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A Review of the Special Credit Programme in an Irrigation Project in India*

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SUMMARY

This paper gives a brief account of the special credit efforts undertaken by the Command Area Development Authority in a major irrigation project in synchronization with assured irrigation supplies. Co-ordinated action with credit societies in the co-operative sector and with commercial banks in the banking sector proved effective. An analysis of factors behind defaults in the repayment of loan dues showed that the characteristics which usually distinguish between the two groups of prompt repayers and defaulters were found to be statistically significant.

INTRODUCTION

In the Indian agricultural context, irrigation facilities are critically important as they offer the possibilities of multiple cropping, as well as providing a much needed protective cover during the uncertain *kharif* (July to October) season. Further, the income gains from the increases in productivity achieved by water-intensive high yielding varieties (HYV) of crops and the higher wages earned through greater labour absorption in irrigated agriculture are likely to enable the small (size of holding: 1 to

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2 ha) and marginal (size of holding: less than 1 ha) farmers and the landless labourers to break the poverty barrier.[4]

However, the potential gains from irrigated agriculture are realised only when the farmers are able, by means of short-term crop loans, to buy quality HYV seeds, chemical fertilizers and insecticides. The Command Area Development Authorities (CADAs) in charge of irrigation projects in India designed to speed up the construction of tertiary watercourses for delivering water to individual farmers below government outlets have also been entrusted with the responsibility of arranging for crop loans to farmers and for essential supplies.[1]

However, uncertainties in the delivery of water supplies have been found to be the major reason for farmers' unwillingness to adopt water-intensive HYVs and the associated package of practices based on high technology. Consequently, the farmers have settled for the drought-resistant, low value crops which are less intensive in water use with poor input applications and low technology practices.

The natural concern with the disappointing performance of the projects led the authorities to look closely at the delivery sytem. One of the solutions tried was the introduction of a rotational water supply (RWS) scheme at the farm level assuring each farm a certain quantity of water on a time per hectare basis, taking into account the discharge at the outlet, each serving not more than 40 ha at appropriate intervals dictated by crop and soil characteristics. An impact study revealed substantial social and economic gains from RWS.[2] The latter also enabled the farmers to plan in advance with regard to the choice of crops and inputs so that they no longer had to resort to the usual scramble for water and could allot their time more usefully. Further, farms either at the tail-end or belonging to the weaker sections of the society, such as small and marginal farmers, or those belonging to low castes, were also assured of equal access to water. Economic gains were evident in the increases of both marginal and average production of wheat—the major crop in the area during the *rabi* (winter) season.

Thus, when water supplies are reasonably assured, the need to ensure similar flows of crop loans to help the farmers to buy critical inputs assumes importance. With the aim of mobilising credit resources from financial institutions, such as the co-operative societies and the public sector commercial banks, special campaigns are mounted just before the cropping season starts. A special feature of these campaigns is the emphasis on credit facilities for small and marginal farmers.

The objective of this paper is to undertake a review of such a credit campaign in an irrigation project where RWS has come to stay. The project chosen for study is known as the Mahi-Kadana Irrigation Project in the State of Gujarat, which was partly financed by soft-loan assistance from the World Bank during 1970–76. The paper is divided into four sections. The first provides the background to the project. The second presents a brief account of special credit efforts undertaken in an area where the RWS was in operation. The third analyses the factors accounting for the defaults in the repayment of credit dues. The last section offers a summary and certain policy conclusions.

PROJECT AREA

The Mahi-Kadana Irrigation Project in Gujarat State was completed in two phases. The first phase relates to the construction of a diversion weir across the River Mahi at Wanakbori in the Kheda District in 1960; the second refers to the completion of a dam in 1978 across the river at Kadana village in the adjacent district of Panchmahals, 112 km upstream from Wanakbori.

The cultivable command area of the project is estimated to be 0·212 million hectares covering either whole or part of the seven revenue units of the Kheda District, known as *Talukas*, on the right bank, and 0·011 million hectares, covering parts of the two *talukas* of the Panchmahals District, on the left bank.

