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Doubling Farmer's Income: Role of Institutional Credit in Crop Production

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ABSTRACT

Doubling farmers' income in today's scenario is one of the most significant subject and becomes highly prioritized after the Hon'ble Prime Minister showed his vision for doubling the farmers income by 2022. The doubling farmers' income is not an easy task and government has to take comprehensive measures to achieve this. It is a herculean project but it can be achieve through efficient use of all factors of production. It can be achieved through intensive application of inputs and technology. For the use of improved technology farmers require more and more capital resource agriculture credit is an important resource that can help to achieve this target. Therefore, the role of institutional credit plays a major factor in doubling the farmer income. The agricultural credit appears to be an essential input along with modern technology for doubling the farmer's income. The study has conducted in the Madhubani district of Bihar. The district is enlisted among the 100 "Agriculturally less developed and distress districts of India" on the bases of lower productivity of agriculture, lower credit-deposit ratio and lower proportion of urban to rural households by an 'Expert Group of Ministry of Finance' on 'Agricultural Indebtness'. The role of institutional agriculture credit was estimated by comparing the costs and returns in crop cultivation of loanee farmers in before and after institutional agriculture production credit use situation and paired t-test was used to test the significance of the difference in income before and after situation. Paddy, wheat, maize and potato crops were selected for the study, as these crops together accounted for more than 80 per cent of gross cropped area of the sample farmers. It was observed that the farmers were obtaining more output and realized the better price for their output conversely getting higher net income from cultivation of paddy, wheat, maize and potato in after credit use situation. It can be inferred that the institutional credit support extended to the farmers allowed them not only to use more inputs, but also substitute the inputs for one another. Further, credit enabled the farmers not only to obtain higher yields, but also fetch better price for their produce and higher net returns from the crops grown by them.

Keywords: Institutional agricultural credit, net farm income, CACP cost concept

Agriculture and allied sectors accounted for 17.2% of the Gross Domestic Product (GDP) and about 48% of the total workforce (Economic survey, 2017). Agriculture is a dominant sector of Indian economy and credit plays an important role in increasing agricultural production. In India, for a long time, there was no institutional agency for providing agricultural credit. Farming was small scale and subsistence, the cultivators used to borrow only from non-institutional agencies such as moneylenders, indigenous bankers, friends and relatives. Institutional credit in India made a beginning in the year 1904, when the Co-operative Credit Societies were started to provide agricultural credit. The passing of the co-operative credit societies Act 1904 paved the way for starting co-operative

credit in India. Even after the cooperatives were ushered, in the initial years their impact was poor and the credit disbursed by them was dismally insufficient and inadequate. The per hectare institutional credit flow had shown that in most of the states across the country the coverage had increased, though in different degrees during the post liberalization stage over the pre-liberalization period (Khan *et al.* 2007). It observed that the loan for agricultural purpose enable the barrowers to improve from mechanization by purchasing tractor, tillers and pump sets for minor irrigation the term loan also helped in increasing irrigated area as well as cropping patterns and cropping intensity from one crop to two crops a year (Jugal, 1997). The institutional finance was instrumental in acquiring productive farm assets and development of irrigation facilities which resulted in changes in the cropping pattern, increase in the cropping intensity and adoption of high yielding varieties (Veerashekarappa, 1997). Forty per cent of the non-defaulter group and 60 per cent of the defaulter group misutilized the crop loan, was not up to the extent for production and repayment had been affected (Singh *et al.* 2004). The smallholders had relatively more hurdle to access and lesser impact of formal credit than big farmers (Amjad and Hasnu, 2007). All the regions of the country comprising seventeen agriculturally most important states having about 96 per cent agricultural land was covered. It revealed that inter-regional disparities in per hectare flow of institutional credit as measured through coefficient of variation (CV) had increased during the pre-liberalization period between 1980-81 and 1990-91 (Khan *et al.* 2007). About three-fourth of the farmers opined complicated and time consuming procedure to procure loans from the institutional agencies (Singh *et al.* 2007). It was observed that, access to institutional credit to more farmers and appropriate quantity and quality of agricultural credit are crucial for realizing full potential of agriculture as a profitable activity (Agri 2011). The regional rural banks (RRBs) have taken deep roots and have become a sort of everlasting part of the rural credit structure in India (Gupta and Khan, 2014). The various studies showed that 47 per cent loan was diverted to other purposes (Mishra, 1976).

