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KUTTANAD DEVELOPMENT PROJECT:
An Economic Evaluation

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KUTTANAD DEVELOPMENT PROJECT : AN ECONOMIC EVALUATION

I

Introduction

This paper attempts an economic evaluation of the Kuttanad Development Project (henceforth referred to as KDP) which is part of an overall programme of the Government of Kerala to augment the production of paddy in the State. The paper highlights two important aspects: one pertaining to the methodology of project evaluation, and the other pertaining to certain aspects of policy. Methodologically, this study is an application of the UNIDO's Guidelines For Project Evaluation[1] demonstrating a method for incorporating various objectives of the government to find out the impact of the project on them. As for policy aspects, one of the main conclusions emerging from this study is that the project, as it is envisaged, is biased in favour of the big farmers and is likely to increase the income disparity among the various groups in the Kuttanad region.

The Background

Kuttanad region is a low-lying area covering an area of 874 sq.km out of which 304 sq.km are garden lands, 490 sq.km. of paddy fields and the rest uncultivable dry lands like sandy area, unreclaimed kayal areas and other area occupied by rivers, cananls, etc. Paddy is the main cultivation of the area and is undertaken under great hazards. Almost the entire area is only single-cropped. The main hazards of cultivation are the intrusion of salt water in the fields whenever the water level in the lakes fall below sea level and the threat of monsoon floods which cause breaches to bunds and washing away of standing crops. The KDP envisages construction of 1,966 km long permanent submersible bunds covering an area of 52,000 hectares (1,25,000 acres) so as to check the threat of floods effectively. This will enable the farmers to raise a second crop in the area. Once the KDP is completed, it is

expected that the state would get an additional yield of 1.5 lakh tonnes of paddy per annum thus easing its dependence on import to that extent. In addition, about 3.15 lakh coconut trees are expected to be planted along the 1,966 km long bunds the yield of which (about 158 lakh coconuts) will add to the income from coconuts of the State.

Project Outline

The KDP can be divided into two categories according to the type of work involved. The main programme of work is the construction of permanent submersible bunds, which may be referred to as the Project Work, and the other is the Infrastructure Work which consists of improvements to leading channel to the Thottappally spillway, protective works to the bunds affected by the Thottappally spillway, and diversion of Idikki tail race water from the Muvattupuzha basin to Kuttanad. The project work started from 1973-74 and is mainly in the form of strengthening the existing bunds and constructing new ones wherever necessary. The proposed specification of the bunds provide for a top width of 3 meters with 1.5 to 1.00 meter on the water side and 0.5 to 1.0 meter on the fields side. The construction of bunds is to be carried out with locally available materials such as clay, sand etc. The retaining wall is proposed to be constructed with fascin mattress layer at the bottom and rubble dumping upto the low water level over which rubble masonry will be provided upto ordinary flood level. As and when the construction of bund is completed over given distances, it will be followed by planting of coconut trees to further strengthen the bunds. Apart from this, provision for sluices flood regulators, cattle ramps, etc. has also been made.

The infrastrucutre work is expected to be completed within a period of three years starting from 1974-75. The improvements proposed to be made to the leading channel to the Thottappally spillway and the provision of protective works to the bunds affected by the operation of the Thottappally Spillway are intended to control the floods. The next item of infrastructure work, namely, diversion of Idikki tail race water from the Muvattupuzha river basin to Kuttanad paddy fields is intended to supply irrigation water to the fields since it has been estimated that the existing availability of water may not be sufficient for raising a second crop. This, in brief, is the broad programme of

work envisaged under KDP. The overall estimate of investment cost for the two programmes of work is given in table 1.

Table 1

Estimated Investment cost of the Project
(Rs.in million)

I. Strengthening the bunds	
(i) Cost of providing permanent bunds according to the 1968 schedule of rates	152.50
(ii) 20% extra added for variation in costs	30.50
(iii) Establishment charges	17.00
	200.00
II. Infrastructure Works	
(i) Improvements to the leading channel to the Thottappally Spil-way adding establishment charges	26.90
(ii) Providing protective works to the bunds affected by the operation by the Thottappally spillway adding establishment charges	9.60
(iii) Diversion of Idikki tail race water from the Muvattupuzha basin to Kuttanad	6.50
Total	243.00

II

Government's Evaluation of the Project and its Main Drawbacks

The economic worthiness of the project was determined after an exercise in economic evaluation of the scheme carried out in the Report of the Kuttanad Development Project prepared by the Economic Affairs Department. The cost items were identified as cost of bund construction, cost of planting coconut trees, repairs and maintenance to bunds and cost of cultivation of paddy - all given on a functional categorization basis. The benefit items were listed as increased output of paddy and coconut.

Incorporating the above costs and benefits, a cash-flow chart was prepared and discounted at 12% for a period of 20 years. The benefit-cost ratio was found to be 1.56 and 1.41 when discounted for period of 30 years and 20 years respectively. Since the benefit-cost ratio was greater than unity, the project was considered economically worthwhile.

Apart from the above exercise in cash-flow analysis, a section on social benefits of KDP gave the employment potential of the project in its construction work and annual cultivation of paddy and coconut. This, no doubt, was intended to justify the project in terms of employment generation also which would contribute in some measure to relieving the acute unemployment problem in the area.

The economic evaluation contained in the report of the KDP makes an implicit recognition of the inadequacy of calculating the commercial profitability of a public project to determine its economic worthiness. That is why the report also considers the benefits and costs of paddy and coconut cultivation flowing to the farmers. Thus it considers its economic analysis of the scheme a comprehensive one which takes into account the social costs and benefits of the project. As an additional justification for the scheme, the report points out to the employment potential of the scheme which is supposed to be highly desirable in view of acute unemployment in the area. To the extent that the project report considers it necessary to include the farmers costs and benefits for evaluating the economic worthiness of a public project of this nature, it is a desirable sign of the increasing awareness on the part of the authorities to view public projects in terms of its net contribution to the welfare of the society rather than the net cash flow accruing to the agency under-taking the project. But to claim that such an analysis is an exercise in terms of social costs and benefits, is to restrict the meaning and content of social cost-benefit analysis. The objectives of the government in undertaking this project are mainly to increase the output of paddy in the state, to promote the development of Kuttanad area and to generate employment to the labourers who are presently unemployed and underemployed. These are the declared policies of the government and they have been mentioned in the Report in several places. There may also be other declared policies like the protection of the relatively weaker sections such as small farmers which

are not stated explicitly in the Report. But an economic evaluation of a public project intended to promote the above objectives is expected to incorporate all these important objectives and see the impact of the project on these objectives. But no attempt has been made to incorporate these objectives into the economic evaluation which is supposed to be a comprehensive one. The importance of incorporating different major objectives of the government into the evaluation is to find out whether the setting up of a project does result in conflicting impact on these objectives. Apart from articulating the decision-makers, this will help in the preparation of corrective measures if a project is still decided to be taken up.

