



Impact of Credit and Technology on Net Farm Returns of Farmers in Kadapa District of Andhra Pradesh

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ABSTRACT

The results of the study brought that credit and technology played an important role in increasing net farm income. The credit was more effective under recommended technology than under existing technology on both the size groups. There is a greater potentiality of increasing net farm returns through borrowing adequate capital on small farms under recommended technology as compared to large farms.

Key words : Credit and technology, Net farm returns.

Farmers are using more cash inputs *viz.*, high-yielding varieties of seeds, fertilizers, irrigation, machinery and land development. Consequently, cash needs in agriculture have increased manifold. All these cash needs cannot be met fully by the farmers out of their own savings. Unless they get some financial assistance from outside they cannot make full use of various technological developments. In order to sustain and grow the use of technological developments in agriculture, availability of credit in adequate amount is necessary. With this problematic situation in view, an attempt has been made in this paper to examine the impact of credit and technology on net farm returns of different sizes of farms.

MATERIAL AND METHODS

The district of Kadapa which is one of the agriculturally advanced districts in Andhra Pradesh was purposively selected for the present study. Out of three revenue divisions in the Kadapa district, Jammalamadugu revenue division having similar cropping pattern, soil, climate and other general conditions of the district was purposively selected for the study. From the above selected revenue division, four mandals *viz.*, Mylavaram, Proddatur, Mydukur and Duvvur were selected at random. All the villages in the selected mandals based on the gross cropped area were arranged in the descending order and the first two villages from each mandal were selected for a detailed study. Thus, number of farmers selected from each village

is sixteen and the total number of farmers selected for the purpose of present study was 128. The data on technical coefficients and factor and product prices were collected from the selected respondents for the agricultural year 2010-11 by survey method.

Linear programming model of the following form was used as an analytical tool to explore the possibilities of optimizing net farm returns, considering only crop activities.

$$\text{Maximise } Z = \sum_{j=1}^n C_j X_j$$

$j = 1$ to n activities

Subject to following constraints

$$1. \quad \sum_{j=1}^n a_{ij} X_j \geq b_i \quad (i = 1, \dots, K)$$

$$2. \quad a_{ij} X_j \leq b_i \quad (i = K+1, \dots, m)$$

$$3. \quad a_{ij} X_j = b_i \quad (i = m+1, \dots, v)$$

$$4. \quad X_j, b_i \geq 0 \quad (\text{non negativity constraint})$$

where,

$Z =$ is the objective function to be maximized in the year.

$C_j =$ is the value or price of j^{th} activity during *kharif* and *rabi* seasons of the year.

$X_j =$ is the unit of j^{th} production activity during *kharif* and *rabi* seasons of the year.

$a_{ij} =$ amount of i^{th} resource required by j^{th} activity

$b_i =$ quantity of i^{th} resource.

With the help of above model, following four optimum plans (models) were developed for both small and large farms.

Model 1: Optimum farm plan with existing technology and owned funds.

Model 2: Optimum farm plan with existing technology and relaxed borrowing.

Model 3: Optimum farm plan with recommended technology and owned funds

Model 4: Optimum farm plan with recommended technology and relaxed borrowing

Each of these four models was designed separately for small (S_1 , S_2 , S_3 , and S_4) and large (L_1 , L_2 , L_3 , and L_4) farmers category.

RESULTS AND DISCUSSION

Impact of Credit on Net Farm Returns

The term relaxed capital (unrestricted capital) was defined as the provision of as much credit as needed by the farmers. Accepting this definition, the credit needs and their effect on net farm returns were assessed by comparing the optimum plans worked out with limited and unlimited capital availability. The impact of credit on net farm returns of small and large farmers is presented in Table 1.

The comparison of results of models 1 and 2 indicates the impact of credit under existing technology, when the farmers were allowed to borrow required short term credit. The net farm returns indicated by models S_1 and L_1 were Rs. 86,750.80 and Rs. 1,72,247.00 for small and large farms respectively when the cash availability was restricted to owned funds. When the farmers were allowed to borrow required credit to supplement owned funds, the net farm returns increased to Rs. 1,13,170.80 and Rs. 1,96,923.00 on small and large farms respectively. The increase of Rs.26,420.00 (30.45 per cent) on small farms and Rs. 24,676.00 (14.32 per cent) on large farms could be attributed to the external financial facilities and the consequential changes in the crop mix.

The impact of credit under recommended technology can be assessed by comparing the net farm returns between the models developed at recommended technology with owned funds (Model 3) and recommended technology with relaxed borrowing (Model 4). The net farm returns of small and large farmers when they adopt recommended technology with their owned funds were Rs. 89,998.45 and Rs. 2,17,823.20 respectively. On the other hand, if they were allowed to borrow required

credit to adopt recommended technology, the small and large farmers could further increase their net farm returns to Rs. 1,31,426.60 and Rs.2,77,976.60 respectively. This represented an increase of Rs. 41,428.15 (46.03 per cent) and Rs. 60,153.40 (27.61 per cent) over model S_3 and model L_3 respectively. This increase in the net farm returns could be attributed to the impact of credit under recommended technology. These findings are similar to the findings of Deoghare (1997), Ramakrishnaiah (1998), Kiresur *et al.* (2004), Rajeswari and Sastry (2011) and Varalakshmi *et al.* (2011).

