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IMPACT OF INTEGRATED RURAL DEVELOPMENT PROGRAMME IN ANANTAPUR DISTRICT OF ANDHRA PRADESH—A MULTIPLE DISCRIMINANT FUNCTION APPROACH

The Integrated Rural Development Programme (IRDP) seeks to create productive assets among the poorer sections of society in the rural areas. It is a modest attempt to correct the distortions in the credit market for the have-nots. The practice of creating assets among the beneficiaries is intended to strengthen their asset position and consequently their credit worthiness in the future. The final goal however is to improve their overall economic condition.

Asset creation has a two-fold purpose, firstly, generation of additional employment among the beneficiary households and secondly, augmenting their incomes. It is to this end that IRDP strives. As a result, the overall economic status of the beneficiary is expected to improve, which will enable them to cross the poverty line.

IRDP is the single largest anti-poverty programme currently underway in all the 5,011 blocks in the country. Under this programme about Rs. 1,766 crores were spent during the Sixth Five Year Plan (1980-85) and Rs. 3,473 crores are earmarked for the Seventh Five Year Plan. When such a huge outlay is involved, it is essential to evaluate the extent to which this programme has had an impact in alleviating poverty and the problems encountered and how it could be revitalised. The main objective of the study is to analyse the overall impact of the IRDP in Anantapur district of Andhra Pradesh.

Methodology

The study was carried out based on a random sample selected at two levels. In the first instance, two blocks, *i.e.*, Penukonda [Drought Prone Area Programme (DPAP) block] and Uravakonda [Command Area Development Agency (CADA) block] were selected randomly from 16 blocks in Anantapur, a chronically drought-prone district of Andhra Pradesh. Thereafter, 100 beneficiaries and 60 non-beneficiaries were selected randomly from each block.

The primary data were collected from the beneficiaries as well as non-beneficiaries of the two blocks for the reference period 1981-82 and 1984-85. Thus those respondents who obtained the assistance in 1981-82 were studied and assessed for their socio-economic conditions at two points of time, *i.e.*, in 1981-82 (before the project was initiated) and 1984-85 (after three years of project implementation), thus allowing sufficient time for the programme to run, to have its impact on the economic conditions of the households, as per the Planning Commission's expectations. Similar information was collected for non-beneficiary households also as a check.

The performance of a rural development programme is better judged by its output rather than by its input. Hence, what is needed is a simple and quick system of monitoring and concurrent evaluation of the impact of the IRDP on income, employment and asset generation of the beneficiaries rather than merely reporting

the number of beneficiaries covered and the amount of subsidies and loans disbursed. This is popularly referred as the target approach.

In the present study, the overall impact of the programme for the uplift of the rural poor is evaluated considering different variables/characteristics through multiple discriminant analysis. The procedure outlined by Overall and Klett (1972) was followed. To accomplish this objective of the analysis, 'pre and post' and 'with and without' approaches are combined for project evaluation, thus constituting a total of eight groups. The method of multiple discriminant analysis results in reduction of the multiple measurement to one or more weighted combinations having maximum potential for distinguishing among the members of the different groups.

The significance of the multiple discriminant function was tested by the Chi-square test as suggested by Overall and Klett (1972). Computations of distances among the groups and testing for their significance were in accordance with the procedures described by Overall and Klett (1972). The relative magnitudes of the variables in different multiple discriminant functions were calculated by multiplying the coefficients with the respective standard deviations of the variables to which the coefficents correspond.

Two discriminant functions have been determined in the present study, of the type,

$$Y^{(1)} = a_1{}^{(1)} X_1 + a_2{}^{(1)} X_2 + \ldots + a_p{}^{(1)} X_p \ldots . (1)$$

and $$Y^{(2)} = a_1{}^{(2)} X + a_2{}^{(2)} X + \ldots + a_p{}^{(2)} X \quad \ldots . (2)$$

which are found adequate to discriminate the groups (K) formed in our study.

Hence, superscripts (1) and (2) employed in $Y^{(1)}$, $Y^{(2)}$ and $a^{(1)}$, $a^{(2)}$ are merely used to emphasise different discriminant functions, here a's are determined numerically, as explained in Overall and Klett (1972).

Once the discriminant functions are constructed, a few possibilities of their use exist. First, it helps us to get an insight into structural configuration of the groups in the (geometric) discriminant space. When a clear-cut configuration emerges, then it is possible to assign some economic meaning to these discriminant functions in the role played for discrimination.

