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Short-term Credit and Rice Productivity in Orissa

An Investigative Study at District Level

ABSTRACT

Credit is considered as a critical input that affects agricultural productivity. Due to the lack of economic power and of educational background, the small and marginal farmers in Orissa (India) are unable to adopt the new technologies to increase the agricultural productivity, more specifically the productivity of rice. This is because the state looks rural credit from the supply side. In this paper, an attempt was made to study the impact of institutional short-term credit on productivity of rice in Bargarh district of Orissa by taking 454 samples from three different blocks. It is found that the availability of and accessibility to institutional short term credit has a positive impact on the use of modern technology and other inputs to improve the rice productivity. Key words: Rice productivity Short-term credit, Roissa and Farmars

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1.   BACKGROUD OF THE STUDY

Orissa is primarily an agrarian economy. Agriculture is the state's dominant sector with a contribution of nearly 30 per cent to the Net State Domestic Product (NSDP). About 73 per cent of total main workers are engaged in agriculture including 44.3 per cent cultivators and 28.7 per cent agricultural labourers (1991 census). Nearly 87 per cent of total population lives in rural areas. Though the contribution of agriculture to NSDP has significantly declined from 67 per cent in 1951 to around 30 per cent in 1998, the percentage of workforce engaged in agriculture has remained somewhat unchanged with 73.8 per cent in 1960 and 73 per cent in 1990 (Table 1). This implies that there has been an overcrowding in agriculture without any perceptible increase in production. There has been a spectacular increase in disguised unemployment or underemployment in the agriculture sector with zero or near zero marginal productivity of agricultural labour. Cultivated land area remaining more or less fixed, with increase in population the land-man ratio has worsened over time. The per capita availability of cultivated land which was 0.39 hector in 1950 has been drastically reduced to 0.17 hector in 1999.

Moreover the percentage of cultivators to main workers has decreased from 57 per cent in 1960 to 44 per cent in 1990. By contrast the percentage of agricultural labourers to main workers has increased from 17 per cent in 1960 to 29 per cent in 1990. Thus, within a span of three decades the ratio of agricultural labourers to cultivators has increased substantially from about 3:7 in 1960 to 6.5:3.5 in 1990. This is primarily due to increase in landlessness or near landlessness on account of population growth and sub-division of land holdings among legal heirs. As the pace of industrialisation in the state is dawdling and has not taken off, agriculture continues to provide sources of livelihood to a significant segment of population. Therefore, agricultural growth holds the key to the overall development of the state by way of creating employment, generating income, providing raw materials to the industrial sector and last but not the least ensuring self-reliance in food production and food security to the deprived sections.

2.　INTER-STATE COMPARISON OF PADDY PRODUCTIVITY IN INDIA

Coming to the physical crop productivity, it is observed that in the year 1998-99 the yield rate of food grains in Orissa was only 1080 kg/ha, whereas for all-India the figure was quite higher i.e. 1620 kg/ha (Table 2). Also, in the neighbouring states of West Bengal and Andhra Pradesh having similar agro-climatic conditions, the yield was substantially higher i.e.2200 kg/ha and 2000 kg/ha respectively. The yield rate was the

Table-1
Importance of Agriculture in Orissa Economy

Sl.No.	Indicators	1950-51	1960-61	1970-71	1980-81	1990-91
1	Share of Agriculture in NSDP (%)	66.8*	na	54.6	na	30.0**
2	Percentage of Total Population Living in Rural Area	95.9	93.7	91.6	88.2	87.0
3	Percentage of Total Workforce Engaged in Agriculture-	na	73.8	77.4	74.7	73.0
	a Percentage of Cultivators to Main Workers	na	56.8	49.2	46.9	44.3
	b Percentage of Agricultural Labourers to Main Workers	na	17.0	28.3	27.8	28.7
4	Per Capita Availability Of Cultivated Land (Ha)	0.39	0.38	0.31	na	0.18**

*Note: * Figures for 1951-52 **Figures for 1998-99 Source: Government of Orissa, Economic Survey (Various Issues), and Statistical Abstracts of Orissa, (Various Issues) Directorate of Economics and Statistics, Orissa, Bhubaneswar.*

