FACTOR-PRODUCT RELATIONSHIP AND FAMILY LABOUR EMPLOYMENT IN SMALL COCONUT GARDENS OF MAIDAN TRACT, KARNATAKA

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ABSTRACT

The resource use and their allocative efficiency as well as the factors which emerged as the determinant of the family labour use on the small coconut holdings in the Maidan tract of Karnataka State are discussed in this paper.

INTRODUCTION

Coconut is essentially a small growers' crop. The importance of small-scale farming in our agrarian set-up, which has a preponderance of tiny-sized operational holdings is too obvious to be stressed. The physical limitations of the poor land base and the constraints on the capital coupled with an abundant availability of family labour result in factorial disequilibrium on these holdings, which in turn, lead to the problems of resource use and allocative efficiency on such gardens. The low employment opportunities and poor wage incomes on the farm and non-farm sectors of the rural complex have further aggravated the socio-economic backwardness of this vulnerable section of people. Therefore, greater emphasis has to be given on the kind of agricultural technology that may result in increase in income, purchasing power and employment among the weaker section of our rural mass. Diversification of enterprises in the existing gardenland may be one of the measures to solve the problem of low income of coconut growers. The present study aims at (*i*) studying the employment pattern in the gardenland, (*ii*) examining the factor-product relationship in the coconut gardens and (*iii*) identifying the determinants of family labour use on farm.

MATERIAL AND METHODS

The data utilized for the study was taken from a broad investigation conducted on coconut cultivation, to identify the problems

and prospects of growing coconut in the Maidan tract of Karnataka State. A multi-stage random sampling procedure was adopted in selecting coconut growers from Arsikere taluk of Hassan district. The present investigation relied on the data of 20 small gardens of less than 3 ha.

Data collection was done by the conventional survey method on specially structured schedules pertaining to the agricultural year 1976–77. Information on farm structures, cultural and management practices, labour use and employment, were collected from the selected growers.

Tabular analysis was used to examine the employment pattern in the gardenland. To establish the factor-product relationship and to examine the efficiency in resource use, production function technique was used. Both linear and Cobb-Douglas production functions were fitted on the set of data.

$Y=f(X_1, X_2, X_3)$

where

Y =gross income from coconut production (Rs)

X_1=gross area under coconut palm (ha)

X_2=total cost (Rs)

X_3=total labour employed in the garden (mandays)

However, based upon the values and significance of the regression coefficients as well as the magnitude of R^2 estimated, Cobb-Douglas equation was used for the final analyses.

Marginal value productivity (MVP)

The most reliable and perhaps the most useful estimate of MVP is obtained by taking the resources as well as gross returns at their geometric means. The MVP was computed by multiplying the regression coefficient of the given resource with the ratio of geometric mean of gross returns to the geometric mean of the given resource. For instance, the MVP of X_1 would be

$$\text{MVP } (X_1)=b_1\frac{\overline{Y}\ (GM)}{X\ (GM)};$$ where GM represents the geometric mean (Swanson, 1956).

The marginal value productivity for land was measured in rupees per ha and marginal value product of labour was measured in rupees per manday of labour. For expenditure incurred on other items, the marginal value productivity was measured in terms of rupees, per rupee of expenditure.

Economic efficiency of resources

In order to evaluate the economic efficiency of coconut growers as users of resources, the marginal value products of input factors were compared with their marginal factor costs. The cost of land (lease-out value) was taken at Rs 3700 per ha. The estimated wage rate in the study area was Rs 5 per man per day. Assuming 10% interest, the cost of all other items expressed in total cost was Rs 1.10 (i.e. cost of a rupee).

Then the ratios of marginal value productivities of different resources to their marginal factor costs were calculated. A ratio that is equal to unity, indicates the optimum use of that factor. A ratio of more than unity indicates that the returns could be increased by using more of that resource and a less than unity ratio indicates the unprofitable level of resources which should be decreased to minimise the losses.

The determinants of family labour use in the coconut gardens were estimated by fitting at the Cobb-Douglas and the linear function:

$Y = f(X_1, X_2, X_3, X_4)$

where; Y = family labour use (man-days)

X_1 = gross area under coconut palms (ha)

X_2 = percentage of bearing palms

X_3 = gross income from the garden (Rs)

X_4 = total wages paid to the hired labour (Rs)

The explanatory variables specified in the model may also serve as the proxies for technical, social and economic determinants of the use of family labour (Aiyasamy *et al.*, 1975).

The gross area under coconut palms may represent the technical feasibility of raising coconut under resource constraints and availa-

ble technology, while the percentage of bearing palms may restrict the limits of use of labour in a particular garden. The social preference and work ethics can be represented by the gross income derived from the garden, which may be thought of as one of the governing factors of participation of family labour on farm activities at a given point of time. The wages paid to hired labour can be treated as a proxy for the opportunity cost of non-participation in farm work and decision on which may be influenced by economic considerations.

Results and Discussion

Garden size and labour use pattern

The average size of the sample gardens, in aggregate was 1.43 ha only. However, if one considers the size stratum-wise, there are marked differences among the three strata specified (Table 1). The average plant density among the sample farmers was 110 palms/ha, yielding on an average 54 nuts/palm/annum.

