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RESEARCH NOTES

SIR MALCOLM DARLING'S REPORT ON CERTAIN ASPECTS OF CO-OPERATIVE MOVEMENT IN INDIA (1957)

At the outset it may be recalled that Sir Malcolm Darling is one of the pioneers of the Co-operative Movement in India in its early stages. Naturally, therefore his Report on certain aspects of the Movement, coming as it is from one who had worked indefatigably for a number of years to introduce and spread the Movement, especially in the Punjab, should prove very useful.

Moreover, it is a matter of personal gratification to me to find that Sir Malcolm is in broad agreement with my own point of view regarding the course and pattern of future development of the Movement in India. Reflecting on the main recommendations of the Rural Credit Survey which now furnish the basis for future programme, I had set forth my views in a brief article on "Rethinking on Rural Credit."[1] If one were to re-read the article today, one finds that the major points of criticism are almost the same as those advanced by Sir Malcolm.

Without entering into the details of the discussion, I merely enumerate the more important points highlighted in the Report.

In the first place, the whole emphasis in the new version of the Co-operative Movement seems to be on the economic aspects of the problem, relegating to the background what can be called the moral and spiritual basis of the co-operative ideal. In fact, many of the existing co-operatives hardly contain any element of co-operation; they are merely "loan associations" inadequately financed and indifferently supervised. Real *genuine* co-operatives are very few indeed. This has possibly been a result of official policy which paid excessive attention to the numerical growth of the movement rather than to the generation of a genuine co-operative spirit and the integration of village life. Government officials can, of course, do something to support co-operative development. But it should be reiterated that a sound movement, if it is to be lasting, requires something positively more than that. The right qualities and the right spirit amongst the leaders of co-operation form the very base of the movement and therefore, if the movement has no idealism at its roots, it will never succeed, in spite of extraneous help. As Prof. Laidlaw has pointed out in his recent report,[2] the complete co-operative philosophy includes a vast area of education, social, moral and cultural values, which are apt to disappear entirely if the movement is simply fitted into an economic framework ignoring all other legitimate considerations. It is against this background that the future programming of co-operatives has to be judged. The fear that the credit societies to be sponsored by Government will start merely acting as agricultural banks in the strict sense of the term seems to be justified from this point of view.

The point is that it is likely that the new societies will be fully officialised, and run as it were by the State Departments. This is hardly a healthy trend for constructing a sound base at the primary level. It should not be forgotten that

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1. *The Indian Journal of Agricultural Economics*, Vol. XII, No. 1, January-March 1957, pp. 3-16.
2. See Laidlaw, A. F.: Extension Work in the Co-operative Movement, Reserve Bank of India, 1958.

from practical work in the field than from a text-book. It would be better if every new extension worker put out in the field accompanies one "old hand" for at least six months before attending a course. Under this system of training, each good field worker of experience would always be training a raw recruit under his supervision in the field. I may add that we actually followed somewhat this system in the old Baroda State and found that it works well.

These are the main points that strike me as important for future policy of development. A fuller treatment of the subject must await another occasion.

In conclusion I should say Darling's is a realistic appraisal of certain trends in the Co-operative Movement in our country. His recommendations, especially regarding training of personnel are bound to prove very useful. Administrative problems of implementing a programme are as much important as the drawing up of a sound programme itself.

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MARGINAL ANALYSIS IN FARM RESEARCH

This paper is devoted to the marginal analysis as it applies to factor-product relationship in detail, and to factor-factor and product-product relationship as a statement of the basic principles only. Application of marginal analysis is confined to short-run production function because the input-output relationship or production function refers to a specific time period and a single technique.[1] It is only in the case of linear production function that marginal productivity is equal to average productivity and maximum physical product is consistent with maximum profits. But there are not many situations in which marginal productivity is synonymous with average productivity and maximum physical product is necessarily consistent with maximum profits. Since production function is not linear for an acre or an animal as a fixed technical unit for almost all practical purposes, and has normally an elasticity of less than unity in agricultural production, it is necessary to qualify the concept of productivity in terms of level of input to which it applies. This means incorporation of marginal analysis in farm production analysis. The marginal product denotes the rate of change in total output for each unit change in the factor input. With limited resources at his disposal the farmer needs allocate them in such a manner that marginal value product is greater than the marginal cost involved. It is, therefore, necessary that outturn be analysed per unit of factor input or aggregate factor input.