Bihar has a total of 45,103 villages and 5099 rural bank branches; this translates to one branch in every nine villages based on the total branch estimates of 2014. This indicates that even to provide basic access to financial services this is clearly insufficient (State Planning Commission, 2013). The entire rural credit delivery system is not in a good shape in Bihar. A report of Expert Group of 'Ministry of Finance' on 'Agricultural Indebtness' enlisted seven districts of Bihar among 100 'agriculturally less developed and distress districts of India' on the bases of lower productivity of agriculture, lower credit-deposit ratio and low proportion of urban to rural households. These districts are Banka, Bhagalpur, Darbhanga, Jamui, Lakhisarai, Madhubani and Saran. Specially in Madhubani district, the major constraints in the sector are weak short-term cooperative credit structure, slow pace of issue of KCCs, cumbersome procedure of obtaining land records, tenancy problems, poor state of rural infrastructure, lack of adequate supplies of electricity, high level of over dues and small and fragmented land holdings. Madhubani district is located in the north most part of Bihar which is prone to severe flood, therefore, institutional agencies hesitate to provide agriculture loan in view of insecurity of repayment of loan.

MATERIALS AND METHODS

The study was based on the data collected from 100 sample farmers (50 loanee and 50 non-loanee farmers) residing in randomly selected ten villages of five development blocks of the district. The impact of institutional agriculture production credit on net farm income was estimated by comparing the costs and returns in crop cultivation of loanee farmers before and after using the institutional agriculture production credit. Costs and returns were calculated of main crops grown (viz. paddy, wheat, maize and potato), using cost concepts as given by Commission for Agricultural Costs and Prices (CACP).

CACP cost concept

CACP cost concepts are widely used because of their relevance in the decision-making process. This means that these costs serve as a basis to expand the size of the farm, to buy the requisite capital assets in the long run and the requisite inputs in the short run. For example, variable costs have a bearing on the level of production in the short run, on the other hand the decision like expanding the size of the farm, buying the durable assets, etc., are based on the total costs.

Crop costs are split up into various cost components, such as cost A_1, A_2, B_1, B_2, C_1, C_2, C_2^* and C_3.

Gross returns

Returns from each selected crops were calculated by multiplying of physical output of main and by-products with their respective current year prices. By adding returns from main and by-product, gross return from the crop were calculated.

Symbolically,

$$GR_{ij} = \left[Y_{ij} \times p_i \right] + \left[y_{ij} \times p_i \right]$$

Where,

GR_{ij} = gross returns from i^{th} crop,

Y_{ij} = physical output of main product from i^{th} crop,

y_{ij} = physical output of byproduct from i^{th} crop,

P_i = prevailing price of main product of ith crop,

P_i = prevailing price of byproduct of ith crop and

i = paddy, wheat, maize and potato.

Farm income measures

Different income measures were derived using the cost concepts. These measures include farm business income, family labour income, net farm income, farm investment income, etc. The farm income measures were estimated using following formulae.

Farm business income = Gross income – Cost A_2

Family labour income = Gross income – Cost B_2

Net farm income = Gross income – Cost C_2

Farm investment income = Farm business income – Wages of family labour.

Test of significance

With an underlying hypothesis in view that there was no significance difference between the cost of cultivation of major crops and net farm income realized by farmers before and after using institutional agriculture production credit the paired t-test was applied to test the significance of the difference in cost of cultivation and difference in net farm income of all selected crops before and after using institutional agriculture production credit. For the paired t-test, the pairs of variables were developed both for cost of cultivation and net farm income separately for each crop as, given below.

For Cost of Cultivation

Pair I: Difference in cost of cultivation in before and after using institutional agriculture production credit use situation.

For Net Farm Income

Pair II: Difference in net farm income in before and after using institutional agriculture production credit use situation.

To test the above hypotheses paired t- test was applied.

