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Research Paper

Assessing the Role of Credit on Agricultural Growth in Bihar

Rashmi Sinha*, Tulika Kumari and Ritambhara Singh

School of Agribusiness and Rural Management, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India

*Corresponding author: rashmi.sinha@rpcau.ac.in (**ORCID ID:** 0000-0002-6639-7050)

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ABSTRACT

Credit is an important factor that could influence the use of fixed and variable factors in the agriculture production system. A healthy credit system is responsible for the economy's growth, which ensures that in lack of money, neither the supply nor the demand gets affected. The current study explores the role and status of credit to agriculture in Bihar. It assumes importance as the state has around 96 percent of marginal and small holdings and faces the vagaries of weather with recurrent floods, especially in the northern part of it. The study uses secondary data for the purpose of analyzing the growth of institutional credit flow in Bihar. Further, to analyze the credit delivery system in agriculture in Bihar, data from NSS 77th round survey (2021) is used. Results reveal the presence of institutional and non-institutional agencies in Bihar's credit delivery system. The study also uses a multiple linear regression model to assess the role of credit in the agricultural growth of Bihar. The model reveals a significant positive relationship between agricultural production and credit which states the significance of credit to Bihar's agricultural growth.

HIGHLIGHTS

- There are both institutional and non-institutional sources of financing that exist in agriculture in Bihar.
- Annual credit plans for agriculture and outstanding agricultural advances by various institutional agencies have registered growth of 25.34 and 19.90 in Bihar.
- There exists a positive relationship between agricultural credit and output produced.

Keywords: Agricultural credit, Institutional Agencies, Production, Multiple linear regression, CAGR

Research have affirmed that the availability of credit is a necessary condition for any investment and the growth of any sector. The fundamental role of credit is that it does not directly enter as an input in agriculture but plays a complex role in farmer's production decisions. Thus, the impact of credit on the production of crops occurs through multiple channels like the purchase of input, capital stock, etc. (Narayanan, 2016). Srivastava (2017), identified credit as an enabling factor which could influence the use of fixed and variable inputs. The agriculture production of India and the extent of credit distribution has shown a positive growth rate (Roy, 2017). Institutional credit is a vital prerequisite for enhancing productivity in agriculture, thereby strengthening farmers' income, and therefore for faster agricultural growth, an increased institutional credit flow is essential (Singh and Nasir, 2003). Availability of adequate and timely credit at a reasonable cost enables farmers to purchase inputs and build up capital assets in the form of farm implements, irrigation infrastructure, constructions of poly houses and new buildings, etc. Alternatively, credit promotes gross capital formation, which is very crucial for growth and development in the long run. Credit also facilitates the quick adoption of new and sustainable technologies, which boost production and facilitate marketing and distribution of both- the inputs and outputs. Thus, food systems require a constant flow of credit so that farmers

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can fulfill their need for working capital and fixed capital requirements. Supply chain has three major features, the flow of money, flow of information, and flow of product. It shows that credit is as essential in the post-production stage as it is in the pre-production and production stages of the food systems.

Farmers in India depend upon institutional and non-institutional sources to obtain credit. Institutional sources are regulated by the Reserve Bank of India and the Government of India through various policy interventions based upon the needs and requirements of farmers, thereby making it cost-effective. Non-institutional sources, however, do not come into such purview, as a result of which the interest rates are often high. Still, since they provide unrestricted and easy access to credit, they continue to be part of the credit delivery system. According to the NSS 77th round survey (2021), about 50 percent of agricultural households were indebted; among these, 69.6 percent of the outstanding loan was taken from institutional sources, while 20.5 percent was from non-institutional agencies. Further, the survey stated that 57.5 percent of loans were taken for agricultural purposes alone. According to the survey, the presence of non-institutional agencies in the agriculture credit system is way deeper in India; even though it is characterized by its weaknesses (exploitation of the borrower), its easy availability still allures the farming community the most.