Table 1. *Garden size and general characteristics*

Stratum	Size	Average area under coconut (ha)	Number of palms/ha	Bearing palms %	Yield per palm per annum (nuts)
I	Below 1.0 ha	0.33	106	100.0	39
II	1.01—2.0 ha	1.56	104	81.2	55
III	2.01—3.0 ha	2.52	117	78.2	55
Average		1.43	110	86.3	55

The labour use pattern in the study area is given in Table 2. The source of power for performing cultural and management practices in the gardens was mainly from human labour. Family labour and hired labour found entry, consistent with the situational needs. Among the sample growers the lowest stratum had negligible hired labour employment and family labour substituted the need for hired labour. Predominance of intensive use of family labour

was the general characteristic of these farms to minimize out-of-pocket expenses and to ensure self employment within their own garden, whatever might be its worth. On an average 281 mandays of labour were engaged per ha of the garden of which, a major portion (71%) was being contributed by the family labour which was found to be declining with the increase in the size of the garden (Table 2).

Table 2. *Labour use per ha of gardenland (mandays)*

Stratum	Total labour engaged	Family labour	Hired labour
I	319.2	319.4 (91.5)	29.8 (8.5)
II	275.9	194.6 (70.5)	81.3 (29.5)
III	285.3	182.5 (66.3)	92.8 (33.7)
Average	280.8	189.0 (70.7)	82.8 (29.3)

Figures in parenthesis indicate percentage of total

Factor-product relationship

Since the major focus of the present study was on establishing factor-product relationship, production function technique was adopted for analysis. The results are given in Table 3.

The coefficient of land was 0.5969, which was significant at 1% level of probability. The regression coefficient of capital expenditure (X_2) was 0.7345, significant at 10% probability level. The coefficient of labour use was non-significant probably because excessive use of labour on the gardens surveyed and preponderance of under-employment and surplus family labour.

It is also obvious from the table that the MVP of gardenland was Rs 2869 per ha. The MVP of capital was Rs 1.81, whereas labour had a value of Rs 6.99.

Table 3. *Production functions—factor-product relationship*

Variables	Regression coefficients	MVPs of factors of production	Geometric means	Ratios of MVPs to their costs
Intercept	129.0	—	—	—
Gross returns (Y)	—	—	4821 (Rs)	—
Gross area under coconut (X_1)	0.5969*** (0.3359)	2869	1.003 (ha)	0.77
Total cost (X_2)	0.7345* (0.3521)	1.81	1956 (Rs)	1.64@
Labour cost (X_3)	–0.3469 (0.4070)	–6.99	239.2 (mandays)	–1.39***
Coefficient of multiple determination (R^2)	0.8690			

(figures in parentheses indicate the respective standard errors)
@significant at 20% level of probability
*significant at 10% level of probability
**significant at 5% level of probability
***significant at 1% level of probability

The ratio of MVP of gardenland to its factor cost was 0.77, which was not significantly different from unity. The ratio of MVP of labour to its acquisition cost was 1.39 which was negative as well as significantly different from unity. However, the ratio of MVP of capital to the cost of capital was 1.64, which again was significantly different from unity.

The functional analysis brought out that the small coconut growers were rational in allocating their scanty capital resources. However, due to limited off-farm employment opportunities, most of the family labour was engaged on the farm itself despite the fact that only 281 mandays of labour were engaged per ha. In order to raise the marginal value of productivity and to ensure gainful employment to the farm family labour, crop diversification as well as integrating livestock activities with crop *sine quonon* should be taken up.

Determinants of family labour use

In this case again Cobb-Douglas equation was selected for the final analysis based on reasons enumerated earlier. The estimated equation is given below:

$$Y = 45.97 \quad \underset{X_1}{1.2108^{***}} \quad \underset{X_2}{0.7255^{*}} \quad \underset{X_3}{-0.0908^{**}} \quad \underset{X_4}{-0.1476}$$

$$\qquad\qquad (0.1985) \qquad (0.3563) \qquad (0.0395) \qquad (0.1874)$$

$R^2 = 0.8923$

***Significant at 1% level of probability

**Significant at 5% level of probability

*Significant at 10% level of probability

Figures in the parenthesis show the stanard errors of the regression coefficients.

The regression coefficients for gross area under coconut and percentage of bearing palms in the garden were 1.21 and 0.73 which were significant at 1% and 10% probability levels, respectively. This could be interpreted as that with 1% expansion in the area under coconut, there would be an increase in the use of family labour by 1.21% other things remaining the same. The negative sign of coefficient for gross income was significant, contrary to our expectation. It may shed some light on the social preferences and behavioural aspects of the growers. It seems, an increase in the gross income is likely to take off, to some extent, family labour from direct participation. The regression coefficient of wages for hired labour was non-significant.

The functional analysis of small coconut gardens of the Maidan tract in Karnataka brought out that efficiency of land resource use could be enhanced by going in for diversification of crops as well as integrating livestock activities in coconut gardens. Empirical evidences suggest that the growers should curtail the use of human labour. However, owing to the fixed nature of resources like family labour and limited off-farm employment, curtailment of these resources may not be feasible and palatable. Nevertheless, better utilization of available labour can be ensured through intensive use of land by changing the cropping pattern and adopting inter

and mixed cropping which have built in capacities to create employment opportunities for rural labour in general and family labour in particular. Deliberate attempts are necessary to diversify the farm enterprise and to stabilize employment.

REFERENCES

AIYASAMY, P. K., RAJAGOPALAN, V. AND SUNDARESAN, R. 1975. Labour use pattern in the small farms of Tamil Nadu. *Indian J. agric. Econ.* 30: 197-204.

SWANSON, EARL, R. 1956. Determining optimum size of business from production functions. In *Resource Productivity, Returns to Scale and Farm Size*, eds. Earl, O. Heady, Glenn L. Johnson and Lowell S. Hardin. Iowa State College Press, Ames, U.S.A.