Test Statistics

$$t = \frac{\bar{d}}{\sqrt{s_d^2 / n}}$$

This follows t-distribution with n-1 degree of freedom.

Here,

$$\bar{d} = \frac{\sum d}{n}$$

$$s^2 = \frac{1}{n} \left[\sum d^2 - \frac{(\sum\ )}{n} \right]$$

$$d = X - Y$$

Where,

d = Difference between cost of cultivation/Net farm income in before and after using institutional agriculture production credit use situation. (₹/farm)

$\bar{d}$ = Mean value of difference (d) (₹/farm)

s_d^2 = Variance of the difference (d)

X = Cost of cultivation/Net farm income before using institutional agriculture production credit use situation. (₹/farm)

Y = Cost of cultivation/Net farm income after using institutional agriculture production credit use situation. (₹/farm)

n = Total number of loanee-farmers

Decision

The calculated t-value was compared with tabulated t-value at ∝ % level of significance. When calculated value of 't' statistic was less than table value then the difference was considered to be insignificant and concluded that the institutional agriculture production credit taken did not lead any significant difference between mean values of the cost of cultivation/net farm income before and after using institutional agriculture production credit.

RESULTS AND DISCUSSION

In order to assess the role of institutional agriculture production credit on net farm income of loanee farmers the cost of cultivation and net returns from major crops grown by the farmers were estimated in before and after institutional agriculture production credit use situations. A positive change in net returns from these crops over previous year's net returns was considered to be an impact of institutional agriculture production credit. The cost of cultivation and net returns were calculated for major crops grown in study area viz. paddy, wheat, maize and potato, as these crops occupied about 82 per cent of total cropped area on the sample farms. The changes in cost of cultivation, gross returns, net farm income and net returns over one rupee expenditure in major crops cultivated by farmers in before and after agricultural production credit use situations were calculated for assessment of role of institutional agriculture credit.

Economics of paddy cultivation for loanee farmers

The economics of paddy cultivation for loanee farmers is presented in Table 1. The yield of paddy (main product) before credit use was 48 q/ha, which increased to 52q/ha after credit use by loanee farmers. The increase in yield was estimated to be 7.06 per cent.

Table 1: Returns of loanee farmers from paddy cultivation

Output/Income	Paddy		
	Before	**After**	**Change (%)**
Main product (q/ha)	48	52	7.06
By-product (q/ ha)	87	90	3.15
Price Main product (₹/q)	950	1060	11.58
Price By-product (₹/q)	100	105	4.88
Gross returns (₹/ha)	54946	64646	17.65
Farm business income (₹/ha)	41530	46157	11.14
Family labour income (₹/ha)	29404	32031	8.93
Family investment income (₹/ha)	35140.70	62189	76.97
Net return (₹/ha)	18716	25643	37.01

The average price realized by farmers for main product was ₹ 950/q before credit use, while the same was increased to ₹ 1060/q. Thus, the famers fetched about 12 per cent higher price for the main product after the use of credit. Further, the gross returns received from paddy cultivation were ₹ 54946 per hectare before credit use situation, which increased by 17.65 per cent to ₹ 64646 per hectare after credit use. Again, the net returns received from paddy cultivation were increased from ₹ 18716 per hectare before credit use to ₹ 25643 per hectare after credit use. Thus, net returns increased by 37.01 per cent after the use of credit. The farmers realized more net returns and gross returns from paddy cultivation after the use of credit. The higher gross and net returns from paddy, realized after credit use were due to the higher yield obtained and better price fetched by the farmers.

Economics of wheat cultivation for loanee farmers

The economics of wheat cultivation for loanee farmers is shown in Table 2. The average yield of wheat (main product) obtained by farmers was 40 q/ha before credit use, while the same was 42 q/ha after the use of credit. Thus, farmers obtained 6.17 per cent higher yield after credit use by loanee farmers.

After credit use, the farmers fetched 6.55 per cent higher price for their produce, as the average price realized before and after credit use was ₹ 1220 and

₹ 1300 per quintal, respectively. Further, the gross returns received by farmers from wheat cultivation were increased by 13.78 per cent, from ₹ 60064 per hectare before credit use to ₹ 68343 per hectare after the use of credit. The net returns received were also increased from ₹ 16086 per hectare before credit use to ₹ 21204 per hectare after credit use, showing an increase of 31.83 per cent.