The other drawback is with regard to the items of costs and benefits included in the cash-flow statement. While the cost of the major construction work, i.e. permanent bunds, has been included, the cost of infrastructure works has been omitted. Since the three items listed under the infrastructure works are necessary for the raisi of a second crop in the area, they form part of the overall programme of KDP. There is no justification for the exclusion of this item of cost, whether it is no justification for the exclusion of this item of

The point is not who bears the cost but whether there is any cost to be incurred from the point of view of the society. The same criterion applies to the benefit items. Apart from the benefits mentioned in the Report we find there are two more items which deserve inclusion. They are: farmers' saving due to reduction in annual repairs to bunds and increase in the yield of first crop which is damaged now due to floods, etc.

The use of a discount rate of 12% to discount future costs and benefits seems to be arbitrary. No justification has been given to the use of this particular rate.

Apart from all these, an important omission from the point of view of a project evaluator who is interested in the relative economic worthiness of the project is with regard to a technical alternative or alternatives for execution of the project. It is only the technicians who are in a position to suggest a set of technically feasible alternatives. Once these alternatives are presented, an economic evaluation may help the selection of that alternative which results in maximum social-benefi

In brief, what is attempted in the report is a general cash-flow ana[illegible]s of the project using s[illegible] standard techniques like discounting and [illegible]e decision rules like benefit-cost ratio plus a description of some of [illegible] benefits like employment. But all these put together do not mak[illegible] a systematic social-cost-benefit analysis to measure the net impact of [illegible] project to the society. This leads to some conceptual and meth[illegible]ological issues involved in a social cost benefit analysis.

To put it briefly, social cost-benefit analysis is not a substitute for [illegible] exercise in financial analysis. Rather it is intended for appl[illegible]cation to public projects whose pricing policies are not governed by [illegible]ommercial interests or whose benefits are not directly accruing to the investing agency but spread on a number of groups and/or regions, ove[illegible] a period of time. Once this is recognised, then it is not difficult to [illegible]nderstand that public projects may result in costs and benefits both d[illegible]rectly and indirectly. Therefore, the first problem to be reckoned in [illegible] social cost-benefit analysis is the need to quantify all possible cos[illegible]s and benefits, both direct and indirect. The next problem is that of [illegible]aluation of these costs and benefits. Here we take particular note of the fact that costs and benefits are not viewed from the point of its pr[illegible]es in the market but in terms of social values. Governmental co[illegible]trols and regulations and [illegible]ther phenomena like unemployment result in a divergence of private and social values, commonly understood as ma[illegible]ket imperfections. Social cost-benefit analysis attempts to correct th[illegible] divergence by deriving a set of shadow prices. Shadow prices are th[illegible]refore derived to reflect the relative scarcities of resources in the ec[illegible]nomy. Once quantification [illegible] all costs and benefits has been done an[illegible] then net benefits derived in terms of social values suitably adjus[illegible] to reflect also the relative scarcity of investment in the economy, we ha[illegible] to bring in the factor of time involved in the realization of th[illegible]se net benefits. This is done by way of a discount rate used for [illegible] di[illegible]counting the future stream of net benefits. The present net worth, de[illegible]ived in this manner, for each objective according to the weightage a[illegible]ched to it would give us a clear picture of the impact of the project t[illegible]e economy. Finally, the opportunity cost of investment in a p[illegible]cular project is assessed by comparing the present worth of ne[illegible] b[illegible]fits in an alternative variant of the scheme or an alternative p[illegible]ject producing the same commodity.

Methodology

These are the main conceptual issues involved in a social cost-benefit analysis. The methodology which translate these conceptual issues into precise techniques of analysis may vary depending on the project evaluator's choice. The methodology used in the present analys is the one prepared for the developing countries by the United Nations Industrial Development Organization under the title "Guidelines for Project Evaluation". Since the justification and detailed procedure of the UNIDO Guidelines has been explained in the paper on "Comparative Analysis of OECD Manual and UNIDO Guidelines"[2], a description of the methodology is not attempted here.

Objectives

In any exercise in project evaluation it is necessary to state the objectives explicitly so as to assess the net contribution of the project to each of the stated objectives. In the case of the KDP, references to some of the objectives have been made in the project repo The first and foremost objective is that of increasing the production of paddy in the State. Though not incorporated explicitly in the evaluation, the project report also makes references to the labour intensive nature of the project and the likely generation of employmen in the future. Another important objective of the government is with regard to the question of redistribution. Several measures like land reforms, distribution of food to school children, educational and other concessions are mainly intended to achieve the objective distributive justice. It would therefore be incompatible if the project evaluator disregards the question of the redistributive effect of a major public project as the KDP. Above all there is also the recognit of the fact that the Kuttanad area needs to be developed in view of the high density of population and lack of adequate opportunities for employment. For the sake of analytical clarity let us put down the objectives in their order of importance.

1. Need for increasing the production of paddy in the state - Aggregate Consumption Objective;

2. Need for developing the Kuttanad region - Regional Development Objective;

3. Need for redistribution of income to the less privileged - Group Income Redistribution Objective; and

4. Need for generating additional employment opportunities in the region - Employment Objective.

Our attempt is to measure the net contribution of the KDP in terms of each of these objectives. This calls for a systematic approach to the task based on the available set of data.

Data Requirements

A set of basic data giving details of the design, construction and other aspects of the project is a necessary pre-condition for a project evaluation. The data base of this evaluation is the Engineering and Economic Evaluation Reports of the KDP prepared by the Government.[3] Though it cannot claim to contain every detail of the project, we have been able to get the core of our data requirements. The other sources of information are the pamphlets brought out by the Kerala Land Development Corporation (KLDC), who is the implementing agency of the KDP, and discussion with its officials. Based on these data, a set of tables giving the necessary details of each benefit and cost item by year were worked out. Cost items were broken down into labour and non-labour resources. A flow chart incorporating all the benefit and cost items is presented in table 2. This chart takes into account all the relevant benefits, costs, and cash transfers due to the project for a period of 30 years. The repayment of farmer's loan for the construction of permanent bunds - which is a cash transfer - has been calculated according to the terms and conditions of the loan. It may be noted that all the items are valued at their market prices and do not therefore reflect their opportunity costs. As a first approximation, it is convenient to start with an evaluation in terms of market prices. Afterwards we shall introduce corrections to the relevant items and evaluate the project in terms of social values.