It is necessary to specify the rate at which variable resources should be applied to fixed resources. This would mean relating the value of the output to the value of the input so that factor-product price ratio is equal to the transformation ratio. Marginal analysis as studied by the agricultural economist is thus related to the input of resource under the given price conditions and is different from the response curve represented by the physical scientists. To illustrate the difference in approach, reference is made to an experiment on "Response Curve of Nitrogen on Wheat Variety, C 518."[2] The authors have studied the economics of different doses of nitrogen on the basis of extra yield obtained over the control for each

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1. Koopman: Activity Analysis of Production and Allocation.
2. Published in the *Journal of Indian Society of Social Science*, Vol. 3, No. 2, 1955.

unit of nitrogenous fertilizers added, and the conclusion drawn is, the use of nitrogen alone has proved to be economical irrespective of the dose. The following table gives the physical productivity results.[3]

TABLE I—YIELD OF WHEAT GRAIN (C. 518) IN MDS. PER ACRE

Treatment levels of			Years			Average of three years (calculated)
N	P	K	1950-51	1951-52	1952-53	
A 0	0	0	18.06	11.94	32.11	20.70
B 0	60	40	19.20	11.46	33.58	21.41
C 10	,,	,,	21.85	11.40	33.07	22.11
D 20	,,	,,	26.01	11.89	35.54	24.48
E 30	,	,,	27.66	11.97	34.06	24.23
F 40	,,	,,	30.75	12.69	36.39	26.61
G 50	,,	,,	30.62	19.90	35.41	28.64
H 60	,,	,,	30.53	13.88	35.77	26.73
I 70	,,	,,	30.72	13.93	36.52	27.06
J 80	,,	,,	36.58	17.27	39.71	31.19
K 90	,,	,,	36.47	15.55	39.19	30.40
L 100	,,	,,	36.64	13.29	38.84	29.59

The analysis of the above data does not specify the economic optima of nitrogenous fertilizer. With a view to determining the most profitable level of nitrogen application from the farmer's point of view, marginality analysis is applied to the above table and results are shown in Table II for the year 1950-51 as an illustration and in Table III for the average of three years' yield calculated by the authors.[4] The optimum rate of fertilization changes with the change in the price ratio but price of wheat grain and cost of nitrogen are taken at Rs. 16/- a maund and Re. 1/- respectively for all the three years simply because the authors have chosen these rates for working out economics of the experiment.

TABLE II (1950-51)

Number of (N) 10 lbs. units of fertilizer (P & K as basal dose)			Total output mds. per acre	Marginal product in mds. per acre	Value of added fertilizer at Rs. 10/ for 10 lbs. units	Value of added wheat at Rs. 16/- per md.
N	P	K			Rs.	Rs.
0	60	40	19.20	+2.65	10/-	+42/6
1	,,	,,	21.85	+4.16	10/-	+66/9
2	,,	,,	26.01	+1.65	10/-	26/6
3	,,	,,	27.66	+3.09	10/-	49/7
4	,,	,,	30.75	— .13	10/-	2/1
5	,,	,,	30.62			
6	,,	,,	30.53			
7	,,	,,	36.58			
8	,,	,,	36.47			
9	,,	,,	36.64			
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3. *Op. cit.*, Table 3.
4. Costs involved in applying the fertilizer and harvesting and handling the added yield are minor and are ignored because the main objective of the paper is to introduce the reader with marginality analysis.

Marginal analysis in Table II shows that the 5th unit of nitrogen applied gives a minus marginal product of .13 mds. at which level the value of added fertilizer is Rs. 10/-, which means that the application of the 5th unit of nitrogen would involve a loss of Rs. 12-1 to the farmer if he were trying this experiment on his field and he would naturally not want to apply any more dose of nitrogen.