Table 2: Returns of loanee farmers from wheat cultivation

Output/Income	Wheat		
	Before	After	Change (%)
Main product (q/ha)	40	42	6.17
By-product (q/ha)	57	64	10.96
Price Main product (₹/q)	1220	1300	6.55
Price By-product (₹/q)	200	210	5.00
Gross returns (₹/ha)	60064	68343	13.78
Farm business income (₹/ha)	37064	39587	6.80
Family labour income (₹/ha)	24385	26763	9.75
Family investment income (₹/ha)	33348	38488	15.41
Net return (₹/ha)	16086	21206	31.83

The farmers received more gross returns and net returns from wheat cultivation after credit use due to higher yield obtained and better average price realized by the farmers after the use of institutional agricultural credit.

Economics of maize cultivation for loanee farmers

The yield of maize (main product) was increased by 6.97 per cent from 43 q/ha before credit use to 46 q/ha after the use of credit. Similarly the yield of by-product of maize was also increased by 7.27 per cent from 110 q/ha before credit use to 118 q/ha after the use of credit (Table 3).

The price realized by farmers for their main product was increased by 8.13 per cent from ₹ 860 per quintal before credit use to ₹ 930 per quintal after credit use. Further, the gross returns received from maize cultivation were increased by 18.44 per cent from ₹ 43580 per hectare before credit use to ₹ 50450 per hectare after credit use. The net returns received from

maize cultivation were also increased from ₹ 5226 per hectare before credit use to ₹ 6952 per hectare after credit use, with an increase of 33.03 per cent (Table 3).

Table 3: Returns of loanee farmers from maize cultivation

Output/ Income	Maize		
	Before	After	Change (%)
Main product (Qt. per ha)	43	46	6.97
by-product (Qt. per ha)	110	118	7.27
Price Main product (₹/qtl)	860	930	8.13
Price By-product (₹/qtl)	60	65	8.33
Gross returns (₹/ha)	43580	50450	18.44
Farm business income (₹/ha)	27474	28690	4.43
Family labour income (₹/ha)	15350	15534	1.20
Family investment income (₹/ha)	20886	46450	122.40
Net return (₹/ha)	5226	6952	33.03

The loanee farmers obtained higher yield of maize and realized better price for their produce after credit use and thus realized more returns from maize cultivation.

Economics of potato cultivation for loanee farmers

The yield of potato was increased by 12.52 per cent from 212 q/ha before credit use to 239 q/ha after the use of credit. Similarly, the price realized by farmers increased by 12.07 per cent from ₹ 580 per quintal before credit use to ₹ 650 per quintal after credit use. Further, the gross returns received from potato cultivation increased by 26.10 per cent from ₹ 123296 per hectare before credit use to ₹ 155480 per hectare after credit use. The net returns received from maize cultivation were also increased from ₹ 44268 per hectare before credit use to ₹ 58264 per hectare after credit use, with an increase of 31.61 per cent (Table 4). Again, the increase in gross as well as net returns was due to the increase in output and price of potato.

The change in net returns before and after use of institutional credit from cultivation of paddy, wheat, maize and potato is depicted in Fig. 1. The increase in net returns after credit use was highest in case of

paddy (37.01%), followed by wheat (31.83%), potato (31.61%) and maize (33.03%).