The distribution system, consisting of the main canal and distributaries and the farm level field channels, has only very recently reached completion stage on the left bank but a large part of the area on the right bank has received irrigation supplies for the last two decades due to the completion of the first phase of the project. The diversion weir has enabled intensive irrigation in the *kharif* (monsoon) season, from July to October, and limited irrigation in the *rabi* (winter) season, from October to March, and in hot weather from March to June depending upon the river flows. After completion of the dam in 1978, year-round irrigation has become a reality with a greater area also under irrigation in the *rabi* and hot weather seasons. Since the left bank is relatively new to irrigation compared with the right bank, our attention here is confined to the right bank only.

The area under study is one of the most progressive spots in the State in

terms of agricultural practices and of co-operative ventures such as milk processing. The upper and the upper middle parts of the command area (Thasra and Nadiad *Talukas*) have the most fertile land in the area (sandy loam to sandy). The lower middle part of the area (Anand, Petland and Borsad *Talukas*) is of the medium black type. The tail part of the area (Matar and Khambhat *Talukas*), which is mostly coastal saline, is poorly drained and less fertile.

Pearl millet, paddy and pulses, especially pigeon pea, are the important *kharif* crops. Tobacco is grown as a two seasonal crop, accounting for 40 per cent of the cropped area in the *kharif*. The exclusive *rabi* crops are wheat and potatoes. In summer, pearl millet and fodder sorghum are grown.

With regard to facilities for crop loans which meet the most crucial input needs of the cultivators, there are 488 primary (village level) agricultural co-operative societies financed by the District Central Co-operative Bank at the apex level covering 496 villages with 76 per cent of

TABLE 1

Co-operative Crop Loans at Current and Constant Prices in the Mahi-Kadana Command Area

Year	*Aggregate crop loans at current price (Rs. million)*	*Aggregate crop loans at constant (1970–71) prices (Rs. million)*	*Crop loans per hectare at current prices (Rs.)*	*Crop loans per hectare at constant (1970–71) prices (Rs.)*
1966–67	10·6	12·8	28·6	34·6
1967–68	16·2	17·6	47·9	47·5
1968–69	21·4	23·5	58·0	63·5
1969–70	22·0	23·2	59·4	62·7
1970–71	28·9	28·9	78·0	78·0
1971–72	34·9	33·1	94·5	89·5
1972–73	45·4	39·1	122·8	105·7
1973–74	47·2	33·8	127·6	91·3
1974–75	87·0	49·7	275·0	134·4
1975–76	93·4	54·0	252·5	145·9
1976–77	89·1	50·1	240·9	136·9
1977–78	97·3	52·6	311·8	167·9
1978–79	119·1	64·1	317·5	189·1
1979–80	128·4	59·0	374·6	172·1
1980–81	148·6	58·8	433·3	171·5

the cultivators enrolled as members. The average number of members of each of these societies is about 215, of which 42 per cent is the active borrowing membership. Table 1 presents details of the aggregate short-term loans disbursed, as well as loans per hectare at constant prices over the last 13-year period.

The public sector commercial banks, which entered on the rural scene in a big way only after their nationalisation in 1969, have been devoting, on an all-India level, 15 per cent of their total advances to agricultural needs. In the project area under study, the corresponding proportion is 30 per cent. However, their coverage is not as extensive as that of the co-operative societies. Their branches are less in number, only 42 as against 488 primary co-operatives. Most branches are concentrated within a 15 km radius of the *Talukas* headquarters, with the result that the interior villages are not catered for.

From 1979 to 1981, when crop loans in the Kaira District (inclusive of the project area) amounted to around 250 million Rupees per annum on average, over 85 per cent of the crop loan needs were being met by the co-operatives. This is understandable since the public sector banks are fairly new to agricultural financing. But it is encouraging to note that the proportion of bank loans for agriculture's short-term needs has also been on the increase.

