crop intensity with observed propensities to grow labour intensive crops like cotton and tobacco. C. K. Dasampalayam is located near a Municipal Town, Mettupalayam and out of 11 farms, seven farms had taken to cultivation of jasmine flower which commanded a good market. Flower picking is a skilled operation, demanding more labour and hence labour used was found to be more in this village.

(b) *Bullock Labour:* Small farmers depended exclusively upon bullocks for motive power required for ploughing, transport and miscellaneous farm activities. Out of 75 sample farms, 57 had their own bullocks. High investments, rising maintenance costs of cattle and sub-optimal sizes of farms did not permit owning bullock pairs in other cases. The bullock labour used was, on the average, seven pair days per acre. Hence they preferred to hire during cultivation seasons and or obtained on *gratis* from neighbouring farmers for transport of farm produce. The maintenance costs accounted for Rs. 3.13 per day but, when computed for working day, the same works out to Rs. 54.33 which indicates the degree of under utilisation of this resource or, by implication, inadequate size of farms to maintain a pair of bullocks optimally. Agarwal (1950) stated that the handicap to small holdings was the heavy incidence of bullock maintenance expenditure. These observations, made two decades back, holds good even now indicating their near stagnation.

III. Capital (a) *Fixed Investment:* Investment per acre on fixed assets amounted to over Rs. 10,000 in all the cases, of which the share of land alone exceeded 65 per cent. In general land is an inherited property and appreciates in value consistant with the other investments contributing for production capabilities. Creating irrigation potential is the one single major factor, deciding both the land value and the investment on buildings, livestock and deadstock items and, in the final analysis, the farm business income and returns. The structure of investment was as in Table 5. The setting up of a small farm on an average required an investment of over Rs. 40,000 in the study area.

II. FUNCTIONAL ANALYSIS:

The productivity of resource was estimated through the Cobb-Douglas function. The results were as follows:

$$Y = 2.66713 x_1^{0.25941**} x_2^{0.25448**} \underset{(0.05916)}{} \underset{(0.04381)}{}$$
$$-0.40843** x_4^{0.16816*}$$
$$\underset{(0.07155)}{} \underset{(0.06693)}{}$$
$$x_5^{0.06366} x_6^{0.00758}$$
$$\underset{(0.05253)}{} \underset{(0.02489)}{}$$
$$x_7^{0.09891**}$$
$$\underset{(0.02627)}{}$$

$$R^2 = 0.91291, \quad \sum_{i}^{7} b_i = 0.44377$$

where,

Y gross crop income in rupees,

TABLE 4. Labour used in man days

(Per farm and per acre)

Name of village	Average farm area	Average size of farm household	Family labour		Hired labour		Total human labour	
			Per farm	Per acre	Per farm	Per acre	Per farm	Per acre
Marudur	3.78	4.05	117	31	147	39	264	70
Karamadai	3.91	4.22	98	25	133	34	231	59
T. K. Patty	3.82	4.62	111	29	153	40	264	69
Belladhi	3.61	4.09	97	27	199	55	296	82
C. K. Dasampalayam	3.84	3.52	88	23	180	47	268	70
Average	3.79	4.10	102	27	163	43	265	70

TABLE 5. Capital investment

(Rupees)

Name of Village	Land		Building		Wells & irrigation structures		Live stock		Dead stock		Total	
	Per farm	Per acre	Per farm	Per acre	Per farm	Per acre	Per farm	Per acre	Per farm	Per acre	Per farm	Per acre
Marudur	25004	6615 (64.3)	5645	1493 (14.5)	5806	1536 (14.9)	970	257 (2.5)	1444	382 (3.8)	38869	10289 (100.0)
Karamadai	27681	7080 (67.8)	6115	1564 (14.9)	5058	1294 (12.3)	876	224 (2.3)	1106	283 (2.7)	40836	10445 (100.0)
T. K. Patty	29913	7831 (66.1)	6319	1654 (13.9)	6509	1704 (14.5)	1074	281 (2.3)	1428	374 (3.2)	45243	11884 (100.0)
Belladhi	26789	7421 (63.1)	6095	1688 (14.3)	6836	1894 (16.2)	1105	306 (2.6)	1648	457 (3.8)	42473	11766 (100.0)
C. K. Dasampalayam	29032	7560 (66.9)	5308	1382 (12.3)	6591	1716 (15.1)	900	234 (2.2)	1551	404 (3.5)	43377	11296 (100.0)
Average	27684	7301 (65.6)	5896	1556 (14.0)	6160	1629 (14.6)	985	260 (2.3)	1435	380 (3.5)	42159	11126 (100.0)

Figures in parentheses indicate the relative shares expressed as percentages

X_1 value of family labour in rupees (man, women and juvenile labour converted into man day units, market rate for adult labour is computed),

X_2 value of hired labour in rupees (hired labour includes permanent labour and casual labour); in case of permanent labour the monetary value for kind payments was worked out at market price of the produces,

X_3 value of bullock labour in rupees excluding the human labour,

X_4 value of manures and fertilizers excluding incidentals in transport and spreading,

X_5 value of machine labour such as hire charges of power sprayer, threshing machine and electricity charges paid for lifting water for irrigation,

X_6 cost of plant protection chemicals,

X_7 cropping intensity in percentage,

a constant, b_i—elasticities of production.