Aggregate Consumption Objective

We shall now try to calculate the net benefits of the project according to the objectives listed in the begining of this section. The Aggregate Consumption Objective sums up all the net benefits of the

Table 2

Benefits, Costs and Transfer flows by year (at market prices)

(Rs. in lakhs)

Item	Year 0	1	2	3	4	5	6
(A) Benefits							
(1) Addl.yeild from paddy cultivation	-	32.10	288.90	587.43	940.53	1,325.73	1,660.76
(1-a) Addl.yeild from first crop	-	1.10	9.90	20.13	32.23	45.43	56.91
(1-b) Yeild from second crop	-	30.00	270.00	549.00	879.00	1,239.00	1,552.11
(1-c) Yeild of straw from second crop	-	1.00	9.00	18.30	29.30	41.30	51.74
(2) Yoild from cocoonut cultivation	-	-	-	-	-	-	-
(B) Costs							
(3) Construction of bunds	40.09	342.70	368.30	419.40	480.80	359.00	-
(3-a) Labour	14.03	119.95	128.87	146.79	168.28	125.65	-
(3-b) Domestic Materials	22.34	191.79	205.95	234.48	268.81	200.71	-
(3-c) Establishment expenses	3.72	31.16	33.48	38.15	43.71	32.64	-
(4) Infrastructure Works	10.00	30.00	80.00	120.00	130.00	-	-
(4-a) Labour	2.60	7.80	20.80	31.20	36.40	-	-
(4-b) Domestic Materials	7.40	22.20	59.20	88.80	93.60	-	-
(5) Maintenance and repairs	-	2.05	19.19	37.60	58.57	82.61	100.56
(5-a) Labour	-	0.72	6.72	13.16	20.50	28.91	35.20
(5-b) Domestic materials	-	1.33	12.47	24.44	38.07	53.70	65.36
(6) Cultivation of Paddy	-	22.65	203.35	414.50	663.65	935.45	1,171.84
(6-a) Labour		8.15	73.39	149.22	238.91	336 .76	421.96
(6-b) Domestic materials	-	14.50	130.46	265.28	424.74	598.69	749.98
(7) Planting coconut trees	-	0.45	3.76	4.03	4.59	5.26	3.93
(7-a) Labour	-	0.17	1.43	1.53	1.74	2.00	1.49
(7-b) Domestic materials	-	0 28	2.32	2.50	2.85	3.26	2.44
(8) Cultivation of nonbearing trees	-	-	0.51	4.80	9.41	14.66	20.67
(8-a) Labour	-	-	0.12	1.15	2.26	3.52	4.96
(8-b) Domestic materials	-	-	0.39	3.65	7.15	11.14	15.71
(9) Cultivation of bearing trees	-	-	-	-	-	-	-
(9-a) Labour	-	-	-	-	-	-	-
(9-b) Domestic materials	-	-	-	-	-	-	-
(C) Cash Transfers	-	-	-	-	-	-	-
(10) Compensation to farmers	-	30.00	30.00	-	-	-	-
(11) Reduction in cost of repairs of bunds	-	2290	26.10	53.07	84.97	119.77	150.04
(12) Loan repayments	3.61	34.45	67.59	106.70	161.63	206.46	220.72

	7	8	9	10	11	12	13-30
(A)	1,660.76	1,660.76	1,660.76	1,660.76	1,660.76	1,660.76	1,660.76
(1-a)	56.91	56 .91	56.91	56.91	56.91	56.91	56.91
(1-b)	1,552.11	1,552.11	1,552.11	1,552.11	1,552.11	1,552.11	1,552.11
(1-c)	51.74	51.74	51.74	51.74	51.74	51.74	51.74
(2)	1.92	18.00	35.28	54.96	77.52	94.37	94.37
(3)	-	-	-	-	-	-	-
(3-a)	-	-	-	-	-	-	-
(3-b)	-	-	-	-	-	-	-
(3-c)	-	-	-	-	-	-	-
(4)	-	-	-	-	-	-	-
(4-a)	-	-	-	-	-	-	-
(4-b)	-	-	-	-	-	-	-
(5)	100.56	100.56	100.56	100.56	100.56	100.56	100.56
(5-a)	35.20	35.20	35.20	35.20	35.20	35.20	35.20
(5-b)	65.36	65.36	65.36	65.36	65.36	65.36	65.36
(6)	1,171.84	1,171.84	1,171.84	1,171.84	1,171.84	1,171.84	1,171.84
(6-a)	421.86	421.86	421.86	421.86	421.86	421.86	421.86
(6-b)	749.98	749.98	749.98	749.98	749.98	749.98	749.98
(7)	-	-	-	-	-	-	-
(7-a)	-	-	-	-	-	-	-
(7-b)	-	-	-	-	-	-	-
(8)	25.16	24.65	20.36	15.76	10.51	4.49	-
(8-a)	6.04	5.92	4.89	3.78	2.52	1.08	-
(8-b)	19.12	18.73	15.47	11.98	7.99	3.41	-
(9)	0.83	7.80	15.29	23.82	33,59	40.89	40.89
(9-a)	0.28	2.65	5.20	8.10	11.42	13.90	13.90
(9-b)	0.55	5.15	10.09	15.72	22.17	26.99	26.99
(10)	-	-	-	-	-	-	-
(11)	150.04	150.94	150.94	150.94	150.94	150.94	150.94
(12)	220.72	237.07	249.28	249.28	249.28	249.28	249.28

*Rs 249.28 lakhs will continue upto year 17. Afterwards the loan repayment will be

year	18	19	20	21	22
	244.31	201.81	156.15	104.14	44.52

project valued in terms of consumption units which contribute to the increase in consumption of the society. The market value (MV) of net aggregate consumption benefits for any year can be obtained from table 2, in the following way.

$$MV = (1) + (2) - (3) - (4) - (5) - (6) - (7) - (8) - (9)$$
$$= [(1) + (2)] - [(3) + (4) + (5) + (6) + (7) + (8) + (9)]$$

The second approximation consists in correcting the market values of the items in the flow chart to reflect their social opportunity cost. The corrected values are called shadow prices or social values. For specific commodities the shadow prices are calculated according to the principle of willingness to pay. If the market for particular commodities is free from major distortions, the prevailing market price is taken as the consumers willingness to pay. Under (1), the valuation of (1-b) in the report was on the basis of the present market price (1973-74) of paddy at Rs.150/- per quintal. This has been corrected by taking the average farm price of paddy for the last five years.

In the same way, item (2) has been valued at the average farm price of coconut for the last 5 years. As for the items (3-b), (4-b), (5-b), (6-b), (7-b), (8-b) and (9-b) which consists of domestic materials involved in the construction and maintenance of the project and cultivation of crops in the project area, the valuation is done on the basis of the cost of obtaining such items as clay, rubble and sand in the construction work for which one cannot speak of a market in the strict sense of the term. For those materials in the cost of cultivation of crops (paddy and coconut) the materials are both available and obtained domestically in the open market. The valuation of these items therefore is based on their market prices.

There remains one major item, that of labour, which needs to be evaluated in terms of the social opportunity cost. The shadow price of labour is a national parameter applicable to all projects. But marginal differences can occur depending on the direct and indirect social costs involved in employing unemployed labour for purposes of valuation. Since the Kuttanad area is one of the most densily populated areas with a high incidence of unemployment, no direct social cost is involved in employing the otherwise idle labour force. Therefore the direct opportunity cost would be treated as zero. The nature of the project also

does not warrant any expenditure like transportation or settlement of labour in the project area. This means that we get a shadow price of labour equal to zero.

i.e., W = z.w, where z = 0.

where W stands for shadow wage rate, z for direct opportunity cost and w for market wage rate. This could be one position in respect of the shadow pricing of labour.