Despite increased attention being paid to small farmers holding 2 ha or less, the flow of credit to them has all along been only around 30 per cent of the total credit disbursed. Overdues at the primary co-operatives level is about 12 per cent of the total outstanding, which is far less than the overdues of the co-operatives for the whole State; namely, 37 per cent. This shows that the repaying capacity of the farmers of the public sector banks is not very encouraging. This is mainly due to the fact that the post-disbursement control of the credit used has not been efficient and that the banks have no intimate grassroots connections, as the primary co-operative societies have, in the project area. It is hoped that, with increases in the number of branches in the rural areas in future years, the banks will have greater access to the interior parts and hence will be able to step-up their recoveries.

SPECIAL CREDIT EFFORTS

RWS, as part of the World Bank Assisted programme, was introduced in the *rabi* (October–March) season of 1980–81 in an area of 6278 ha in 30

villages. Well before the season began, the Commissioner of the CADA, at his monthly co-ordination meeting, held in August with the officials of the irrigation department and the District *Panchayat*—the apex local self-government institution in a three-tier scheme of decentralized administration, in charge of the agricultural production and extension programme—the Deputy Registrar of Co-operatives (DRCS) and the Manager of the District Central Co-operative Bank (DCCB), evolved a strategy for the implementation of RWS.

This strategy consisted of the following steps:

(a) Giving wide publicity to the introduction of RWS, assuring the farmers of certainty of supplies in the specified area through the vernacular press, radio and TV.
(b) Preparing detailed maps of the distribution system and the farms under each outlet covered by RWS for each village.
(c) Distribution of the relevant village maps to each village level worker (VLW) under the Training and Visit system of extension to carry the message of an assured irrigation supply to the farmers in his charge.
(d) Discussion of the RWS at the weekly meetings attended by all the VLWs at the Block headquarters each Friday.
(e) Preparation by the CADA staff, working under the DRCS, of estimates of credit requirements for the crops to be grown after contacting each farmer in the RWS area.
(f) Discussion of ways and means to meet the credit requirements of a series of special meetings with representatives of the District Central Co-operative Bank and the public sector commercial banks operating in the district.
(g) Fortnightly monitoring of the progress of RWS.

Following the general strategy outlined above, the idea of organising a formal meeting with all the District Managers of the public sector commercial banks and the Manager of the District Central Co-operative Bank was discussed with the Regional Manager of the Bank of Baroda and the DRCS. The Regional Manager of the Bank of Baroda suggested that, as a leader among the public sector banks operating in the District, by virtue of having the largest number of branches and having been designated by the Reserve Bank of India as the leading bank, he would assume the stewardship and discuss it with his counterparts in the banking

sector, in the first instance on the subject of sharing the responsibilities of credit disbursement to the RWS area among the 22 nationalized banks.

In September, when the District Credit Consultative meeting was held, the CADA officials, the District Central Co-operative Bank's Manager and the DRCS were invited, and the credit mobilization strategy was discussed in detail. It was agreed that:

(a) The public sector commercial banks, being the latecomers to the agricultural credit sector, would not cut into the already well-established sphere of operation of the co-operative societies, and that the banks would extend credit only to those who are not members of the co-operative societies.
(b) The banks and co-operatives would not extend any credit to those farmers who have accumulated overdues with any bank or co-operative societies in the past.
(c) Credit would be disbursed only to those who are generally eligible, such as those having clear title to land.
(d) As the leading bank, the Bank of Baroda would assume the responsibility of credit distribution in 70 per cent of the villages, and the other nationalized bank would be responsible for credit distribution in the remaining villages in accordance with the ratio of number of branches.

Following these decisions, each bank was given a list of outlets under RWS, with full details of each farm land, such as its revenue survey number, description and location, the owner's name and the details of the crops likely to be grown in the *rabi* season, as determined by the extension workers.

Well co-ordinated efforts with periodical monitoring produced impressive results, as shown in Table 2. In the 2-year period prior to the special campaign, the average credit per hectare in the *rabi* season was much below the recorded figure of Rs. 2104 per hectare for the 1980–81 *rabi* season. Similarly, the number of farmers and the total hectares under cultivation covered by the crop-loan facility are also greater than the corresponding figures for previous years.