TABLE III

(Average of 3 years yield data)

Number of (N) 10 lbs. units of fertilizers (P & K as basal dose)			Total output (average of 3 years) in mds. per acre	Marginal product in mds.	Value of added fertilizers at Rs. 10/- per 10 lbs. units	Value of added wheat at Rs. 16/- per md.
N	P	K			Rs.	Rs.
0	0	0	20.70	+ .70	10/-	+11/3
0	60	40	21.40	+ .70	10/-	+11/3
1	,,	,,	22.11	+2.37	10/-	+37/15
2	,,	,,	24.48	— .25	10/-	— 4/-
3	,,	,,	24.23			
4	,,	,,	26.61			
5	,,	,,	28.64			
6	,,	,,	26.73			
7	,,	,,	27.06			
8	,,	,,	31.19			
9	,,	,,	30.40			
10	,,	,,	29.59			

Marginal analysis in Table III shows that 30 lbs. of nitrogen applied gives a negative marginal product of .25 mds. at which level the value of added fertilizer is Rs. 10/-. No farmer would therefore want to apply any more fertilizer because 30 lbs. of nitrogen applied in this case involves a loss of Rs. 14/- rather than earning any profit for the farmer. It is this basis of working out the incremental yields forthcoming from the different rates of fertilizer application under specified crops and soil conditions that determines the economic optimum quantity of fertilizer and the physical scientist need apply this analysis if the farmer is to be benefited and guided to use his resources most efficiently.

There are similar margins in every production relation in which diminishing returns are involved. Everyday examples of factor-product relationship are found in the intensive application of any specific form of capital such as seed, irrigation water, etc. The marginal product of any specific form of capital is the amount added to the yield at the particular capital input level. This relationship is important in the determination of the most profitable level of factor-input applications. The most profitable rate of feeding, for example, is the rate at which value of an increase in yield of milk is just equal to the cost of increase in the amount

of rations. Factor-product relationship is thus a solution to the problem of intensity of production.

Again, marginal analysis will be most helpful in the determination of rational resource use under factor-factor relationship. Factor-factor relationship is cost minimisation problem. Cost will be minimised when the ratio of factor prices is inversely equal to marginal rate of substitution of the factors of production.

Marginal rate of substitution also applies under product-product relationship to maximise the net revenue. Farm enterprises will assume competitive relationship if marginal rate of substitution is less than zero. The relationship will be complementary if the marginal rate of substitution is greater than zero and supplementary if the rate of substitution is equal to zero. In terms of land use problem and particularly in rotation problems the marginal output analysis would apply in place of average output analysis. Likewise land conservation will be economically feasible, only if the value of marginal output exceeds or is at least equal to the cost of obtaining the crop plus the cost of restoring the fertility lost in obtaining the crop.

Marginal analysis is a very important tool in the kit of agricultural economist which helps him to determine for the farmer the best profit output through study of input-output functional relationship.

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MULTIPLE REGRESSION ANALYSIS IN PROJECT EVALUATION*

In an underdeveloped economy subjected to systematic development, the assessment of the pattern of determinants of economic growth becomes necessary particularly in problems of strategy and choice of techniques. Economic planning implies the many sided development of all the sectors in an economy and the problems faced therein. Here we wish to confine ourselves to the problem of studying the changing pattern of determinants of development which will help to step up production in the rural sector and to initiate institutional changes not only in the economic sphere but in a wider sphere of human activity.

Much theoretical logic chopping has taken place while discussing problems of growth and development. The necessity for an objective approach in assessing the factors. to support the conclusions drawn by theoretical models is very much felt. Income, output and employment levels being the most important indicators in a study of change, the relations for which we can secure data are often at best

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*The analysis and the procedure indicated to be adopted for project evaluation is based on the assumption that various factors affecting the average income of rural farm households are mutually independent. The grounds for this fundamental assumption will have to be carefully examined before this technique of evaluation is applied. If these various influencing factors are not independent, the procedure indicated by the author will not be valid. The author of the note has given a slight hint to this effect at the end of his note. [Ed].

descriptions of the ultimate forces producing that particular situation. Hence, a study of the ultimate forces will yield the necessary results and the variations shown by them over a period of time are indicative of the process and direction of change being brought about by economic planning. So the role, tools of analysis have to play, assume importance and at times even simple statistical techniques will be more illuminating than the whole lot of theoretical verbiage.