In Bihar, agriculture occupies a dominant role in the state's economy as it provides food income and livelihood support for the masses. About 75 percent of its population is engaged in agriculture as an occupation, and the urbanization rate is only 11.3 percent *(Government of India, 2011)*. Furthermore, a majority of farmers are small and marginal and have poor or negligible savings; they depend upon credit for meeting their long-term and short-term needs for investing in critical inputs and technology in agriculture. Therefore, institutional credit holds utmost importance in the context of Bihar so that these small and marginal farmers get credit at a cost-effective rate so that they have better access to quality inputs in time which in turn will help them raise farm productivity and farm income. Institutional credit to agriculture is thus essential for the development of the economy of Bihar, keeping in view the rural base of the economy, the limited resource availability, and the competition emerging from the liberalization of the economy. Therefore, this study was undertaken to assess the current status of agriculture credit in Bihar, and its role in the agricultural growth of the state

MATERIALS AND METHODS

Data

The analysis was done over a period of 17 years from 2003-04 to 2019-20 using secondary data available from various published sources. The data relating to the use of Fertilizer, the Annual Credit Plan for Agriculture in Bihar, and Agriculture loan outstanding by various agencies was collected from various issues of the Bihar Economic Survey conducted by *Government of Bihar (2007-2021).* The data relating to the agricultural production of major Food grains in Bihar was collected from the Handbook of Statistics on the Indian States published by the *Reserve Bank of India (2016-2021).* Food grains include Rice, Wheat, Coarse Cereal, Pulses, and Oilseeds. Data about the gross irrigated area was collected from the Bihar Statistical Handbook released by *Government of Bihar (2006; 2012; 2014; 2018)*. The data relating to the gross irrigated area during 2019-20 was collected from the Handbook of Statistics on the Indian States 2020-21 published by the *Reserve Bank of India (2021)*. Existing sources of Institutional and Non-institutional agencies in agricultural credit in Bihar had been identified based on *NSS 77th round survey (2021*). Other document used for data collection is Bihar through Figures published by *Government of Bihar (2019)*

Analytical Tools

The collected data in this study were analyzed using appropriate tools. To compute the present status of agriculture credit by institutional agencies, the compound annual growth rate was calculated by using the following function on time series data of achievements of annual credit plans and outstanding agricultural loans:

$$Y = ab^t$$

$$lnY = lna + t\ lnb$$

$$b = ln\ (1 + r)$$

Where, Y is the dependent variable = Agricultural loan outstanding/ achievement in annual credit plan as the case may be.

a = constant

t refers to the period (1,2,3……n)

Where 2012-13 = 1 and so forth

b = regression coefficient (growth rate in the series)

Further the compound annual growth rate is computed by:

$$r = (antilog\ b - 1)$$

When multiplied by 100 it gives compound annual growth rate

$$CAGR\ (\%) = r = (Antilog\ b - 1) \times 100$$

Carter (1989) used agriculture credit as an explanatory variable in his study, arguing that agriculture credit brings technological changes, increases the intensity of fixed assets, and helps in purchasing input. In a similar trend, Saleem & Jan (2011) used agriculture credit as an explanatory variable and domestic agricultural product as the dependent variable.

Agunuwa (2015) analyzed the time series data on credit provided by Commercial Bank and the agricultural productivity using the Ordinary Least Square (OLS) technique and found a positive relationship between the two.

In the current study, at first, a total of five variables were taken, including ACP Achievements for agriculture, fertilizers, gross irrigated area, tractor purchased, and cropping intensity for a period of 17 years. But due to Multicollinearity between the independent variables, the tractor purchased and cropping intensity were dropped. Another test was run to check the heteroscedasticity. Finally, the multiple linear regression model was adopted for the analysis as follows:

$$Y = a + b1\ X1 + b2\ X2 + b3\ X3 + \varepsilon$$

Where,

Y = production of major food grains in '000 tons

a = Constant

X_1 = Achievements under annual credit plan for agriculture

X_2 = Fertilizer used in '000 tons

X_3 = Gross irrigated area in '000 ha

ε = Error term

RESULTS AND DISCUSSION

Framework of the study

Fig. 1 shows the analytical framework developed for the study. The various institutional sources of finance, when utilized for productive purpose in agriculture by the farmers, results in increasing the total production.