Table-2
Inter-State Comparison of Agricultural Indicators in India

State	Yield Rateof Food grains (kg/ha) (1998-99)	Yield Rateof Rice (kg/ha) (1998-99)	% of GC AIrrigated (1996-97)	Fertilizer Use (kg/ha) (1998-99)	Av Sizeof Operational Holding (hectares) (1990-91)	% of Operational Area Leased in (1991)
Orissa	1080	1210	27.5	43.8	1.34	9.5
Bihar	1440	1300	46.0	97.2	0.93	3.9
West Bengal	2200	2260	27.5	136.0	0.90	10.4
Assam	1290	1340	14.4	27.7	1.31	8.9
Andhra Pradesh	2000	2780	43.1	155.5	1.56	9.6
Karnataka	1350	2530	23.7	103.1	2.13	7.4
Kerala	1770	1890	15.4	70.0	0.33	2.9
Tamil Nadu	2280	3440	51.8	162.9	0.93	10.9
Madhya Pradesh	1110	1010	25.8	47.2	2.63	6.3
Gujarat	1430	1630	33.1	87.8	2.93	3.3
Rajasthan	960	1220	32.6	39.5	4.11	5.2
Maharashtra	970	1660	14.5	88.9	2.20	5.5
Utter Pradesh	1960	1960	66.9	125.4	0.89	10.5
Punjab	3740	3150	94.1	184.6	3.61	18.5
Haryana	2700	2240	78.8	148.5	2.43	33.7
Himachal Pradesh	1770	1420	18.6	13.4	1.20	
Jammu & Kashmir	1730	2180	41.5	58.2	0.80	
India	**1620**	**1930**	**38.7**	**95.3**	**1.57**	**8.3**

Source: 1. Agriculture, CMIE, November-2000. 2. Report of the expert Group on estimation of Proportion and number of poor, Planning Commission (1993)

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highest for Punjab (3740kg/ha) followed by Haryana (2700 kg/ha), Tamil Nadu (2280 kg/ha) and West Bengal (2200 kg/ha).

If we consider the yield rate of rice which is the staple cereal crop of Orissa, the picture is, also, not encouraging. The average per hectare yield rate of rice in Orissa is only 1210 kg, whereas the all-India average is 1930 kg. A probe into the reasons for low productivity in Orissa unfolds that in agriculturally advanced states like Punjab, Haryana and Tamil Nadu the use level of yield enhancing inputs like irrigation and fertilizer is found to be too high in comparison to Orissa.

3. REVIEW OF AVAILABLE LITERATURE

Viner Jacob (1957) has observed that dominantly agricultural countries are found to be poor not because they are agricultural but their agriculture is backward. Desai (2001) has rightly pointed out that in countries like Mexico and Japan, agriculture has fared better off several times than that of India. It is not because they have relatively superior quality of land but due to the improved technology, skill, better quality seeds and better financial facilities etc. Mamoria and Tripathy (2003) have rightly said in their study that agricultural production and efficiency largely depend upon the inputs applied and the methods adopted.

Agricultural credit and agricultural productivity should go hand in hand and farmers should improve farming methods and also be provided adequate and cheap credit (Datt and Sundharm, 2005). Timely and adequate agricultural credit is important for increase in fixed and working capital for farmers. The credit needs of farmers are met chiefly by the money lenders, co-operative credit societies, commercial banks and regional rural banks. Dhingra (1993) in his work revealed that the peasantry gets finance from two major sources, viz. institutional

agencies and non-institutional agencies. The co-operative credit societies, commercial banks land development banks and RRBs come under institutional agencies where as money lenders and their agents, friends and relatives including landlords come under the category of non-institutional agencies.

To raise productivity of agriculture, there should be an improvement of institutional agricultural credit system (Parida, 1998), as it facilitates access to resources and services. Patil (2005) and Srivastav (1995) on realizing the importance of institutional credit suggested that bank should provide adequate credit to agricultural sector for increasing productivity which leads to the prosperity of the nation. Kanthi Mathinathan (2004) is of the view that, without cheap credit it is not possible for small and marginal farmers to run their business. Mosher (1986) in his study concludes institutional credit agencies serve as an important accelerator for agricultural development.

Zuberi (1989) estimated production function for the agriculture sector and concluded that the impact of institutional credit comes through financing of seed and fertiliser. The role of financing fixed investment was found insignificant. However, Qureshi and Shah (1992) observed that institutional credit affects agricultural output also through financing of capital investment. They found that the responsiveness of agricultural output is larger to institutional credit than that of output to fertilizer. Both the studies dropped the important variables like land and water in their finally estimated equations blaming the problem of multicollinearity while overlooking the dependency of purchased inputs like fertilizer and seed on institutional credit.

However, in case of Orissa, few studies have focused on the impact of institutional credit on agricultural production. A farm level analysis for rice cultivation in

Orissa was undertaken by Sarap and Vasisth (1993). The study reveals that the proportion of households adopting the modern varieties increases with an increase in the size of holding. The adoption of modern technology is also dependant upon credit availability and farm size. Though many researchers earlier have verified the positive linkage of agricultural productivity and adoption of modern technology, but in most of the earlier studies the impact of short term credit on paddy productivity are found to be lacking.