Table 4: Returns of loanee farmers from potato cultivation

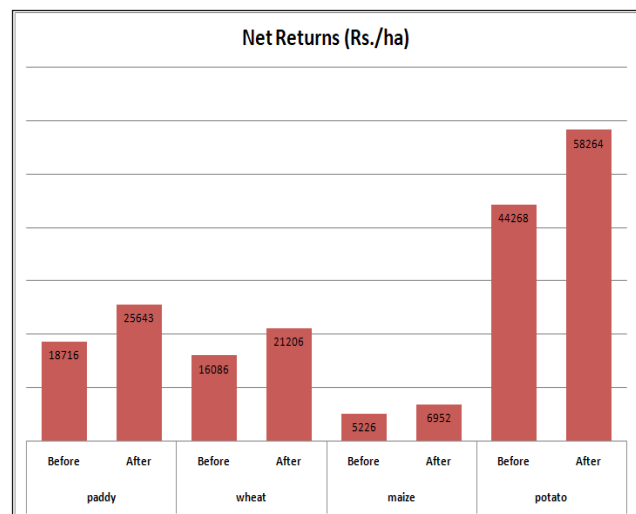| Output/Income	Potato		
	Before	After	Change (%)
Main product (Qt. per ha)	212	239	12.52
Price Main product (₹/qtl)	580	650	12.07
Gross returns (₹/ha)	123296	155480	26.10
Farm business income (₹/ha)	73577	85709	16.49
Family labour income (₹/ha)	61451	73583	19.74
Family investment income (₹/ha)	64937	149820	130.71
Net return (₹/ha)	44268	58264	31.61

Fig. 1: Comparison of net returns realised from four crops

Impact of credit use in crop production

The significance of percentage changes in magnitudes in respect of major corps i.e. paddy, wheat, maize and potato are presented in Table 5. The cost of cultivation, gross returns, net farm income realized by farmers in cultivating different crops have increased by varying magnitudes with statistical significance (Table 5). However, it can be inferred that institutional credit enabled farmers to realized higher net farm income, along-with a considerable effect on cost of cultivation.

Table 5: Impact of institutional credit on net farm income

Crop	Cost/Return	Before credit use	After credit use	Change (%)
Paddy	Total cost of cultivation (₹/ha)	36230	39003	7.65**
	Gross returns (₹/ha)	54946	64646	17.65**
	Net Farm Income (₹/ha)	18716	25643	37.01*
	B.C. ratio	0.52	0.66	26.92
Wheat	Total cost of cultivation (₹/ha)	43978	47137	7.18***
	Gross returns (₹/ha)	60064	68343	13.78*
	Net Farm Income (₹/ha)	16086	21206	31.83***
	B.C. ratio	0.36	0.44	22.22
Maize	Total cost of cultivation (₹/ha)	38354	43498	13.41*
	Gross returns (₹/ha)	43580	50450	18.44**
	Net Farm Income (₹/ha)	5226	6952	33.03*
	B.C. ratio	0.14	0.16	14.16
Potato	Total cost of cultivation (₹/ha)	79028	97216	23.01**
	Gross returns (₹/ha)	123296	155480	26.10***
	Net Farm Income (₹/ha)	44268	58264	31.61**
	B.C. ratio	0.56	0.60	7.02

*, ** & **** significant at 1 per cent, 5 per cent and 10 per cent level, respectively.

CONCLUSION

It is concluded that the total cost of cultivation of paddy, wheat, maize and potato after credit use were increased by 7.65 per cent, 7.18 per cent, 13.41 per cent and 23.01 per cent respectively. The net returns received were increased by 37.01 per cent, 31.83 per cent, 33.03 per cent and 31.61 per cent after credit use in case of paddy, wheat, maize and potato respectively. The net return received on per rupee expenditure in case of paddy, wheat, maize and potato were increased by 26.22 per cent, 22.22 per

cent, 14.16 per cent and 7.02 per cent, respectively after credit use situation. It can be inferred that the institutional agriculture credit support extended to the farmers allowed them not only to use more inputs, but also substitute the inputs for one another. Further, credit enabled the farmers not only to obtain higher yields, but also fetch better price for their produce and higher net returns from the crops grown by them. Therefore, the credit acts as an important input to help in doubling farmer's income. In the present circumstances there is a need to re-orient the agriculture credit policy and strategy to provide larger credit accommodation so as to realize higher returns from agriculture. The agriculture sector still has potential to increase incomes of the farmers, provided that sufficient credit support is extended to them. Therefore, there is need to take initiatives on the part of banks and policy makers to create conducive environment in which people engaged in agriculture sector can avail the credit facility to tap the untapped potential of agriculture sector for increasing their income. There are many studies at macro level on agricultural finance but studies at micro level about problems faced by farmers needs more attention. The procedure of agriculture credit delivery system should be made simple with reduced interest rate for marginal and small farmers.

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