To estimate the resource efficiency of small farmers, crop income alone was considered since inclusion of off-farm and non-farm income would not have relevance to the variables considered.

The coefficient of multiple determination was 0.91 implying that 91 per cent of the variation in gross income could be explained in terms of variations in independent variables. Elasticities of the variables indicated that family labour (x_1), hired labour (x_2). manures and fertilizers (x_4) and crop intensity (x_7) were positive and gross incomes, but at diminishing rate, while the variable bullock labour (x_8) showed decreasing returns. The regression coefficient of bullock labour was not only highly significant but also with negative sign. Generally, one could infer that because of diminishing returns evident in respect of the variable, one would be better off if the use of the variable could be reduced. However, this cannot happen in the present case as the bullock labour used in physical units, is seven pair days per acre and is somewhat minimal and any further reduction will result in inadequate land preparation and other farm work. The significant issue seems to be, as the variable expressed in value terms, high maintenance cost and considerable degree of excess capacity. If this is agreed, it follows that cost of maintenance of bullock pairs has to be reduced considerably, either through reduction in feeds or through putting bullock pairs for greater use. The former is constrained by limited complementary resources of farms while the latter is limited by availability of opportunities. The third alternative is not maintaining of bullocks at all which may, in an aggregate sense, worsen its supply levels and affect timely operations. Thus, the problem gets complicated and solution becomes situation specific. Investment on development of irrigation resources and multiple cropping may perhaps minimize this problem.

The sum of elasticities indicates the returns to scale. In the present analysis a diminishing return to scale was evident particularly due to use of bullock labour; one per cent increase in all the factors would result in an increase of only 0.4 per cent in gross income.

AVERAGE AND MARGINAL VALUE PRODUCTS

Average and marginal products were worked out at mean level and the same are presented in Table 6.

The factors machine labour and plant protection were observed to be not significant in increasing gross crop income of the farms. Average value products in respect of family labour, hired labour, bullock labour, manures and fertilizers and cropping intensity were Rs. 16.18, Rs. 13.05, Rs. 16.77, Rs. 12.63 and Rs. 45.95 respectively. Cropping intensity had the highest value and paradoxically manures and fertilizers showed the least value. Therefore, the marginal value product would be a better indicator of relative efficiency of factors used. Marginal value product of family labour, hired human labour, bullock labour, manures and fertilizers and cropping intensity were respectively Rs. 4.20, Rs. 3.32, Rs. 6.85, Rs. 2.12 and Rs. 4.54.

TABLE 6. Average and marginal value product

	Mean level	AVP	MVP
Gross crop income Y	6420.00		
Family labour X_1	396.58	16.18	4.20
Hired labour X_2	491.80	13.05	3.32
Bullock labour X_3	382.68	16.77	6.85
Manures and fertilizers X_4	508.09	12.63	2.12
Machine labour X_5	261.28	..	..
Plant protection $_6$	100.20	..	..
Cropping intensity X_7	139.70	45.95	4.54

Cropping intensity has the largest marginal value product of Rs. 4.54. It means that an increase in cropping intensity by one per cent, under the existing resource levels, would increase gross crop income of the farms by Rs. 4.54 at mean level which seems to be not much. Similarly, an addition of a rupee worth family labour, hired labour, and manures and fertilizers would add to the gross crop income over the mean value of Rs. 6420.00 per farm, respectively by Rs. 4.20, Rs. 3.32 and Rs. 2.12. Bullock labour gives a negative marginal return and therefore the use of bullock labour must be reduced as far as to make the marginal product equal to zero. Since bullock labour is measured in its rupee worth, a rupee worth of bullock labour must be avoided at the mean level of Rs. 382.68 to avoid a negative return by about Rs. 6.85. Next, application of a rupee worth of fertilizers adds only

to Rs. 2.12 to the mean income of Rs. 6420.00, per farm. Even though the marginal value product is still positive, it is so small that further increase in application of fertilizers must rest on relative factor - product prices. Significant factors in increasing crop income are human labour and cropping intensity which in turn reflects the availability of irrigation. Therefore, scope for increasing income of the farm lies in better use of human labour and irrigation facilities.

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