In the above context, this paper has been prepared to focus on impact of institutional agricultural credit on rice productivity in Bargarh district of Orissa state. The study has been alienated in three parts. While the first part deals with the importance of agriculture in Orissan economy, the second part reviews the available literature on agricultural credit and crop productivity. The third part concludes after making necessary empirical analysis of the data.

4.   MATERIALS AND METHODS

One of the notable districts of Orissa in Indian sub-continent, Bargarh is spread over a total geographical area of 5837 sq. km and holds a population of 13.46 millions as per the census data of 2001. The district is surrounded by Chhattisgarh on the north, Balangir district on the south, Sambalpur district on the east and Nawapara district on the west. The undulating alluvial Bargarh Plain is suitable to grow good quality rice and paddy. Blessed with natural drainage facilities, Bargarh Plain supports the growth of large agricultural products and is free from insects and pests. River Mahanadi and its tributaries flow through the district and make the district very fertile for growing agricultural crops.

In order to study the impact of institutional short term credit on productivity of rice in different farm size and different irrigated, semi-irrigated and non-irrigated areas, pre-and-post loan periods are compared. Three villages with varying degree of agrarian development and irrigation facilities drawn from three different blocks of the district are considered for the present study. One village is chosen from irrigated (double crop area) pocket, the other one from semi-irrigated (where irrigation for one crop i.e. khariff crop is assured) and the other from rain fed (non-irrigated) pocket. The villages were selected by stratified random sampling method. The selections of the sample cultivators of the sample villages are made on the basis of census method. It means all the farm households (based on their operational holdings) of the selected sample villages are considered for the present study. Based on the operational holdings the farms in each village under study are divided into three categories; such as Small (up to 5 acres), Medium (5.01 to 10 acres) and Large (more than 10 acres) farms. Altogether 454 samples were collected from three sample villages under study.

Pre-loan period is a period where more than 80 percent of the farms under study were not borrowing from formal sources either because of lack of access to formal farm credit or, lack of capacity to borrow or lack of trust of the lenders on their lending capacity, as many were poor or, lack of use of modern technology and thereby requirement of less formal farm credit or use of own fund as the only source of fund (even though insufficient) for farming or, psycho fear of the borrowers on the consequences of the formal credit if no repaid in time or, non-irrigated nature of the cropped area or, any other reasons or, all of these reasons. In other words, it is a period where the percentage of non-borrowers of formal farm credit was found very high.

To test the hypotheses, the 'F' value is found out by TWO-Way ANOVA Table

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where the Villages (3 types of villages: irrigated, semi-irrigated and non-irrigated) and Farm sizes (3 size classes: Small, Medium and Large) are known as Column and Row elements respectively.

For Column: $Ft = St2 / SE2 \sim F (k-1), (h-1) (k-1)$ Here, $Ft = St2 / SE2 \sim F (2, 4)$
For Row : $Fv = Sv2 / SE2 \sim F (h-1), (h-1) (k-1)$ Here, $Fv = Sv2 / SE2 \sim F (2,4)$

5.   RESULTS AND DISCUSSION

The relationship between formal farm credit (short-term) and productivity of rice can be analyzed in terms of the impact of institutional farm credit on the productivity of rice. The impact is considered in terms of the percentage growth of the productivity indicators in post-loan period compared to pre-loan period across the farm sizes and villages under study as discussed below.

The production of rice (in Rs.) per farm/acre in the post-loan period was compared to pre-loan period by different size classes of farms in different villages under study is represented in the following Table-3.

It is observed from the above Table 3 that there exists a significant difference in the production of rice per farm/acre across the farm sizes and villages under study in the post-loan period as compared to pre-loan period. In V1, the production of rice per farm/acre has increased by 36.44 percent, 34.81 percent and 32.59 percent for medium, large and small farms respectively in post-loan period over pre-loan period. On an average the production has increased by 34.78 percent for entire V1. Similarly in V2, the production of rice per farm/acre in post-loan period over pre-loan period has increased by 81.53 percent, 71.88 percent and 56.36 percent for medium, large and small farms respectively. On an average it is found 70.23 percent in post-loan period in V2. In V3, the production of rice per farm/acre in post-loan period over pre-loan period has increased by 61.40 percent,