Table 3 shows the distribution of borrowers divided into two categories: marginal and small farmers and large-scale farmers. Seventy-eight per cent of the borrowers belong to the small and marginal farmer

TABLE 2

Disbursement of Crop Loans During the *Rabi* Season by Credit Institutions in Thirty Villages: 1978–79 to 1980–81

Year	*Crop loans disbursed (Rs. in '000)*			*Number of farmers to whom loans given*			*Area covered (ha)*			*Per hectare loan (Rs.)*			*Loans repaid (Rs. in '000)*		
	Co-op. Socs.	*Banks*	*Total*	*Co-op. Socs.*	*Banks*	*Total*	*Co-op. Socs.*	*Banks*	*Total*	*Co-op. Socs.*	*Banks*	*Total*	*Co-op. Socs.*	*Banks*	*Total*
1978–79	8192	1491	9683	2606	569	3175	4553	626	5179	1799	2382	1870	5781	960	6741
1979–80	6033	2240	8273	2300	458	2758	4389	698	5087	1375	3209	1626	6018	1656	7674
1980–81	10134	2789	12923	2839	545	3384	5243	899	6142	1933	3103	2104	6923	1809	8732

category and 72 per cent of the area covered by the loan facilities belongs to small and marginal farmers.

Among the prompt repayers, 80 per cent belong to the category of small and marginal farmers, and nearly 86 per cent of the aggregated loan recovered comes from this particular category of farmers.

A more detailed review of the six randomly selected villages covered by the special credit campaign shows that, of 571 borrowers (1192 ha) in these, 75 per cent belonged to the marginal and small farmer category and

TABLE 3
Distribution of Borrowers, Loans Disbursed and Recovered in Thirty Villages

Farmer category	*Credit disbursed*				*Number of farmers*	*Amount recovered (Rs. '000)*
	Number of farmers	*Area covered (ha)*	*Loans given (Rs. '000)*	*Per hectare credit (Rs.)*		
Marginal and small farmers	2628 (77·66)	4468 (72·75)	10104 (78·19)	2261	1649 (80·13)	7523 (86·15)
Large-scale farmers	756 (22·34)	1674 (27·25)	2819 (21·81)	1684	409 (19·87)	1209 (13·85)
Total	3384 (100)	6142 (100)	12923 (100)	2104	2058 (100)	8732 (100)

(Figures in parentheses denote percentages of total.)

25 per cent to the large-scale farmer category. However, the area covered by crop loans belonging to the marginal and small farmers was about 65 per cent. On average, crop loans per hectare for the *rabi* season were Rs. 2025, but the marginal and small farmers received a higher amount per hectare than the large-scale farmers.

Three-hundred-and-sixty-eight—or 68 per cent—of borrowers repaid the crop loan dues. Of the prompt repayers of crop loan dues, 80 per cent belonged to the marginal and small farmer category and the amount recovered from the same category also forms a similar percentage of the total amount recovered (Table 4).

TABLE 4
Distribution of Borrowers, Credit Disbursed and Recovered in Six Villages

Farmer category	*Credit disbursed*			*Prompt repayment*			*Defaulters*	
	Number of farmers	*Area covered (ha)*	*Loans given (Rs.'000)*	*Per hectare credit (Rs.)*	*Number of farmers*	*Amount recovered (Rs.'000)*	*Number of farmers*	*Amounts due (Rs.'000)*
Marginal and small farmers	430	770	1 761	2 267	308	1 196	122	565
	(75·3)	(64·6)	(72·9)		(79·8)	(79·9)	(65·9)	(61·6)
Large-scale farmers	141	422	653	1 547	78	301	63	352
	(24·7)	(35·4)	(27·1)		(20·2)	(20·1)	(34·1)	(38·4)
Total	571	1 192	2 414	2 025	386	1 497	185	917
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)

(Figures in parentheses denote percentages of total.)