Structural Configuration of the Groups

The K groups can be located in the discriminant space spanned by $Y^{(1)}$ and $Y^{(2)}$ as follows:

First the group means $\overline{Y}_g{}^{(1)}$ (g = 1, 2 .... K) are computed for the individual households for each group 'g' by substituting the means ($\overline{X}_1$, $\overline{X}_2$ ... $\overline{X}_p$) for the

respective groups in the first discriminant function $Y^{(1)}$ defined by equation (1). Likewise, the group means $\overline{Y}_g^{(2)}$ (g = 1, 2 ... K) are computed for each group by substituting $(\overline{X}_1, \overline{X}_2 \ldots \overline{X}_p)$ in $Y^{(2)}$ defined by equation (2). Thus for each group g (g = 1, 2 ... K), we have a pair of numbers $(\overline{Y}_g^{(1)}, \overline{Y}_g^{(2)})$ which serve as co-ordinates for locating that group 'g' in the discriminant space defined by $Y^{(1)}$ and $Y^{(2)}$ axis.

The improvement over time due to the factors other than the project was calculated as follows:

$$A = \frac{(\overline{Y}^{(1)}_{PNB} + \overline{Y}^{(2)}_{PNB}) - (\overline{Y}^{(1)}_{PRNB} + \overline{Y}^{(2)}_{PRNB})}{(\overline{Y}^{(1)}_{PRNB} + \overline{Y}^{(2)}_{PRNB})} \times 100$$

The change in the position of the beneficiaries during the project period was assumed to be due to the impact of project, and in addition to the effect of other inherent factors and was calculated as follows:

$$B = \frac{(\overline{Y}^{(1)}_{PB} + \overline{Y}^{(2)}_{PB}) - (\overline{Y}^{(1)}_{PRB} + \overline{Y}^{(2)}_{PRB})}{(\overline{Y}^{(1)}_{PRB} + \overline{Y}^{(2)}_{PRB})} \times 100$$

where PNB = post-non-beneficiary
PRNB = pre-non-beneficiary
PB = post-beneficiary
PRB = pre-beneficiary
$Y^{(1)}$ = first discriminant function
$Y^{(2)}$ = second discriminant function

The significance of this change was tested by D^2 statistics calculated using two multiple discriminant functions, if the two functions explain more than 90 per cent of the total variation, as explained by Overall and Klett (1972).

Results and Discussion

As already mentioned, the difference between the overall economic status of beneficiaries before and after the implementation of the project is assumed to be due to the impact of the project and the instrinsic factors other than the programme. In contrast, the changes in the case of non-beneficiaries before and after the project are only due to the factors other than the project. If the beneficiaries and the non-beneficiaries prior to the programme were economically homogeneous, then the difference in their economic status before and after the project could be attributed to the impact of the project. But the present investigation pointed out a significant divergence in the economic status of participants and non-participants before and after the project itself (Table I). Under such circumstances, it was thought appropriate to analyse the impact of the programme by adopting 'before and after' and 'with and without' approaches. Keeping this analogy in mind, discrimination of these groups as well as divergence among them through ten socio-economic variables was attempted using the multiple discriminant function. The ten variables included in the function were family size, working labour force, productive assets, non-productive assets, total consumption expenditure, education, per capita total income, employment per man unit, land (dummy 0-1) and total productive expenditure. Total variation in these variables was 228.27 per cent and 396.14 per cent for CADA and DPAP respondents respectively, out of which the first multiple discriminant function variation for corresponding groups accounted for 73.75 per cent and 63.81 per cent respectively. In contrast, the second multiple discriminant function explained 17.35 per cent and 34.39 per cent for the respective groups. Thus the first two functions could explain more than 90 per cent (91.09 for CADA and 98.21 for DPAP) of the total variation with these ten explanatory variables (Table I). Accordingly, only two multiple discriminant functions were extracted.

A persual of the relative magnitudes of each of the coefficents, adjusted for the differences in units of measurements, indicated that the total consumption expenditure and per capita total income had contributed the maximum to the first and second function respectively in CADA. On the contrary, in DPAP, the family size was found to be the major factor for discriminating the four groups through the first two multiple discriminant functions. However, apart from this variable, the highest weightages in the first and the second function were consumption expenditure and total income respectively, as in the case of CADA. In general, from the overall relative importance of different variables, two dimensions of economic status could be identified. The first function might project the dimension of total consumption expenditure, while the second might reveal the dimension of per capita total income. It is obvious that an economically viable individual will have to balance his total income and total consumption expenditure. These two variables also have a bearing on the net income of the individual. Thus the important variables of economic status as suggested by multiple discriminant function have given higher weightage in determining the economic change over time and due to the project.