Another position would be with regard to the marginal increase in consumption of the workers employed in the project or in the cultivation of crops after the completion of the project. It is true that workers have to consume something even if they are unemployed in order to survive. But once they get some work, it is quite likely that they would be consuming more than the previous level of consumption which may be just around subsistence. To the extent that there is a marginal increase in consumption, then there is a case for including this additional consumption as the direct social cost of employing labour. Our strategy is to incorporate this factor in our correction of the benefits for the social value of investment through the premium attached to the saving propensity of different groups.

A final approximation of the social value (SV) is with regard to the adjustments necessary to reflect the social value of investment which exceeds the social value of consumption, i.e. social value of investment exceeding unity. This is because the fiscal and other measures of the government are not considered effective to raise the level of savings and investment in the economy to the desired level. This means that the level of investment is not sufficient to equate the marginal rate of investment in the economy, q, to the social rate of discount, i, which reflects the weightage of the society towards intertemporal choice of consumption. The social value of investment of a project can be derived with the help of the marginal social rate of return from investment, q, the marginal rate of investment of profit s, and the social rate of discount, i, by using the following formula.[4]

$$P_{inv} = \frac{(1-s)q}{i-sq}$$

Assuming that marginal rate of return on investment is 20 per cent and a marginal rate of return of 20 per cent is obtained from reinvestment (i.e. a uniform rate of plough back), and social rate of discount at 10 per cent, we get the social value of investment of 2.67.

This means that the social value of investment exceeds the socia value of consumption which is unity. Our task now is to correct the net aggregate benefits of the Kuttanad Development Project to reflect social value of investment. To evaluate the net effect, we shall have to consider all the costs and benefits including cash transfers accrui to the respective groups. Broadly, we shall distinguish 3 groups according to gainers or losers with respect to the Kuttanad Developme Project. Farmers derive certain benefits in the form of additional yield from paddy and coconut cultivation, reduction in cost of repairs to bunds, and compensation amount paid to them for acquisition of land and incur certain costs like annual cost of cultivation of paddy and coconut (item 6 to 9). In addition, they have to pay back the cost of construction of bunds in instalments (item 12) and also bear the maintenance and repairs cost (item 5). The other group is that of labour who get employment both in the construction works and in the annual cultivation of paddy and coconut. The payments made to them becomes a real earning. The third group is the government which pays for the c of construction of bunds, and also makes compensation payments to the farmers. The government in turn receives the annual repayment instalm (item 12). Government here denote all the agencies involved in the KD Therefore this group subsumes the lending financial institutions like t ARC, the departments and other corporations of the State Government executing the construction of bunds and infrastructure works. The tot net social value would therefore be a summation of the social value of net aggregate benefits accruing to the three groups. This can be written as

$$SV = SV^{F} + SV^{L} + SV^{G} \quad \ldots\ldots\ldots\ldots\ldots \quad (ii)$$

Where SV is the social value of net aggregate consumption benefits of Kuttanad Development Project and SV^{F}, SV^{L}, SV^{G} stand for the group net benefits of farmers, labourers and government respectively. The group net benefits can be found out from

$$SV^F = (1)+(2)-(5)-(6)-(7)-(8)-(9)+(10)+(11)-(12)$$
$$= [(1)+(2)+(10)+(11)]-[(5)+(6)+(7)+(8)+(9)+(12)] \quad \ldots\ldots(iii)$$
$$SV^L = -[(3-a)+(4-a)+(5-a)+(6-a)+(7-a)+(8-a)+(9-a)]-(11) \ldots\ldots(iv)$$
$$SV^G = -(3)-(4)-(10)+(12) = -[(3)+(4)+(10)]+(12) \quad \ldots\ldots\ldots(v)$$

Now to arrive at the social value of net aggregate consumption benefits corrected for the shadow price of investment (let us denote as SV*), we have to correct the net social values of the three groups mentioned above according to the proportion in which the benefit of each group is divided between consumption and investment. This can be worked out once we know the proportion of savings of an average farmer, say s^f, of labour s^l, and govt. s^g.

$$SV^{*F} = [s^f \text{ pinv} + (1-s^f)] SV^F \quad \ldots\ldots\ldots\ldots\ldots\ldots(vi)$$

similarly for other groups we can derive the respective social value of net benefits

$$SV^{*L} [s^l \text{ pinv} + (1-s^l)] SV^L \quad \ldots\ldots\ldots\ldots\ldots(vii) \text{ and}$$
$$SV^{*G} [s^G \text{ pinv} + (1-s^G)] SV^G \quad \ldots\ldots\ldots\ldots\ldots(viii)$$

The total net aggregate consumption benefits would therefore be

$$SV^* = SV^{*F} + SV^{*L} + SV^{*G} \quad \ldots\ldots\ldots\ldots\ldots(ix)$$

which may also be written as

$$SV^* = SV + (\text{pinv}-1)[(s^f SV^F + s^l SV^L + s^G SV^G)] \ldots\ldots(x)$$

Thus the total social value of net aggregate consumption benefits is equal to the total net social value before correcting for the shadow price of investment (SV) corrected by a term that multiplies the total marginal savings out of the net consumption benefits of the project by the excess of the social value of investment over the social value of consumption.

The Regional Development of Kuttanad

So far we have been concerned with the evaluation of the KDP in terms of the net aggregate consumption benefits it confers on the economy of the State. In other words, our attempt was to quantify the net impact of the project to the economy taking into account all measurable benefits and costs. But this is only one of the objectives albeit the most important - of the project. We shall now address ourselves to the task of measuring the net aggregate consumption benefits of the project to the Kuttanad Region only. For finding out

the regional redistribution objective, all the items in the flow chart are not relevant. Let us sort out the relevant benefit and cost items contributing to the regional-redistribution objective.

The net contribution of the project to regional development is measured by finding out the total income flow to the region and subtracting the total income flowing out of the region as a result of the project. Benefits of item (1) and (2) clearly accrue to the farmers in Kuttanad. The expenditure on items (5) and (4) are borne by the government and not the Kuttanad region. But when it is spent in Kuttanad it becomes a gain or benefit to the region in two ways. one is in the form of payments made to labour (3-a) and (4-a), and the other in the form of obtaining local materials like clay, rubble, sand etc. for construction works. Therefore all items under (3) and (4) become benefits to the region. Item (10) is also an income flow to the region in the form of compensation for land acquisition. As for income flowing out of the region, item (12) i.e. loan repayments is the most important one. Another item which constitutes a income flow from the region to outside is (6-b) for obtaining materials like fertiliser, pesticides, pumpsets, electricity, agricultural implements, etc. for cultivation of paddy. Therefore, the net benefit to regional development of Kuttanad for any given year can be measured as follows:

$$RD^K = (1) + (2) + (3) + (4) + (10) - (12) - (6\text{-}b)$$
$$= [(1) + (2) + (3) + (4) + (10)] - [(12) + (6\text{-}b)] \quad \ldots\ldots\ldots (xi)$$