Impact of Technology on Net Farm Returns

The comparison of net farm returns between models designed at existing technology (Model S_1 and L_1) and at recommended technology (Model S_3 and Model L_3) with available funds shows impact of technology under restricted capital and a similar comparison of models with borrowed capital (Model 2 and Model 4) shows the impact of technology under unlimited capital. The results of these comparisons are presented in Table 2.

The programme designed at recommended technology with limited capital helped large farmers to realize an income of Rs. 2,17,823.20 as against Rs.89,998.45 realized by small farmers. Due to the adoption of recommended technology small and large farmers realized an increased income of Rs. 3,248.65 (3.74 per cent) and Rs. 45,576.20 (26.46 per cent) respectively over the optimum plans developed at the current technology with owned funds and this reflects the impact of technology under capital constraint.

The existing technology with adequate capital helped small and large farmers to realize Rs. 1,13,170.80 and Rs. 1,96,923.00 respectively as net farm returns. The results of models developed at recommended technology with relaxed borrowing revealed that it was possible to get net farm returns of Rs. 1,31,426.60 and Rs. 2,77,976.60 for small and large farmers respectively. These returns were higher by Rs. 18,256.80 (16.13 per cent) and Rs. 81,053.60 (41.16 per cent) over the net farm returns obtained from models S_2 and L_2 respectively. This indicates the influence of technology on income under relaxed borrowing. These findings are in conformity with the findings

Table 1. Impact of credit on net farm returns of small and large farms.

(in Rupees)

Category / Model	Existing technology			Recommended technology		
	Model-1	Model-2	Change over	Model-3	Model-4	Change over
			Model-1			Model 3
Small farmers	86750.80	113170.80	26420.00(30.45)	89998.45	131426.60	41428.15(46.03)
Large farmers	172247.00	196923.00	24676.00(14.32)	217823.20	277976.60	60153.40(27.61)

Note: Figures in parentheses indicate percentages

Table 2. Impact of technology on net farm returns of small and large farms.

(in Rupees)

Category / Model	Existing technology			Recommended technology		
	Model-1	Model-3	Change over	Model-2	Model-4	Change over
			Model-1			Model - 2
Small farmers	86750.80	89,998.45	3,248.65(3.74)	1,13,170.80	131426.60	18,256.80(16.13)
Large farmers	172247.00	2,17,823.20	45,576.20(26.46)	1,96,923.00	277976.60	81,053.60(41.16)

Note: Figures in parentheses indicate percentages

Table 3. Borrowing, repayment and cash transfers of small and large farmers under different optimum models.

S. No. Items	Small farmers				Large farmers			
	S ₁	S ₂	S ₃	S ₄	L ₁	L ₂	L ₃	L ₄
1. Borrowing in <i>kharif</i>	-	22781.29	-	38305.95	-	85377.77	-	90592.67
2. Repayment in <i>rabi</i>	-	24148.16	-	40604.30	-	90500.43	-	96028.23
At the end	-	-	-	-	-	-	-	-
3. Cash transfer <i>kharif</i> to <i>rabi</i>	-	-	-	-	-	-	-	-
<i>Rabi</i> to Z	18981.23	39846.33	22345.74	33185.62	42114.76	-	68709.24	38782.58

of Deoghare (1997), Rajeswari and Sastry (2011) and Varalakshmi *et al.* (2011).

Borrowing, Repayment And Cash Transfers Under Different Optimum Models

The borrowings, repayment and cash transfers of small and large farmers are presented in Table 3. The optimum models S₂ and L₂ suggested to borrow Rs.22,781.29 and Rs.80,377.77 for small and large farmers respectively for the optimization of resources at

currently practicing technology. The optimum models S₄ and L₄ indicated borrowing of Rs. 38,305.95 and Rs. 90,592.67 for small and large farmers to optimize with recommended technology. The entire credit with interest Rs. 40,604.30 and 96,028.30 was repaid in *rabi* season. The credit requirement of small and large farmers under recommended technology increased by 68.14 per cent and 6.10 per cent respectively over existing technology.

It was observed from the results of the optimization models that the initial cash availability in *kharif* season was either inadequate or just sufficient to meet the requirements of crop production. So, there was no cash transfer from *kharif* to *rabi* on both the categories of farms. However, cash transfers were activated from *rabi* to objective function.

CONCLUSIONS

Credit and technology played an important role in increasing net farm income. The impact of credit was more under recommended technology compared to existing technology. The absolute increase in net farm returns under existing technology was inversely related with the size of farm while under recommended technology it was directly related with size of the farm. It may also be inferred that the recommended technology had significant effect on net farm returns of both the categories of farmers under limited and unlimited capital conditions. However, the effect of technology was relatively more when it was associated with adequate capital. It is interesting to note that impact of technology was more on large farms compared to small farms both under limited and unlimited capital environments.

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