FACTORS BEHIND DEFAULTS IN REPAYMENT

An agricultural credit campaign is not a 'one-off' programme. It has to be repeated for each cropping season, for which reason the morale of the credit agencies and the enthusiasm of the CADA in orchestrating various activities have to be kept up. This is possible only if the repayment schedules are adhered to by the farmers and the seasonal crop loans are fully paid up before the beginning of the next agricultural year.

It will be of interest to analyse the factors that influence the behaviour of farmers with regard to the repayment of, or the failure to repay, crop loans. It is generally considered that the larger the size of his land holding, the greater are the staying powers of the farmer—and hence his repayment capacity, even in adverse circumstances. Consequently, it often comes to be believed that the small farmer is not a worthy credit risk, although the evidence is to the contrary in the present case.

The next factor of importance is the nature of the crop that is being financed. It is commonly held that farmers growing cash crops are more likely to be able to pay back their crop loans than farmers growing food crops as the returns from cash crop cultivation are far greater. Another factor affecting the repaying capacity of a farmer is his access to irrigation supplies. Although RWS generally takes into account the physical location of the farm land in the outlet command area, by adjusting the time taken for water to travel to the farthest distances from the outlet, the farmers believe that those lands located at the head reaches have the maximum amount of supplies, followed by those located in the middle, the worst sufferers being the farmers situated at the tail-end.

The next two factors relate to the social position and political influence of the farmers. It is normally held that the farmer holding a position in the village *Panchayat*, or an office in the co-operative society, such as being a committee member, may misuse his position to avoid or postpone paying his legitimate dues to the credit institutions or governmental agencies. However, a mitigating factor is the social consciousness which is reflected in the educational attainments of the farmer. Farmers with a number of years spent in acquiring formal education, either at high schools or colleges, are expected to be relatively conscious of their social obligations and to pay off their loan dues in time to credit institutions.

The size of the family is also said to be an important variable affecting the capacity of the farmer to repay the credit amount. The larger the size of the family, the greater are the economic pressures on earnings from the

farm and the lower the farmer's savings which would enable him to repay the loan.

Finally, the farmer's caste, especially if he is a *harijan* who is generally designated as belonging to weaker sections of society, is also considered a relevant factor. The belief is that those belonging to upper castes are well-to-do farmers and that, since their economic position is stronger than that of the *harijans*, they are more capable of meeting their repayment obligations.

Thus, we can identify eight variables, of which two are quantifiable (land holding and number of members in the family) and the other six are categorical (cash crop, location, member of *Panchayat*, office holder in the co-operative society, education and caste). A questionnaire-cum-interview method was adopted for collecting information pertaining to these eight variables from each of the 571 borrowers. Three-hundred-and-forty-four farmers returned the questionnaire fully completed. Of these 344 farmers, 300 had repaid their loan amount and 44 had not.

To distinguish between the two groups of farmers—those who promptly repaid and those who defaulted—the above eight variables are so chosen as to measure the characteristics on which the two groups are expected to differ. These discriminating variables can be weighted and combined linearly in such a fashion that the two groups emerge statistically as distinctly as possible.[3] Thus, we may undertake a discriminant analysis, entering all the known eight variables at the same time.

With the help of discriminant function analysis, the two groups of farmers—those who are prompt repayers and those who are defaulters in repayment—can be separated. Such an analysis of various socio-economic characteristics can also be profitably used for future credit planning if the model is found to emerge with a high predictive value.

A linear discriminant function of the following form has been employed to discriminate the socio-economic characteristics of the two groups of farmers:

$$Z = \sum_{k=1}^{n} a_k X_k$$

Where: Z = total discriminant score for the prompt payer and defaulters
X_1 = size of land holding in hectares
X_2 = 0, if the crop financed is a food crop or
1, if the crop financed is a cash crop

$X_3 = 0$, if the farmer is located at the tail-end,
1, if the farmer is located at middle part, or
2, if the farm is located at upper reaches
$X_4 = 0$, if the farmer is not an elected member of a *Panchayat*, or 1 if otherwise
$X_5 = 0$, if the farmer is not an office holder in the society, or 1, otherwise
$X_6 =$ Size of the family
$X_7 = 0$, if the farmer is illiterate
1, if he had attended a primary school, or
2, if he had attended a college
$X_8 = 0$, if he is a *harijan*, or
1, if he is not a *harijan*
a_k $(k = 1, 2, \ldots, 8)$ are the coefficients of the linear discriminant function