According to Bahsi and Cetin (2020), credit plays a

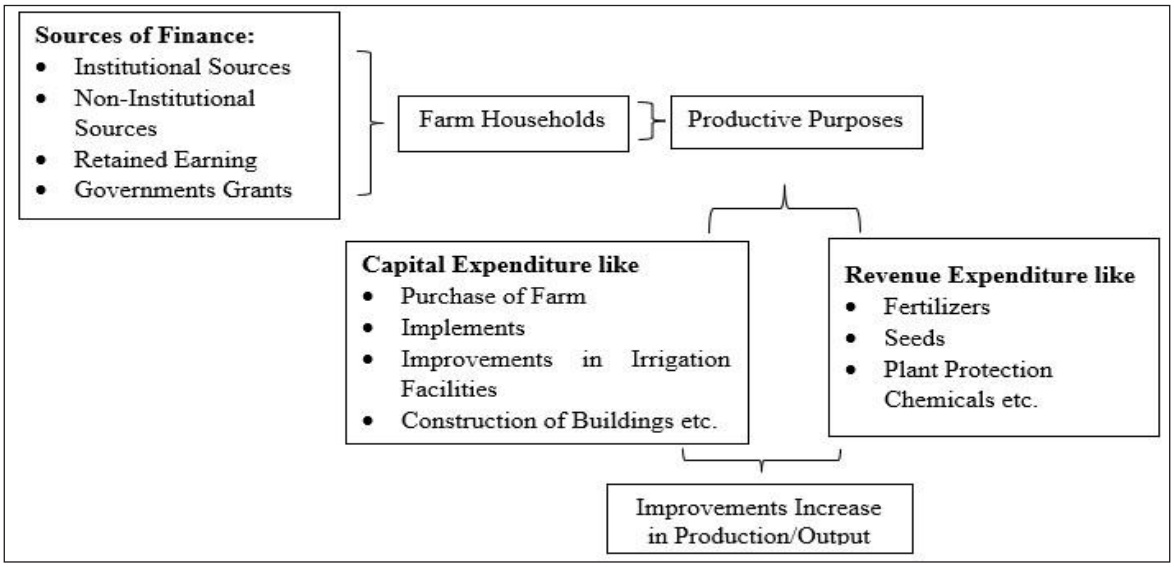


Fig. 1: Relationship between the various variables used in the study

vital role in making agriculture production efficient and productive in emergent nations. Sources of credit are utilized for purchasing agricultural land and acquiring technologies.

Credit and production

To assess total credit flow each year to agriculture, achievements under the annual credit plan for agriculture were considered as it reflects total direct and indirect finance provided to agriculture in a year and total agriculture loan outstanding by various agencies during each financial year. Narayanan (2016) suggested that institutional credit positively correlates with all the inputs like fertilizer, pesticides, and tractors purchased. Baffoe *et al.* (2014) investigated the association between credit access and agricultural productivity. The results indicated that the borrowed household's show more productivity compared to non-borrowed. Although they spend less on variable input, they argue that the main reason for this kind of investment behavior is the technical advice that the lending agencies provide as a part of the credit package. There exists a unidirectional causal relationship between the use of agriculture credit and production (Terin *et al.* 2014).

