ABSTRACT For land outside the sea-dikes of the northern part of the province of Friesland five alternative land-reclamation plans have been made. Agricultural organizations and the Province are in favour of the larger plans because of their expected economic benefits, which mainly accrue to arable farming — wholesale and processing. Environmental organizations are against these plans because of the expected damage to the valuable natural environment of the Dutch Shallows. The plans proposed primarily serve regional interests, have large indirect economic effects, and are finally decided upon by central government. It is argued that for an economic evaluation of such projects an integrated interregional cost-benefit and input-output analysis is most adequate. Under the present Dutch administrative and financial lack of decentralization, it appears to make a great difference whether the cost-benefit analyses are made from a regional point of view or made from the more usual national standpoint.

1. INTRODUCTION

Cost-benefit analysis has been criticized on several grounds and alternatives have been proposed (see, e.g., Nijkamp and van Delft 1977). For the economic evaluation of alternative projects, it nevertheless offers an operational method, the attractiveness of which is determined by its uniform measurement unit (Dasgupta and Pearce 1972). For this reason it continues to be used in practice quite often.

In the case of a land reclamation project for Northern Friesland as many as five alternative cost-benefit analyses have already been carried out. As these plans were primarily set up for economic reasons, this seems a reasonable starting point for an evaluation procedure. In tracing the history of these plans we find that environmental protection was the principal argument against them (see section 2). So intangibles have to be discussed too.

This paper serves two aims. Firstly, we are interested in investigating the manner in which projects with large indirect economic effects can be evaluated. In section 3 we argue that in the case of sector-specific projects, this has to be done by an integrated cost-benefit and input-output analysis. In section 4 we show how this may be done in the case of (agricultural) projects with large supply effects on processing sectors. These effects present a problem because they do not fit into the demand-driven input-output model.

Secondly, we are interested in the consequences of a different spatial level of decision-making and of a different decentralization of finance and power. In section 4 it is argued that regional projects which are financed and decided upon at a national level, may be best analysed by an interregional approach.
Sections 5 and 6 show that interesting empirical differences may be found in the case of the land-reclamation plans for Northern Friesland. In section 7 some theoretical and policy conclusions are drawn from the foregoing analysis.

2. POLICY HISTORY: ENVIRONMENT VERSUS EMPLOYMENT

All dikes along the Dutch coast have to be made heavier and higher to meet the requirements of the Delta act, passed after the big flood of 1953. In the province of Friesland alternative plans (traces A, B, C and D) were prepared in 1975 for the last old dikes in this province (Rapport van de Werkgroep 1975). Figure 1 gives the location of the different traces.

Trace A to a large extent refers to the present situation as it only involves a reinforcement of the present winter-dike. Trace B roughly equals the path of the present summer-dikes, which are flooded once or twice in winter every three or four years. It involves the final reclamation of the present summer-polders (1170 ha.), which are used for cattle breeding. Trace C corresponds closely to the edge of the present so-called ‘kwelders’ (840 ha.), i.e., fairly high-lying land outside the summer-dikes, only flooded with spring-tide, and in summer used extensively for raising calves and sheep. Finally, trace D (see Figure 1) roughly equals the edge of the present land reclamation works (1890 ha.) which contain higher, solid shallow fields and lower, wet ones.

Agricultural organizations and the Province of Friesland strongly favoured trace D, because especially the shallow fields are well suited for the growing of high quality seed potatoes. Northern Friesland feared that its economies of specialization would be threatened. Environmental protection and fishing organizations together favoured trace A: the former because the summer-polders and especially the ‘kwelders’ function as very important feeding and breeding grounds for a number of comparatively rare birds from throughout Europe (Noord-Friesland Buitendijks 1975); the latter because the lower shallow fields have an important function as a nursery for certain kinds of fish and for shrimps (Noord-Friesland Buitendijks 1978).

Finally, discussions became strongly polarised as a simple choice between traces A and D. In 1976 the Province decided in favour of plan D. Its main argument was the maintenance of its centre function for seed potatoes. In 1978, in its reaction to the objections raised during the legally obligatory procedure, employment was put forward as the principal argument. In 1979 the central government decided that the protection of the natural environment was of greater importance and plan D was rejected. In 1980 the central government further decided that this rejection did not imply that plan A had to be executed.

The latter fact was sufficient reason for the Province to commission a new study, to investigate how more new land could be adapted for arable farming and how conservation of the environment could be given greater prominence. This study (Rapport van de Werkgroep 1980) resulted in the presentation of the new traces B1, B2, C1, E1 and E2 (see Figure 1). Each new alternative entailed deep-ploughing of grass-land to make it fit for arable farming, and included the creation of sanctuaries for meadow-birds (380 ha., see Figure 1).

In 1982 the provincial parliament favoured plan C1, because it seemed the largest plan that might be acceptable to the central government in the Hague. This choice was in part based on the strange combination of a national cost-benefit analysis and a regional employment estimate (Rapport van de Werkgroep 1980).
3. **WHY AN INTEGRATED, INTERREGIONAL COST-BENEFIT AND INPUT-OUTPUT ANALYSIS?**

The above-mentioned plans have several characteristics and these largely determine the kind of policy analysis that is most appropriate.