Table 5 presents the results of the discriminant analysis reporting the values of discriminant weights for the eight variables which were entered to determine the discriminant function. Of the eight variables, an equal number have positive and negative signs. Of the four variables having positive signs, the magnitude of the weights for physical location, nature of the crop and office holders in a co-operative society are low. Among the four variables having negative signs, the weights for the variables relating

TABLE 5
Results of Discriminant Analysis

Variables		*Discriminant weights*
Land holding size	(X_1)	−0·009 3
Nature of crop	(X_2)	0·073 4
Physical location	(X_3)	0·017 1
Office holder in the *Panchayat*	(X_4)	−0·196 7
Office holder in the co-operative society	(X_5)	0·049 6
Size of the family	(X_6)	−0·003 2
Education	(X_7)	−0·001 1
Caste	(X_8)	0·168 7

Mahalanobis' $D^2 = 2{\cdot}682\,7$
$F(8{\cdot}335) = 6{\cdot}978\,1$
Bartlett's Chi-squared test = 32·789 1
Degrees of freedom = 8

TABLE 6
Discriminant Score: Means and Cutoff Point

Group	*Sample size*	*Mean*
Prompt repayers	300	0·195 1
Dcfaulters	44	0·171 9
Cutoff point: $\frac{0\cdot195\,1 + 0\cdot171\,9}{2}$ =		0·183 5

to education and size of family have relatively low values. The tests of significance, both F ratio and the Barlett's Chi-squared test, show that the discriminant function determined by entering the eight variables is statistically significant.

Table 6 presents the means of the two groups' discriminant scores. The cutoff point for discriminating between two groups of irrigators is arrived at by taking the sample means of the two groups' mean discriminant score. On the basis of the cutoff point, the predicted as against the actual, classification of the farmers into two groups is shown in Table 7. The classification matrix suggests that (286 + 4)/344, or 84 per cent, of the sample is correctly classified. Hence, the separation effected by the discriminant function is fairly satisfactory from the practical point of view as well.

TABLE 7
Classification Matrix of Borrowers

Actual	*Predicted by function*		
	Prompt repayers	*Defaulters*	*Total*
Prompt repayers	286	14	300
Defaulters	40	4	44
Total	326	18	344

SUMMARY AND CONCLUSIONS

This paper has focused attention on special efforts being undertaken by the CADAs in India to promote irrigated agriculture and to provide crop loans. A case study of a credit campaign mounted in the *rabi* season o

1980–81 in the Mahi-Kadana Irrigation Project shows that well planned and co-ordinated efforts, both just before the season and during the season, could yield impressive results. The latter are generally judged in terms of aggregate quantum of credit as well as per hectare credit. Further, in the context of the current institutional situation of inequitable distribution of land, improved access of the marginal and small farmers to credit also provides a yardstick with which to determine the project's performance.

However, against the general constraint of financial resources, credit recycling is vital, for which prompt repayment of credit dues has to be ensured. Certain socio-economic characteristics of borrowers from a randomly selected sample of six villages were entered into a discriminant function analysis and it was found that the model evolved has a fairly high predictive value.

The general policy implications that could be drawn from the study are as follows:

(a) Whilst the general organizational structure of the CADA provides a suitable framework for ensuring credit flows for crop production, sustained efforts are needed in the sphere of co-ordination between several agencies.
(b) The leading banks in the districts, so designated by the country's banking structure, could successfully implement the leadership rôle among the banks.
(c) The apparent competitive position between the banks and agricultural co-operative societies could be usefully geared to the benefit of the clientele without jeopardizing their spheres of operation.
(d) Whilst the co-operatives enjoy a well-knit grassroots organizational structure functioning to their advantage in the prompt recovery of dues, branch expansion of banks in rural areas on a more intensive scale can be urgently considered so that their recovery performance could be improved.

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