Unlike in the evaluation of the first objective, no correction for the shadow price of labour and/or social value of investment viz-a-viz consumption is made in the evaluation of the regional redistribution objective. This is because what is an opportunity cost to the society as a whole, i.e. the State economy, is not an opportunity cost to a small region within the economy. The social opportunity cost of employing workers may be negligible or zero but to the Kuttanad region the wage payments are in actual market wage rates. Again, the social value of consumption to the economy as a whole, for the economy's rate of saving and investment are considered sub-optimal, and hence the increased consumption flow provided by investment exceeds the

social value of consumption to the economy as a whole, for the economy's rate of saving and investment are considered sub-optimal, and hence the increased consumption flow provided by investment is a gain to the entire economy. The proportion of such a gain accuring to a small region like Kuttanad is negligible and is thus ignored for practical purposes. But one important adjustment to the net redistribution benefits to Kuttanad $(RD)^K$ may be suggested. RD^K measures only the direct redistribution benefits accruing in the Kuttanad region. It is quite possible that a portion of this benefit will be respent in Kuttanad activating the other wise idle resources. To the extent that such a respenting takes place, it results in another round of redistributive benefits to the region. To take this indirect benefits into account we shall have to adjust RD^K accordingly. It can be shown that if represents the marginal proportion of the direct net redistributional benefits, RD^K which - when respent results in additional net benefits to the region, then the value of the "indirect" net redistributional benefits to the region R^I, can be shown as

$$R^I = r\,(RD^K) + r(RD^K) + r\,(r^2 RD^K) + \ldots\ldots$$
$$= RD^K\,(\,r + r^2 + \ldots\ldots\ldots\ldots)$$

The total net redistributional benefits to the region, R^K, then will be

$$R^K = RD^K + R^I = RD^K\,(\,1 + r + r^2 + \ldots\ldots\ldots)$$
$$= RD^K \left[\frac{1}{1-r}\right]$$

The value of $\left[\frac{RD^K}{1-r}\right]$ is the total redistributional benefits flowing to the Kuttanad region as a result of the Kuttanad Development Project.

But calculation of indirect redistributional benefits rests on how realistic is the assumption regarding the marginal proportion respent in the area. It is also sensitive to the time lag involved in the process of spending and responding. To be on the safer side, we have resorted to the calculation of only RD^K, i.e. direct net redistributional benefit to the Kuttanad region.

Group Redistribution Objective

We now come to the evaluation of the KDP with reference to its net contribution of redistributive benefits to the poorer sections. We may identify the poorer sections as those consisting of small farmers and labourers. For an assessment of the redistributive benefits accruing to the small farmers, some information on the pattern of land holding in the area is necessary. The KDP report gives some information regarding the pattern of land holding in Kuttanad area. This is reproduced below in Table 3.

Table 3

Pattern of land holding between small and big farmers

Category	Size of holding	No. of cultivators	Extent of holding (in hectares)	Land per cultivator
1. Small farmers	Below 2 hectares	39,919 (86)	34,393 (60)	0.86
2. Big farmers	Above 2 hectares	6,624 (14)	23,239 (40)	3.51

Note: Figures in bracket indicate percentages.

Generally, a small farmer in the State is defined as one who cultivates below five acres, i.e. nearly 2 hectares of land. On this basis 39,919 cultivators have 34,393 hectares and 6,624 cultivators have 23,239 hectares. While 86 per cent of the cultivators account for 60 per cent of the area with a per cultivator availability of 0.86 hectares, the remaining 14 per cent of cultivators account for 40 per cent of the area, with a per cultivator availability of 3.51 hectares, i.e. four times the per cultivator availability among the small farmers. Therefore the small farmers (86% of the total) in Kuttanad stand to gain 60 per cent of the benefit from the project while the remaining 14 per cent gain 40 per cent of the benefits.

To find out the net benefits, let us distinguish the benefits and costs of this section of people. Items (1) and (2) are clearly benefits accruing to this section also. Under costs, items (5 to 9) are the relevant ones. Item (12) would also constitute a cost in the form of repayment of loan. Though we do not know as to how many small farmers stand to gain from the compensation paid for acquisition of land under item (10) it is likely that this would be a mixed group of small and big farmers and possibly non-farmers. Roughly a portion of this benefit items is also a gain to the small farmers. Since we find that 60 per cent of the total land is cultivated by small farmers, then the net benefits accruing to them can be derived as follows.

$$R^{SF} = 0.60 \left[(1) +(2)-(5)-(6)-(7)-(8)-(9)+(10)+(11)-(12)\right]$$
$$= 0.60 \left[(1)+(2)+(10)+(11)\right] - \left[(5)+(6)+(7)+(8)+(9)+(12)\right] \quad \ldots\ldots(xiii)$$

The net redistributive benefits of the labourers is the total wage payments made to them. That is,

$$R^{L} = \left[(3-a)+(4-a)+(5-a)+(6-a)+(7-a)+(8-a)+(9-a)\right] - (11) \quad \ldots\ldots(xiv)$$

Item (11) is deducted from the benefits to the labourers because the saving of the farmers due to reduction in the cost of repairs to bunds was an income to them before the construction of permanent bunds. Once the bund is constructed this becomes a loss of income in the form of reduced employment.

The total net redistributive benefits of the poorer sections (small farmers + labourers) in the region will be

$$R^{PS} = R^{SF} + R^{L} \quad \ldots\ldots\ldots(xv)$$

As in the case of regional development objective, we have not introduced any corrections to the total net redistributive benefits to the poorer sections for the failure of market values to reflect the relevant social values. Corrections to portray the social opportunity costs are relevant only from the standpoint of the society as a whole, i.e. from the pointof view of aggregate consumption objective. What is relevant for smaller groups or regions is the actual money gains or losses. No consideration is also given to the indirect benefits of the poorer sections because the expenditure of this class is very unlike to result in successive rounds of spending.

A general conclusion that we can safely make is that the higher the inequality in land holding, the lower the benefits to the small farmers. In other words the big farmers stand to gain with a relatively skewed distribution. With reference to the KDP we can make a further comment in terms of the alternative benefits foregone by the present investment. In so far as the investible resource devoted to the KDP is a diversion of the funds which could have been invested in a place where the land distribution is less skewed, the KDP is biased in favour of the big farmers and against the small farmers in the State as a whole. However, if we argue that the government do not attach much importance to the group redistribution - i.e. redistribution of income to the poorer sections - then we need not argue further about this particular objective. If that is not the case - and we have every reason to believe so considering the general social objectives of the Government - then this objective should be given its due importance. Once the project is selected on other grounds, it is still possible to maximise income accruing to the poorer sections. As regards small farmers, their burden can be eased by allowing repayment of loans in smaller amounts spread with a lower rate of interest over a greater number of years than the present period of repayment. At the same time the loan repayment from big farmers can be recovered in greater amounts within a smaller period of time. Secondly, measures can be introduced to subsidise the maintenance and repairing cost of bunds of the smaller farmers.