In this paper an attempt is made to show how we can achieve a simple comparative statical model with the help of multiple regression analysis. For that purpose income levels of rural farm households have been taken instead of the rural sector as a whole, which may need more complicated technique of analyses.

In a study of the relationship of income levels of a rural farm household we have to take into consideration various factors which can be broadly grouped as natural (*i.e.*, geographical, like type of soil, climatic conditions, rainfall, etc.) and artificial (*i.e.*, brought about by deliberate planning, like irrigation and power facilities, improved seeds, fertilisers and manures, etc.). The extent of economic change that has been brought about by the impact of planning, at two points of time say t_1 and t_2 will reflect itself in the income levels of farm households. Let the average income of the rural farm households at t_1 and t_2 be y_1 and y_2 respectively. With the help of multiple regression procedures we can establish two prediction equations of income for the two periods of the form :

$$y_1 = a + bx_1 + cx_2 + \ldots\ldots + lx_n + mx_{n+1} + nx_{n+2} + \ldots\ldots + \ldots\ldots$$

$$y_2 = a_1 + b_1 x'_1 + c_1 x'_2 + \ldots\ldots + l_1 x'_n + m_1 x'_{n+1} + n_1 x'_{n+2} + \ldots\ldots + \ldots$$

Where $x_1, x_2 \ldots\ldots x_n$ are the various indicators which reflect the influence of the natural factors, while $x_{n+1}, x_{n+2}, x_{n+3}, \ldots\ldots$ are the artificial factors which will influence the productivity of a rural farm household.

Once we select the variables which bear logical and statistical relationships, from the many characteristics of a rural farm economy, it is only a matter of procedure to estimate the contribution of these variables to income. The various steps which will help in the analysis are shown below.

Firstly, two sets of correlation co-efficients for y_1 and y_2 are calculated as shown below :

	y_1	x_1	x_2	x_3	x_4	x_5 ....
y_1	1.0	$r_{y_1x_1}$	$r_{y_1x_1}$	$r_{y_1x_3}$	$r_{y_1x_4}$	$r_{y_1x_5}$ ....
x_1		1.0	$r_{x_1x_2}$	$r_{x_1x_3}$	$r_{x_1x_4}$	$r_{x_1x_5}$ ....
x_2			1.0	$r_{x_2x_3}$	$r_{x_2x_4}$	$r_{x_2x_5}$ ...
x_3				1.0	$r_{x_3x_4}$	$r_{x_3x_5}$ ...
x_4					1.0	$r_{x_4x_5}$ ..
x_5						1.0 ..
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The next step is to calculate the co-efficients of multiple determination $R^2_{y_1 12345}\ldots\ldots$ and $R^2_{y_2 12345}\ldots\ldots$ which measures the percentage of variability in income associated with the variability of the specified variables over the period

of time t_1 and t_2. By recalculating R^2 through the successive elimination of each independent variable one may determine the proportion of statistical variance caused by each of the said variables.

When the above co-efficients are calculated for both the periods t_1 and t_2, a careful look into them will show what the proportion of influence of natural factors was before systematic development was started and how it has varied later. Besides, it will also be possible to pin down the factor responsible for the maximum variance in income. Hence it will be easy for the planners to operate upon the artificial factors which are elastic and mould their policy so as to influence that particular factor to attain maximum social benefit in the shortest time. However, at times one may be forced to strike a balance between the different factors which influence income, when confronted with certain technological and structural difficulties.

But one should be conscious of the fact that any attempt to directly translate these statistical relationships, which may be derived as predictors, into casual relationships involves the fact that the various indicators x_1, x_2, x_3......may not in fact be independent. The same general force influencing levels of income may be reflected in more than one of the independent variables.

The same type of analysis can be extended to any comparative static study in general and to the problems of evaluation in a planned economy in particular.