Irrigation and Production

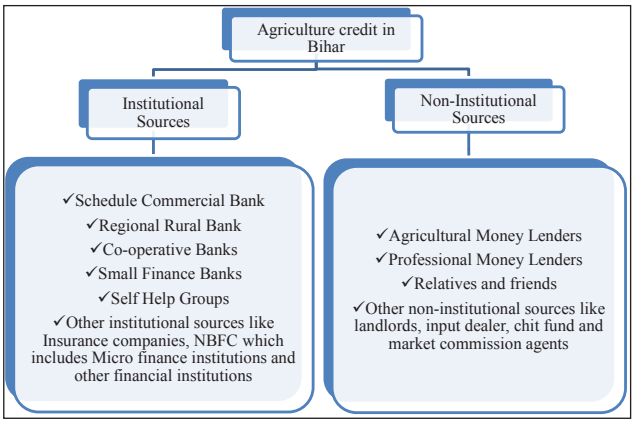
Water is an essential input for the crop and affects yield both ways- if under-used or over-used. According to Jin *et al.* (2012), irrigation has a significant impact on crop productivity and cropping intensities. Irrigation facilities often flourish on credits and in the new ecosystem where Micro Irrigation Systems (MIS) are promoted at a subsidized rate, credit borrowing to purchase MIS equipment's is also seen as prominent borrowing among farmers. Irrigation may same time, be seen as a proxy for mechanization in agriculture.

Fertilizer and Production

Fertilizer is the key to increasing crop production (Jaga and Patel, 2012). Dayal (1984) found that aggregate crop productivity is positively related to fertilizer and irrigation use.

Status of agriculture credit in Bihar

As per the NSS 77th round survey (2021), about 40 percent of the agricultural households are indebted, with an average of INR 23534 outstanding loans. Of these, 57.9 percent had borrowed from Institutional sources, whereas 40.8 percent had borrowed from non-institutional agencies. This shows that a considerable percentage of indebted households are availing of loans from non-institutional agencies in Bihar. The various sources of institutional and non-institutional credit are indicated in Fig. 2.



Source: *NSS 77th round (2019)*

Fig. 2: Sources of agricultural credit in Bihar

The analysis of institutional financial agencies in Bihar shows that scheduled commercial banks provide loans to both industry and agriculture, while Regional Rural Banks (RRBs) and co-operative banks broadly look after the requirements of agriculture. In recent years, the role of small finance banks and Micro-finance Institutions has also increased in the Bihar's economy.

Table 1: Trends and progress in ACP for agriculture and allied activities in Bihar

Year	Targets (₹)	Achievements (₹)	Percentage Achievements
2003-04	1900.34	1558.42	82.01
2004-05	2340.00	2030.00	86.75
2005-06	2698.00	2174.00	80.58
2006-07	3722.37	2985.40	80.20
2007-08	4881.00	3755.00	76.93
2008-09	7076.00	5697.00	80.51
2009-10	8727.00	7163.00	82.08
2010-11	15868.00	10667.00	67.22
2011-12	21102.00	14958.00	70.88
2012-13	25401.00	21566.00	84.90
2013-14	30286.00	28770.00	94.99
2014-15	36000.00	34680.00	96.33
2015-16	42500.00	41350.00	97.29
2016-17	48000.00	41077.00	85.58

2017-18	49000.00	42161.00	86.04
2018-19	60000.00	43621.00	72.70
2019-20	60000.00	41449.00	69.08
2020-21	61828.00	48695.00	78.76
CAGR	25.34%	25.29%	

Sources: *Author Compilation and calculation from Government of Bihar (2007-2021) and SLBC (2021).*

Our analysis of the collected data shows a rising trend in the targets ascertained for Annual Credit Plan (ACP) for the agriculture and allied sector (Fig. 3).