Employment objective

In our evaluation of the KDP, we have explicitly incorporated all the three objectives mentioned previously. It may be asked as to how we propose to incorporate the objective of employment in our evaluation.

A few words in explanation is necessary here. The objective of employment creation in a less developed economy with acute unemployment and income inequality can be looked at in two ways. More employment is desired because it adds to output or becomes a source of income to the poorer sections or both. More employment may also be desired just for the sake of utilizing the idle labour resources by "digging holes on the

ground and filling them up again". Clearly, it is not the latter kind of employment that the government would like to generate when setting up a public project. Once we recognise that employment is desired either for increased output or redistribution of income, then we have implicitly incorporated this objective under the objective of aggregate consumption and redistribution of income. This has been done by the use of a shadow price of labour. In other words, we have taken the social opportunity cost of labour as less than the market wage rate thus making the net worth of the project relatively insensitive to the amount of labour used. This means that labour intensive projects will prove to be more worthwhile than capital-intensive ones. The exact quantum of employment generated will depend upon the type of technology adopted for work.

Evaluation of the Project.

In our evaluation of the KDP with reference to various objectives, we have made use of certain parameters for which values have to be given. In this section we shall explain the reasons for the numerical values given to various parameters and find out the net benefits of the project for various objectives.

Since the attempt is to find out the net present value of the project by treating the value of shadow price of labour at zero, a premium of -1 is attached to this parameter. The social rate of discount is essentially a value parameter. The literature on the derivation of the appropriate social rate of discount is still controversial and lacks on adequate and acceptable conceptual foundation. It would suffice here to note that the present generation, whose income is utilized for investment purposes, do place a premium on a future unit of income viz-a-viz a unit of present income. But this premium cannot be so high as to hinder investment in public projects whose usefulness is spread over a period of years. It has also been argued that when viewed from the point of view of society there is no rational in having a social rate of discount since society is a continuing entity and its responsibility to posterity is no less than its responsibility to the present generation. If this argument is accepted, then the social rate of discount will be zero and the

consequence will be a "situation where one was always ready to sharve oneself in the present so long as there was any annual benefit however small to be derived from adding to the community's stock of capital".[6] We therefore face the problem of choosing a social rate of discount which is not so small as to neglect the time value of money and at the same not so high as to place a prohibitive weight on future income viz-a-viz present income. A rate of discount of 10 per cent has been taken as a first approximation and in the sensitivity analysis values of 7 per cent, 10 per cent and 12 per cent are used to find out how sensitive is the NPV to these rates. Once the rate (or rates) of discount is given, we can derive the corresponding social value of investment in the economy. Taking 20 per cent as the marginal rate of return on investment in the economy. at 20 per cent and the proportion of reinvestment as 20 per cent we get the social value of investment pinv as 2.67 (when i = 10 per cent) by the formula $pinv = \frac{(1-s)q}{i-sq}$. The marginal propensity to save of the farmers in the area (both big and small farmers) is taken at 10 per cent i.e. they are assumed to consume 90 per cent of their additional income. Unskilled labour being agricultural labourers of poor means are considered to be people who can ill afford to save anything and hence their marginal propensity to save is zero. Considering the present rate of investment, it is assumed that the government ready to invest all the return from the project. Therefore the government's propensity to save is unity. The table showing the parameters and their values are given in table 4.

Using the present values given in table 5, we can find out the net benefits of various objectives by applying the values of parameters given in table 4 for various equations detailed previously. Table 6 gives the present values of net benefits thus obtained on the basis of a zero shadow wage rate.

Table 6 summarises the result of our exercise in economic evaluation of the KDP. In terms of market prices of benefits and costs, the project yields a positive net benefit at the three discount rates. But, as discussed earlier, it is not our intention to rely

Table 4

Value of parameters used in the evaluation

1. Premium on unskilled labour		= -1.0
2. Social rate of discount		= 0.07, 0.10, 0.12
3. Marginal rate of return on investment in the economy		= 0.20
4. Marginal rate of reinvestment of profits		= 0.20
5. Associated social value of investment		= 5.30, 2.67, 2.00
6. Marginal propensity to save		
6-a Farmers	s^f	= 0.10
6-b Unskilled labour	s^l	= 0.10
6-c Government	s^G	= 0.00
7. Rates of discount on objectives		
7-a Aggregate consumption		= 0.07, 0.10, 0.12
7-b Redistribution in Kuttanad		= 0.07, 0.10, 0.12
7-c Redistribution to SF & L		= 0.07, 0.10, 0.12
8. Weights on objectives		
8-a Aggregate consumption		= 1.00
8-b Redistribution in Kuttanad		= 1.00
8-c Redistribution to small farmers & labourers		= 1.00

on the market prices for purposes of an economic evaluation. Therefore the net benefit at market prices is only a first approximation. In the second approximation, we have introduced corrections to those market prices which do not reflect, at least broadly, the social values or social opportunity cost. The only item singled out for correction is that of labour. The net benefits presented in table 6 assumes that the social opportunity cost of labour is zero. That is to say, the premium attached to labour = -1. The second approximation also shows a net positive net benefit for all the three rates of discount. Breaking down in terms of the three groups involved in the project, we find both farmers and labourers stand to gain. But at 10 per cent and 12 per cent

Table 5

Present values of Benefits & Costs
(Rs. in lakhs)

Item	20 years			30 years		
	Social rate of discount of			Social rate of discount of		
	7%	10%	12%	7%	10%	12%
Benefits						
1. Annual yield from paddy cultivation	12,779.79	9771.17	8272.96	16,005.08	11,439.72	9362
1.a Annual yield from Ist Crop	402.50	305.63	257.75	513.02	362.81	295
1.b [illegible] crop	11,943.95	9132.14	7731.93	16,958.23	10,691.52	8750
1-c Yield of straw	397.90	304.19	257.52	498.33	356.17	291
2. Yield of coconut	363.34	249.16	195.60	546.61	342.97	257
Costs						
3. Construction of bund	1,647.08	1522.33	1447.38	1,647.08	1,522.33	1447
3-a Labour	576.48	532.82	506.58	576.48	532.82	506
3-b Domestic materials	920.77	851.03	809.12	920.77	851.03	809
4. Infrastructure works	305.04	282.33	268.59	305.04	282.33	268
4-a Labour	81.29	75.18	71.48	82.29	75.18	71
4-b Domestic materials	223.74	207.15	197.10	223.74	207.15	197
5. Maintenance & repairs	779.98	597.24	506.19	975.27	698.27	572
5-a Labour	273.02	209.05	177.18	341.38	244.42	200
5-b Domestic materials	506.95	388.18	329.00	633.89	453.85	371
6. Cultivation of paudy	9,017.67	6894.76	5837.60	11,293.45	8,072.09	6606
6-a Labour	5,912.57	4740.82	4128.84	6,731.85	5,164.65	4405
6-b Domestic materials	5,771.33	4412.66	3736.08	7,227.83	5,166.15	4228
7. Planting of coconut seedlings	16.85	15.15	14.15	16.85	15.15	1
7-a Labour	6.40	5.75	5.37	6.40	5.75	
7-b Domestic materials	10.45	9.39	8.77	10.45	9.39	
8. Cultivation of non-bearing trees	96.60	78.96	69.39	96.60	78.96	6
8-a Labour	23.53	19.23	17.14	23.53	19.23	17
8-b Domestic materials	69.80	57.34	50.55	69.80	57.34	5
9. Cultivation of bearing-trees	157.44	107.96	84.75	236.85	163.04	111
9-a Labour	53.52	36.70	28.81	80.51	55.66	37
9-b Domestic materials	103.92	71.26	55.94	156.33	98.37	7
Cash transfers						
10. Compensation of land acquisition	54.24	52.66	50.70	54.24	52.66	5
11. Reduction in cost of repairs to bunds	1,154.59	882.78	747.43	1,445.98	1,033.52	845
12. Loan Repayments	1,965.57	1,528.74	1295.45	2,041.12	1,561.49	1324