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NATIONAL SEMINAR ON "VILLAGE PANCHAYATS, MEDICAL AND PUBLIC HEALTH AND TRIBAL WELFARE"

The Ministry of Community Development organised the third National Seminar on 'Village Panchayats, Medical and Public Health and Tribal Welfare', at Aurangabad in January 1958. The Chief Minister of Bombay inaugurated the seminar. A brief review of the discussions and conclusions reached at the seminar is presented below.

VILLAGE PANCHAYATS

Problems in Organisation

The seminar discussed the problems of the organisation and finances of village panchayats, their relationship with other institutions at the village level and the combination of the functions of the panchayat secretary and the *gram sevak*. There was much controversy on the size and coverage of village panchayats, especially on the point whether panchayats should be organised on the basis of a single village or a group of villages. The consensus of opinion was that there should be a panchayat for every village having a population of 500 to 2,000. Villages with a smaller population could, however, be suitably grouped together for purposes of panchayat administration.

There was needless controversy on the concept of 'unanimous election' which was being advocated by some delegates with a view to avoiding friction and factionalism in panchayats, little realizing that the concept itself is rather unworkable in great many areas of the country without making democracy, especially at the basic level, a mockery. A healthy contest on well-defined lines need not be abhorred, as that is the democratic way of fostering the growth of civic and community consciousness as well as sound leadership among the village people.

The question of setting up Panchayat Samithis at the Block level dominated the discussions to a greater extent than any other single issue. Some of the official delegates favoured a statutory body at the Block level as recommended by the Report of the Team for the Study of Community Projects and National Extension Service (1957) (Balvantrai Mehta Committee), to evoke popular initiative and support for the development programme as a whole. Others questioned the wisdom of investing such a body with statutory powers, though they recognised the need for a non-official body at the Block level to co-ordinate the activities of village panchayats in the area and also to help the executive agency of the Block in the working of the programme. They felt that the Panchayat Samithis would tend to stifle the growth of autonomous decentralization at the village level and further strengthen the centralizing trends which are already inherent in the existing set-up. The consensus of opinion in the seminar clearly seemed to be that the idea of a Block Panchayat required a further careful study and that in any case, it is a process of evolution from below and not of imposition from above.

Resources

The Chief Minister of Bombay stated that the village panchayats should not be solely dependent on the State's resources but that the Central Government should also come forward to aid the panchayats. The view held by some delegates that the State Governments should give village panchayats at least a minimum of 15 per cent of land revenue cannot be considered a sound recommendation, as such a uniform assignment without taking into account the needs and capacity of particular areas would tend to benefit the relatively more prosperous panchayats at the expense of the needy and poorer panchayats. There is bound to be a gap between the needs and capacity especially at the primary level, and it is incumbent on the State Government to step in to the rescue of the needy and administer suitable grants-in-aid which should take the form of block grants rather than of a percentage of any particular State Tax.

Panchayats vis-a-vis Other Institutional Agencies

The two basic institutional agencies at the village level are no doubt the Village Panchayat and the Co-operative Society. A clear demarcation of functions of these two agencies is necessary. However, the allocation of functions could be best determined on the basis of economic and non-economic activities. While the village panchayat is recognised as the primary representative agency of the people to look after the affairs of village administration including planning and implementation, matters relating to the economic aspects of village life (*e.g.*, distribution of credit and supplies) should be within the purview of the co-operative. It was also felt that the village panchayat should be the parent body for all kinds of village aid activity. All voluntary organisations functioning at the village level

like women's club, youth and farmers' clubs, etc., should be organically linked up with the village panchayat so that the latter's position as the basic institution is not affected.

Combination of Functions of Gram Sevak and Panchayat Secretary

There were sharp differences of opinion on the question of combining the work of *gram sevak* with that of the panchayat secretary. Those who favoured the idea felt that it would lead to greater co-ordination in development work, while those who opposed it held the view that the *gram sevak* is primarily an extension worker, and should not handle routine administrative duties without serious detriment to his role as the primary extension agency at the village. Moreover, as things are today, the *gram sevak's* jurisdiction covers a number of villages, with the result that he is not in a position to discharge even his extension duties satisfactorily in all the villages under his charge. The majority of the delegates were thus against the idea of combining the duties of *gram sevak* and the panchayat secretary.