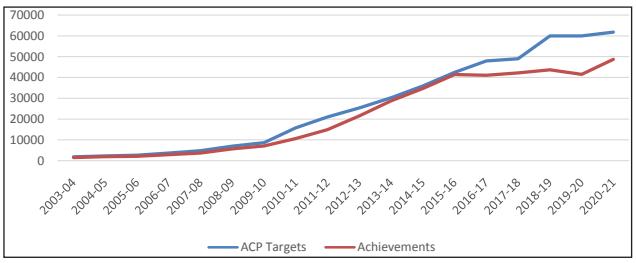


Fig. 3: Trend in the growth of ACP for agriculture and allied activities in Bihar

An analysis of achievements of the annual credit plan (ACP) for agriculture and allied activities also shows a rising trend from ₹ 1558.42 crores in 2003-04 to ₹ 48695 crores in 2020-21 (Table 1), registering 25.29 percent of compound annual growth rate (CAGR). Similarly, the outstanding advances in agriculture also show a rising trend from ₹ 2790 crore in 2003-04 to ₹ 44796 crores in 2019-20 (Table 2). Hence, there is an increasing trend in the outstanding advances to agriculture, which is reflected through a compounded annual growth rate (CAGR) of 19.90 percent. The average achievements of ACP were almost 80 percent over the years. This shows that formal credit has widened its range in the agriculture sector. However, the share of co-operatives and Land Development banks in the total outstanding loan remained quite unstable over the years between 2003-04 to 2012-13 (Fig. 4) and showed a persistent declining trend between 2012-13 (₹ 2824 crore) and 2019-20 (₹ 914 crore), except for 2015-16 and its consecutive year when the situation seemed improving (Table 2). This implies that co-operative credit is volatile/volatile in Bihar, unable to root itself firmly in the state. The area may be explored further for its weaker growth. However, an increasing trend has been observed in agricultural loans outstanding to agriculture by commercial banks and RRBs (Fig. 4).

Role of credit in agricultural growth

Agriculture credits have a positive association with agricultural productivity (Seven and Tunmen, 2020). Credit enhances agricultural growth through multiple indirect channels. First, easy and cost-effective access to credit enables the purchase of

Table 2: Trend in outstanding agricultural advances in Bihar by institutional agencies

Year	Commercial Bank	Regional Rural Bank	Co-operatives and Land Development Banks	Total Outstanding Agriculture Advances (₹ in Crore)
2003-04	1829	481	480	2790
2004-05	2580	854	422	3856
2005-06	3506	1195	379	5080
2006-07	4257	1694	272	6223
2007-08	5085	2249	384	7718
2008-09	6409	2206	308	8923
2009-10	8520	3104	292	11916
2010-11	10664	3270	48	13982
2011-12	12426	3445	2418	18290
2012-13	15422	4219	2824	22538
2013-14	19231	5101	1047	25380
2014-15	23130	6311	1212	30652
2015-16	25281	8856	1536	35673
2016-17	27256	10938	3636	41830
2017-18	30932	12217	2557	45706
2018-19	31239	13543	1032	45815
2019-20	29369	14513	914	44796
CAGR				19.90

Sources: *Author Compilation and calculation from Government of Bihar (2007-2021).*