Table 6

Present Values of Net Benefits of Various objective of KDP
(Rs. in crores)

Item	Equation Number	20 years Social rate of discount 7%	10%	12%	30 years Social rate of discount 8%	10%	12%
Private Consumption objective							
Benefits at market prices	MV (i)	+11.23	+ 5.22	+ 2.40	+19.81	+ 9.65	+ 5.4
Benefits in terms of social value (before effecting for social cost of investment	SV^F (ii)	+31.31	+61.41	+51.76	+84.11	+70.58	+57.75
Benefits of farmers	SV^F_L (iii)	+27.18	+17.42	+14.59	+33.92	+22.94	+18.18
Benefits of labourers	SV_G (iv)	+57.72	+47.37	+41.88	+63.95	+50.59	+42.95
Benefits of Government	SV (v)	+ 0.41	- 3.38	- 4.71	+ 6.35	- 2.95	- 4.42
Benefits corrected for social value of investment	SV*(x)	+93....	+58.67	+48.51	+100.23	+59.48	+55.15
National Development of Tanad	KD^K (xi)	+74.13	+59.36	+52.04	+92.89	+68.60	+58.34
Distribution of Income							
All Farmers	RS^F (xiii)	+17.2..	+10.45	+ 6.75	+20.35	+14.76	+10.91
Labourers	R^L (xiv)	+57.72	+47.37	+41.38	+63.95	+50.59	+43.99
All farmers & Labourers	R^{FS} (xv)	+71.62	+57.82	+50.63	+84.30	+64.35	+54.9...

rate of discount the government receives a negative net benefit, i.e. it incurs a loss as far as the project is concerned. This is because the loan repayment which government receives as income covers only the construction cost of bunds. The establishments expenses and the cost of infrastructure works incurred by the government do not come back to the government.

Though this shows only the government's position with regard to t project, we have to go a step further and see the overall net benefit o the project to the society. This is the third and final approximation which introduces the correction necessary to reflect the social value of investment. Once this is made, the project shows a positive net benefit for all the three rates of discount.

So far we were concerned only with the maximisation of the additional income from the project, i.e. aggregate consumption objectiv We had also included the other objectives, namely, the regional develop-ment of Kuttanad, and the distribution of income from the project to th poorer sections.

As for the regional development of Kuttanad, the project comes out very well because a major share of the project cost is spent in Kuttanad in the form of wages to labourers and obtaining locally available materi for construction of bunds.

The redistributive objective has to be looked at more closely. We find that the small farmers do yield a positive net benefit from the project. But the small farmers who form about 86 per cent of the total number of farmers receive 60 per cent of the net benefit while 14 per cent of the big farmers receive 40 per cent of the net benefit. More on this aspect will be said in the next section.

Another group coming under the poorer sections is the agricultural labourers. Since 35 per cent of the project cost is for the services of labour and about the same per centage constitutes the cost of cultivati of paddy, the relative position of labourers in terms of net benefits from the project seems to be satisfactory.

Sensitivity Analysis

So far our analysis was based on certain assumptions about the shadow wage rate, estimate of future output of paddy per hectare, and so on. Though our attempt was to derive values which approximate to the reality, it is quite possible, especially in the case of agricultural projects, that our values may be subject to more than marginal fluctuatio

In order not to be carried away by the results of using one set of values, we resort to a sensitivity analysis. The sensitivity analysis takes into account the likely changes in the values of certain parameters which are crucial to our exercise in project evaluation.

A crucial parameter in our evaluation is the estimate of output of paddy per hectares for the next 20/30 years. What we have taken is the simple average of the last five years output which may be quite reasonable. But since agriculture is subject the vagaries of monson and other external factors like the attack of brown hopper, etc. we must find out the sensitivity of the project with reference to an estimate which takes into account these risk elements. Our strategy is to find out the minimum output per hectare during the last five year period and use it as an estimate of future output. The results are given in Table 7. The results of this exercise show that in terms of market prices, the project yields a negative net benefits for as low a rate of discount as 7 per cent. But we are essentially seeking the economic justification of the project on social benefits. This is given by the last row in table 7. Here the project is found to yield a positive net benefit on all the three rates of discount. But viewed from the point of view of each group, the farmers receive a negative net benefit on all the three rates of discount with a project life-span of 20 years. However, if the life-span is taken at 30 years, the farmers gain is positive. What this result means is that at an output level of 24 quintals per hectare for the second crop valued at Rs.100 per quintals for the next 20 years, the farmers additional income is not sufficient to cover the additional cost (including repayment of loan).

In the same manner, the government as a party also stand to lose at 10 per cent rate of discount for both 20 and 30 years life-span. The social justification (SV*) is mainly due to the employment potential of the project which is incorporated by way of a zero shadow wage rate.

But a zero shadow wage rate does not mean that the additional consumption of labour is not taken into account. Though the social opportunity cost of employing labour in keeping them idle (which gives a zero value for shadow wage rate), the final approximation in terms of correction for the social value of investment does penalise the additional consumption of labour. This is done by way of a zero value attached to the marginal propensity to save of the labourers.

Table 7

Sensitivity of Net Benefits when additional output from second crop is taken at 24 quintals per hectare(peassimistic) and valued at Rs.100 per quintal (Rs. in crores)

Item	Equation Number		20 years				30 years	
			Social rate of discount of			Social rate of		iscoun
			7%	10%	12%	7%	10%	
Aggregate Consumption Objective								
Benefits at market prices	MV	(i)	-12.66	-13.05	-13.06	-10.11	-11.73	-1
Benefits in terms of social values (before correcting for social value of investment)	SV	(ii)	+57.42	+43.15	+36.30	+68.30	+49.20	+
Benefits of farmers	SV^F	(iii)	- 0.71	- 0.84	- 0.87	+ 1.00	+ 1.55	+
Benefits of labourers	SV^L	(iv)	-57.72	+47.37	+41.88	+63.95	+50.59	+4
Benefits of govt.	SV^G	(v)	+ 0.41	- 3.38	- 4.71	+ 0.35	- 2.95	-
Benefits corrected for social value of investment	SV^*	(x)	+58.68	+57.37	+51.50	+71.53	+44.54	+5
Regional Development of Kuttanad								
Redistribution of Income	RD^K	(xi)	+50.24	+41.10	+36.58	+62.97	+47.21	+
Small farmers	R^{SF}	(xiii)	- 0.43	- 0.50	- 0.52	+ 2.40	+ 0.94	+
Labourers	R^L	(xiv)	+57.72	+47.37	+41.88	+63.95	+50.59	+4
Small farmers & Labourers	R^{FS}	(xv)	+57.29	+46.87	+41.36	+66.35	+51.53	+4

Implementation of the project in time.