TABLE I. COEFFICIENTS FOR THE FIRST TWO MULTIPLE DISCRIMINANT FUNCTIONS DEVELOPED FOR CADA AND DPAP BLOCKS

Variables	CADA		DPAP	
	$Y^{(1)}$	$Y^{(2)}$	$Y^{(1)}$	$Y^{(2)}$
(1)	(2)	(3)	(4)	(5)
Family size (X_1)	−0.17067 (0.2227)	1.01762 (1.3280)	−1.09110 (1.5412)	1.01952 (1.4491)
Working labour force (X_2)	0.11984 (0.0947)	−0.49023 (0.3873)	1.36948 (1.0956)	−0.94333 (0.7547)
Productive assets (X_3)	0.00001 (0.1235)	−0.00006 (0.7410)	0.00001 (0.1230)	−0.00008 (0.9837)
Non-productive assets (X_4)	−0.00025 (0.9230)	0.00015 (0.5538)	−0.00008 (0.3752)	−0.00005 (0.2345)
Total consumption expenditure (X_5)	0.00089 (1.3019)	0.00019 (0.2779)	0.00115 (1.3380)	−0.00013 (0.1512)
Ependiture on education (X_6)	−0.00023 (0.0428)	−0.00284 (0.5288)	0.00244 (0.1486)	−0.00004 (0.0024)
Per capita total income (X_7)	0.00155 (0.7622)	0.00366 (1.7999)	0.00058 (0.2067)	0.00351 (1.2511)
Employment/man unit (X_8)	−0.00749 (0.1329)	−0.01440 (0.2555)	0.03109 (0.4144)	0.01111 (0.1481)
Land dummy (0−1 scale) (X_9)	−0.51794 (0.2590)	0.05846 (0.0292)	0.15711 (0.0758)	−0.58824 (0.2838)
Total productive expenditure(X_{10})	−0.00033 (0.4336)	−0.00064 (0.8410)	−0.00052 (0.6028)	0.00024 (0.2782)
Characteristic root	168.3352	39.597	258.962	134.184
Variation explained (%)	73.745	17.347	63.814	34.394

Figures in parentheses are the relative weightages of the discriminant function coefficients.

Structural Configuration

Total group mean scores on the first two discrimnant functions for each block are presented in Table II. A persual of the table indicated that the scores were comparatively more for the beneficiaries, compared to that for the non-beneficiaries, the divergence being significant (Table III). Apparently, the improvement in the overall economic performance of the beneficiaries during the project period was 9.66 per cent in CADA and 10.89 per cent in DPAP.

The pre- and post-groups of beneficiaries were located wide apart from the corresponding group of non-beneficiaries. Under the multi-dimensional approach, the divergence between the pre- and post-IRDP within the beneficiaries and also

TABLE II. GROUP MEAN SCORES OF DISCRIMINANT FUNCTIONS

Discriminant functions	Beneficiary before	Beneficiary after	Non-beneficiary before	Non-beneficiary after
(1)	(2)	(3)	(4)	(5)
CADA				
$\bar{Y}^{(1)}$	1.6625	2.0246	0.1045	0.7673
$\bar{Y}^{(2)}$	4.8488	5.1159	4.7109	5.7377
DPAP				
$\bar{Y}^{(1)}$	7.1614	7.0838	5.1210	5.5172
$\bar{Y}^{(2)}$	6.0692	7.5871	6.4623	7.2604

TABLE III. MULTI-DIMENSIONAL DIVERGENCES BETWEEN GROUPS

Groups	Beneficiary pre-IRDP	Beneficiary post-IRDP	Non-beneficiary pre-IRDP	Non-beneficiary post-IRDP
(1)	(2)	(3)	(4)	(5)
Beneficiary pre-IRDP	–	0.2025	2.4464*	1.8557*
Beneficiary post-IRDP	0.1128	–	3.8508*	1.9674*
Non-beneficiary pre-IRDP	4.3177*	4.1223*	–	1.4936*
Non-beneficiary post-IRDP	5.1177*	2.5610*	0.7939**	–

*D^2 values significant at 1 per cent level.

**D^2 values significant at 5 per cent level.

Upper diagonal distances related to CADA groups while lower diagonal elements represent the DPAP groups.

within the control group seemed to be meagre in CADA, while it was almost absent in DPAP. The distances between the pre-and post-project for the beneficiaries were not significant as also the D^2 values (Table III). Thus these findings would lead to the conclusion that there was only a marginal change in the overall economic status of both the beneficiaries and non-beneficiaries due to the programme or due to the inherent factors other than the project.

Summing Up

The four groups in the DPAP region appeared to be more homogeneous than those in CADA both among the beneficiaries and non-beneficiaries. This reflects the economic heterogeneity of the respondents in CADA block, while that in DPAP block seemed to be almost uniform over the groups studied. As Subbarao (1985) pointed out, it is too much to expect very poor households trapped in poverty for centuries to be lifted above the poverty line in a couple of years. In this present study, the period is three years, and the above argument is perhaps substantiated as the effect of the project in improving the overall economic conditions of the poor has been only marginal.

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