Table - 3
Production of Rice

Village /Farm Size	Pre-loan Period		Post-loan Period		% of change in post-loan period over pre-loan periodper farm/acre
	Per farm (in Rs.)	*Per acre (in Rs.)*	*Per farm (in Rs.)*	*Per acre (in Rs.)*	
Irrigated Village (V₁)					
Small	24693.25	7412.00	32741.78	9827.88	32.59
Medium	56443.04	7638.91	76985.54	10419.10	36.40
Large	93121.88	6834.63	125533.13	9213.44	34.81
Total	39381.03	7445.89	53076.16	10035.27	34.78
Semi-irrigated Village (V₂)					
Small	18301.83	5284.33	28615.85	8262.32	56.36
Medium	34489.38	4663.35	62610.21	8465.61	81.53
Large	63520.00	5081.60	109175.00	8734.00	71.88
Total	29510.93	4979.35	50235.27	8476.14	70.23
Non-irrigated Village (V₃)					
Small	6766.67	2030.00	10091.67	3027.50	49.14
Medium	19950.00	2695.95	32200.00	4351.35	61.40
Large	41372.50	3008.91	63312.50	4604.55	53.03
Total	20389.33	2730.71	31653.33	4239.29	55.24
All Villages (All V)					
Small	17856.96	5285.93	25488.22	7544.90	42.74
Medium	37506.01	5071.99	57713.88	7804.72	53.88
Large	53974.63	4037.71	84121.54	6292.92	55.85
Total	**29845.19**	**4798.91**	**45059.51**	**7245.27**	**50.98**

Source: Field Survey Note: The quantity of the production is valued at a constant price (i.e. Market price of 2007-08) of output taken for the study for both the data of pre-loan and Post loan period to represent the data into monetary term for the sake of uniformity while making comparison. The percentage of difference in case of production, in Post loan period over pre-loan period is considered here to know the impact of credit.

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53.03 percent and 49.14 percent for medium, large and small farms respectively. On an average the production has increased by 55.24 percent for entire V3. For the entire villages (All V) covered under this study, the production of rice per farm/acre on an average has increased by 29.36 percent in post-loan period over pre-loan period.

The impact of institutional farm credit on the productivity of rice (paddy) per acre/ farm in terms of their percentage growth in post-loan period compared to that of pre-loan period across the farm sizes and villages was presented in Table 4 as follows.

The brief summary of the findings can be stated as the farm productivity i.e. production per acre, cost of production and inputs used per acre/farm are increasing in the Post loan period as compared to that of pre-loan period across farm sizes and village. The difference in the percentage of increase in production of rice (paddy) per acre/farm in Post loan period over the pre-loan period across the farm sizes is found statistically significant at 10% level of significance for $F(2,4) = 4.55$ and across the villages it is found statistically significant at 1% level of significance for $F(2,4) = 30.15$. It means the production of rice per acre/farm has increased in Post loan period even though at varying degree across the farm sizes and villages.

6. CONCLUSION

The productivity of rice has increased significantly in the Post-loan period as compared to that of Pre-loan period. This indicates the importance of institutional credit as one of the major factors in enhancing the productivity of rice in the area under study. It is possible due to the increased application of inputs in the Post loan period compared to that of Pre-loan period. The institutional farm credit increases the purchasing power of the farmers and perhaps due to this reason we

find an increase in the use of various inputs during the Post loan period. The institutional credit makes a moral boost to the farmer in applying a required quantity of inputs in their process of cultivation as a result of which there is a significant increase in productivity of rice in post loan period.

Table-4
Growth of Paddy Production in Post-loan period over Pre-loan period (per acre/farm)

Village / Farm Size	% growth of Production (in Rs.)
Irrigated Village (V₁)	
Small	32.59
Medium	36.40
Large	34.81
Semi-irrigated Village (V₂)	
Small	56.36
Medium	81.53
Large	71.88
Non-irrigated Village (V₃)	
Small	49.14
Medium	61.40
Large	53.03
V.R or F. Ratio for Column (across the farm sizes)	30.15*
V.R or F. Ratio for Row (across the villages)	4.55***

Source: Complied from questionnaire
Note:
1.　　　$F_t = \dfrac{S_t^2}{SE^2} \sim F_{(k-1),(h-1)(k-1)}$ for column (i.e. farm sizes)
　　　　　　df = k-1= 2
　　　　　　df = (h-1)(k-1)= 4

　　　　$F_v = \dfrac{S_v^2}{SE^2} \sim F_{(h-1),(h-1)(k-1)}$ for row (i.e. villages)
　　　　　　df = h-1= 2
　　　　　　df = (h-1)(k-1)= 4

2. * Significant at 1% level of Significance.
　 ** Significant at 5% level of Significance.
　 *** Significant at 10% level of Significance.
3. Tabulated Value = $F_{0.01}$ (2,4) = 18.00
　　　　　　　　　　$F_{0.05}$ (2,4) = 6.94
　　　　　　　　　　$F_{0.10}$ (2,4) = 4.32
4. In Column the 3 size classes of farms i.e. small, medium and large farms were considered. In Row the 3 villages i.e. V1, V2 and V3 were considered.
5. The quantity of the production is valued at a constant price (i.e. Market price of 2007-08) of output taken for the study for both the data of pre-loan and Post loan period to represent the data into monetary term for the sake of uniformity while making comparison. The percentage of difference in case of production, in Post loan period over pre-loan period is considered here to know the impact of credit.

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