Our evaluation of KDP so far was based on an implicit assumption which is very crucial to the results we obtained. This is about the time period within which the project is proposed to be completed. Though we have taken the authorities in good faith, there seems to be very little basis for placing such a faith. If past experience is any guide, then non-completion of the projects within the targeted period is a rule rather than an exception. In the case of KDP, this is especially so considering the extremely tardy progress in the construction of bunds. Therefore, the results of our ex ante evaluation rests on the crucial assumption about the implementation period of the KDP.

What are the factors which hinder the progress of bund construction are not examined here for the present. But it would suffice to note that the technicians while preparing the engineering report assumed that the project would be completed within six years without assigning any basis whatsoever for such an assumption. Moreover, they did not mention an alternative time period which would take into account the usual technical difficulties, administrative delays and so on. In a project like the KDP where there are different parties like the State government, lending institutions and farmers with likely--not necessarily - conflicting interests, it is extremely important to chalk out a well thought-out phasing of the whole programme of work. This would help in two ways. One, the technicians who actually execute the work are in a position to leave some margin for delays, etc. and therefore in a position to tell the political-administrative authorities responsible for the implementation of the project can think ahead of the likely problems which may be procedural as well as institutional and try to minimise them to the extent possible. What is happening now is something entirely different. Problems are left to assume crisis proportions and then suddenly all parties concerned sit on it for resolving them. Once a decision is made and work restarted considerable time would have elapsed. A second crisis undergoes the same cycle of problem-solving with another spell of time being lost.

III

Summary and concluding Remarks

1. The economic evaluation contained in the Report of the KDP does not give the kind of information necessary for decision-making in a typicall large agricultural project. Its scope is confined to an exercise in discounted cash-flow (in terms of market prices) with questionable assumptions on output and its valuation.

2. The report does not provide a technical alternative of the scheme for consideration. It is quite likely that the technique under evaluat may be the appropriate one considering its labour intensive character and utilization of locally available materials.

3. Taking into account the per hectare output of paddy at 30 quintals valued at Rs.100/- for the next 20/30 years, the project yields a positive net benefit for discount rates of 7 per cent, 10 per cent and 12 per cent. In terms of net benefits of farmers the project does come out very well. Labourers also stand to gain by way of employment. From government's point of view (which means the state government and lendi institutions) the project yields a positive net benefit at 7 per cent rate of discount, but at 10 per cent rate of discount the government stand to lose. This is because the repayment of loan covers only the construction cost of bunds. The establishment expenses and the cost o infrastructure works are not to be repaid and hence the loss. But in far as the project generates real income to farmers, the government co if it so desires, think of getting a share through taxation measures s as the imposition of a betterment levy.

4. On the question of regional development of Kuttanad, the KDP's im seems to be very high. By way of wages to labourers, payments for obtaining construction materials, income from additional crop, etc., region stands to gain a considerable share of the project's net benef

5. As for the distribution of income to the poorer sections, two sections were identified as deserving consideration: small farmers an agricultural labourers. The share of labour is relatively satisfact But the average income of labourers will be determined by the size of the labour force in the area.

6. The pattern of land holding (as per the record in June 1973) shows that the distribution is skewed in favour of big farmers. Big farmers (with more than 2 hectares) constituting 14 per cent of the total number of farmers have 40 per cent of the area under cultivation while the small farmers forming 86 per cent have 60 per cent of the cultivated area. Therefore the institutional set up makes it possible to divert a significant portion of the benefits to a relatively small group. The redistributional benefits of the small farmers (given by d^{SF} in table 5) showing a positive net benefit only means that in absolute terms the project confers benefits to this group. But the UNIDO methodology of project evaluation (or for that matter any other methodology of project evaluation) is not able to tell us anything about the inter-personal distribution of income between groups. But a simple arithmetic can tell what would be the average net benefit per small farmer viz-a-viz big farmer as a result of the project. The following figures give this information.

Table 6

Average net income of the small farmer viz-a-viz big farmer given the land distribution as on June 1973(in Rs.)

	20 years			30 years		
	Social rate of discount of			Social rate of discount of		
	5%	7%	10%	5%	7%	10%
(1) Small farmers	4,100	3,100	2,100	6,000	5,200	2,700
(2) Big farmers	10,700	10,400	10,000	20,000	20,100	10,000

The above table shows that the benefits of the project is distributed more in favour of big farmers than small farmers. It is on this basis that we concluded earlier that the project, as it is framed, is biased in favour of big farmers. There are two methods by which the government can correct this bias, if it wants to. One is to think in terms of correcting the institutional factor of land distribution through land reforms. This,

of course, is a long term policy. The other is to built into the project certain corrective measures such as lower rate of interest for the small farmers and/or greater [illegible] of equipment, credit and other facilities for cultivation which would tend to make their position relatively better off.

7. All the above conclusions were based on our estimate of the output of paddy at 30 quintals per hectare (which is the average output for the last five years) valued at Rs.100/- Since the above estimate does not taken into account the risk elements, we have resorted to an evaluation based on 24 quintals of output per hectare (which is the lowest output during the last five years). On this basis, the project is still found to be socially justifiable. But the farmers as a group do not make a positive net benefit (except with a 30 year life span). This brings into focus the crucial factor that every effort should be made to increase the productivity per hectare above [illegible] by way of better agricultural practices, preventive measures [illegible] in case of diseases to crops and adoption of high yielding varieties. In this respect the Agricultural Extension Wing of the Kerala Land Development Corporation has an important role to play.

8. A lesson that we may draw from the above exercise is that [illegible] must first undergo a technical evaluation [illegible] variants for which [illegible], is necessary. But [illegible] decision-making on important public projects [illegible] economic evaluation, i.e. [illegible] cost-benefit analysis.

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4. For a derivation of this formula, see UNIDO Guidelines for Project Evaluation, Ch.14.

5. The values of both the marginal rate of return on investment and marginal rate of return of reinvestment of the profits are national parameters. These values are taken from the evaluation of the Durgapur Fertilizer Project", Mrinal Datta Choudhury and Amartya Sen, Indian Economic Review, April, 1970.

6. See Dobb, Maurice, An Essay on Economic Growth and Planning Ch.2, p.19.