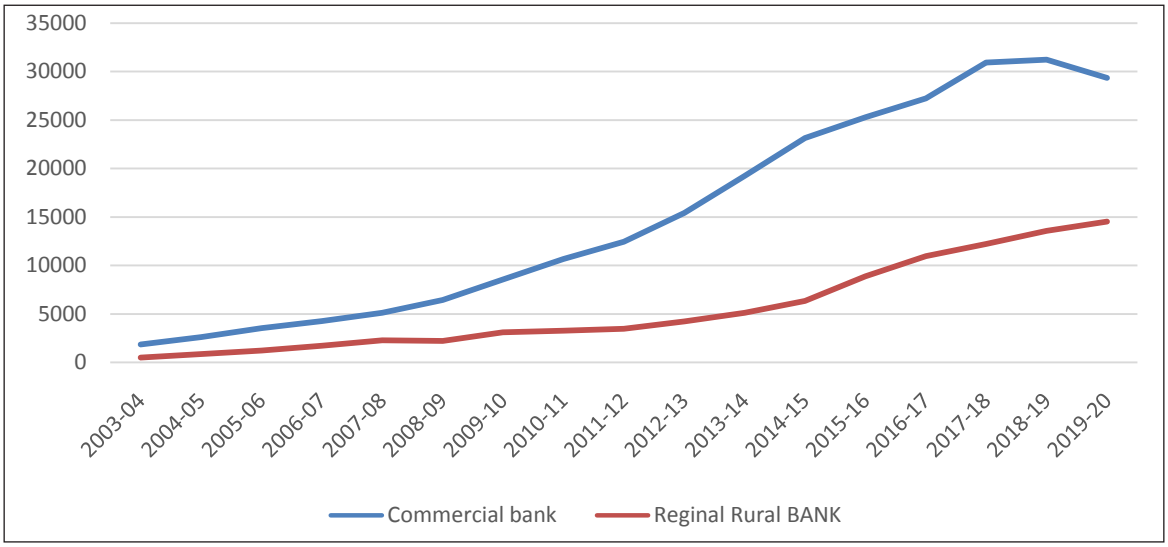


Fig. 4: Trend in the growth of outstanding advances (agriculture) by various agencies in Bihar

inputs during the sowing season; hence short-run impact of credit is on yield. Secondly, long-term credit enables farmers to invest in machinery, irrigation infrastructure, and other capital assets which in the long term increases the cultivated area's yield via major technological interventions. According to Binswanger and Khandkher (1995), credit has a modest impact on agricultural output.

The NSS 77th round survey (2021) shows that among the total loan outstanding by agricultural households in Bihar, 27.7 percent were for capital expenditure in the farm business, while 10.9 percent were for revenue expenditure, and the rest of the loans were taken for other purposes.

Table 3: Partial regression coefficients of variables

	Coefficients	Standard error
Intercept	-23393.14**	-2.33
ACP Achievements	0.17**	2.45
Fertilize in '000 tonnes	4.33	1.46
Gross irrigated area in '000 ha	7.61***	3.46
Multiple R	0.963	
R Square	0.927	
F Value	54.76	

Note: **significant at 10% level, **significant at 5% level, ***significant at 1% level*

The Multiple R was found 0.963, which indicates a strong correlation between the agricultural credit and productivity. The high R Square value of 0.93 suggests that over 93 percent of the variation in the production of crops can be explained by the explanatory variable included in the model, and the unexplained 7 percent variation could be due to external variables/factors. The large value of F Statistics shows that agricultural credit significantly impacts agricultural production.

The P-value for ACP for agriculture was found to be 0.02, falling within the 0.05 level, and for Gross Irrigated Area, it was 0.004 under the 0.01 significance level. It indicates that both variables are significant in the context of crop production

Since the coefficient of agriculture credit is positive, it indicates that with every unit increase in the explanatory variable (credit), the dependent variable (production) will also increase. Thus, the result shows the positive impact of agriculture credit on the agriculture growth rate.

Several studies have also shown that the impact of agricultural credit on agricultural growth is positive. Saleem and Jan (2011) identified a positive relationship between agricultural credit and GSDP. Similarly, Rahman *et al.* (2011) also stated the positive role of agricultural credit in enhancing productivity.

CONCLUSION

Agriculture credit flow in Bihar has increased over the last few years. The achievement under the annual credit plan in agriculture and the total

agricultural loan outstanding by the institutional agencies have registered positive growth. The more significant presence of non-institutional sources for delivering agricultural credit indicates that institutional agencies need to expand their presence in agricultural credit so that farmers get credit at a cost-effective rate. Credit co-operatives have faired poorly in the state. Further reasons have to explore behind their poor performance, and necessary actions may be taken. The positive relationship between the states' production and agricultural credit indicates the importance of credit for enhancing agricultural growth. Since agriculture plays a dominating role in Bihar, most of its people depend on agriculture for their livelihood, income, and food. Therefore the credit delivery system in Bihar needs to be improved so that the desired growth in agriculture and allied sector may be achieved.

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