MEDICAL AND PUBLIC HEALTH

Experience in most States has shown that medical and public health programmes in community project areas had made slow progress. To give a greater fillip to this programme, the seminar recommended advanced planning and a comprehensive survey of existing medical facilities. It further added that there should be a complete integration of the curative and preventive sides of health services at the block, district and State levels to avoid duplication of effort. Integration at the district level would be effective only on the appointment of a Chief Medical Officer and two medical officers under him, one in charge of the curative side and the other in charge of the preventive side.

Health education was regarded as the key to solve the problems of ill-health and disease. Medical test of school children in the Block area should form an integral part of the health programme of the Block. To control epidemics and protect life against diseases, compulsory vaccination and re-vaccination were advocated.

Discussions on family planning provoked a good deal of controversy. While some opposed the use of contraceptives, others felt that the propagation and use of various methods of family planning (including contraceptives) were quite necessary. Intensive education on family planning was recommended before launching any family planning programme as such.

In regard to rural water supply, it was held that funds under the various schemes, such as those of community development, district local boards, etc., should be pooled and a comprehensive programme drawn up.

Paucity of suitable technical personnel was keenly felt in most of the States. This is a serious problem which hindered the progress in rapid expansion of the development programmes. As a rule, doctors and other health personnel are reluctant to go and work in the rural areas for lack of facilities in the matter of housing, etc. While special steps should be taken to provide suitable accommodation for them, special allowances should also be made admissible to them. Facilities should be provided immediately for training an adequate number of midwives with the required financial assistance from the Government of India.

The establishment of orientation training centres for in-service training of health personnel at State level was also recommended.

TRIBAL WELFARE

Special multi-purpose projects have been launched in several tribal areas. These projects would receive an additional grant of Rs. 15 lakhs each, in addition to the normal budgetary provision for the community projects. The progress made in these projects is, however, far from satisfactory. This is mainly due to the lack of suitable personnel and the fixing of rigid pattern of schematic budgets for them. The seminar emphasised the need for some flexibility in the schematic pattern of the different projects according to the varying conditions obtaining in the different areas.

There were differences of opinion among the participants on tribal welfare and education. While some advocated the preservation of tribals as 'museum pieces' in the name of their freedom and growth according to their 'culture', others were of the opinion that what was good for us was also good for them and that social education, as it was commonly understood, should be extended to the tribals using their own, existing cultural 'tools'. The latter view had the support of the majority of delegates.

Specific programmes for improvement in communications, organisation of forests and labour co-operatives, development of cottage industries, etc., were examined. Since roads are the primary means of communication providing easy access to the tribal areas, it was thought that highest priority should be accorded to this programme, while at the same time ensuring that necessary steps are taken to prevent the tribals from being exploited by outside elements, especially the contractors. The organisation of various types of co-operative societies to eliminate exploitation by the middlemen and money-lenders was considered essential. As a major share of income of the tribals is derived from forests, the importance of organising forest labourers' co-operatives was emphasised. The forest department could undertake the processing of timber so as to augment the income of tribals. In this connection it was thought that the forest department should be associated in drawing up development plans for the multi-purpose project areas.

In regard to the village industries for improving living conditions of tribal folks, the seminar was of the opinion that the tribals should be trained in producing baskets, sericulture, bee keeping, weaving, oil crushing, etc. Measures like soil conservation, terracing, colonisation of people, improved methods of cultivation, provision of alternative agricultural land and employment were recommended for eradicating the evils of shifting cultivation and development of land.

Lack of trained personnel was considered to be the main hurdle in making rapid progress in multi-purpose projects. In view of the prevailing backward conditions and the onerous nature of duties to be performed in these areas, the need for providing incentives to attract the right type of working personnel was felt. Higher initial pay, housing facilities, training allowances, etc., were some of the recommendations made in this connection. It was felt that the Government of India should establish special training centres to impart training to these personnel.

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