Firstly, these plans have large *indirect* economic effects, which are aimed at as a matter of fact. The estimation of indirect effects of concrete policy measures on the national economy, in general requires a model of that economy. Secondly, these plans have a rather *specific* economic character, in that they focus upon one *sector*, agriculture. This means that the model of the national economy should be able to grasp this specific-sectoral character of the plans. It implies the use of input-output analysis, because only the input-output model offers an operational national-sectoral model. Thirdly, they concern *investment* projects with costs occurring in an early period and benefits being spread out over the *long-term*. These are precisely the kind of projects that belong to the traditional field of application of cost-benefit analysis (Pasgupta and Pearce 1972).

So, an evaluation of the plans seems most adequately performed by an integrated cost-benefit and input-output analysis.

Such an integration has some incidental advantages. The input-output model gives per sector a specification of production costs. This specification includes intermediate use (domestic and foreign), indirect taxes and price-lowering subsidies, wage costs, other incomes and depreciation. This means that integrated with cost-benefit analyses, it may suffice to use gross value added as a measure of benefits and investments as costs, if it is assumed that the shadow price of labour is zero. In this way the estimation of indirect benefits may be simplified because production values and intermediate costs need not be estimated separately. Moreover, indirect taxes may be separated from the value added measured at market prices, and foreign import and trade-balance effects may be dealt with separately, if necessary.

Last, but not least, the *regional nature* of the plans is important. The initiative for the plans comes from the region and most of the economic benefits are expected to accrue to the region. The latter is plausible as the projects fit perfectly into existing regional patterns of economic activity, i.e., they fit into a well-developed agro-industrial complex (see, e.g., Federation of Northern Economic Institutes 1977).

Thus, for the provincial authorities a regional cost-benefit analysis would be sufficient for them to make up their own minds. National authorities normally neglect international costs and benefits; in the same way regional authorities are entitled to neglect interregional spill-overs, because their main responsibility is the welfare of their own population.

In Dutch administrative practice, however, all larger projects either require national funds or a national final decision, and in most cases, they require both (Oosterhaven 1981a; ch. 3). This means that if the regional authorities do not carry out a national cost-benefit analysis, the national government will do so. The latter was in fact the case with plan D (National Department for the Maintenance of Dikes 1979).

So, the regional authorities would be better served by an interregional analysis. This meets their own evaluation aims and informs them about the alternatives which are most likely favoured by the national decision-makers. Moreover, an interregional analysis is also of interest from a national point of view. By means of such an analysis, the division of costs and benefits over the
national population as well as the administrative aspects of different financial division-keys may be studied.

When all characteristics are considered as a whole, a clear case for an integrated, interregional cost-benefit and input-output analysis emerges.

4. THE INTERREGIONAL INPUT-OUTPUT MODEL USED IN THE STUDY

The model used in this study is based on an interregional input-output table for 1970. In this table the three northern provinces of the Netherlands are taken together and the rest of the Netherlands functions as the second region (Oosterhaven 1979). Unfortunately an interregional table for the province of Friesland and the rest of the Netherlands is not yet available. In the present model we intend to take three kinds of indirect economic effects into account.

Firstly, we want to take account of backward effects on the intermediate inputs necessary for the extra production of all sectors. In principle this relation is modelled in the ordinary way (see, e.g., Oosterhven 1981a; ch. 2).

Secondly, we want to allow for the empirically important backward linkages that run via sectoral labour incomes to consumption expenditures. For an adequate modelling of this relationship, reaction functions for employed and unemployed people from within and from outside the region should be estimated. Only in this way can an adequate description of the interdependency between labour incomes and non-labour incomes be made (see Oosterhaven 1981a; ch. 6, for the structure of such a model).

In the present case we have used a rather simplified version of this more general approach. The location of the projects is in the far north of the Netherlands. Moreover, the labour required fits very well with local experience because of its strong regional character. So, we assume that no migration will take place as a consequence of executing one of the alternatives. Furthermore, because of high national unemployment, especially of young people, we assume that all labour needed is easily found. Both directly and via substitution chains, unemployed are assumed to find work without any increase in wages or other costs. Note that regional unemployment in the Northern Netherlands is some 50% higher than national, which makes this assumption even more plausible. Finally, we assume that the school leavers and unemployed who find work because of these plans, will lose non-labour incomes. These are assumed to be 50% of their new labour incomes.

The third type of indirect effect with which we want to deal is probably most important. It concerns the forward effects of the increase supply of agricultural products on the processing wholesale and the processing food industry. The traditional input-output model, however, is demand-driven. It is not capable of dealing with supply effects. On the contrary, it assumes supply to be infinitely elastic. If there is one scarce but complementary factor of production, such as land in the case of agriculture, this assumption is implausible. In such cases, the direction of causality is quite different. Moreover, in our case the demand for agricultural products seems more or less infinitely elastic, because of favourable export conditions and European Community arrangements.

Unfortunately, existing interindustry approaches that claim to deal with forward linkages, may be argued to be either inconsistent or theoretically implausible or both (see Oosterhaven 1981a; ch. 8 and 1981b). In our opinion an operational and theoretically plausible interindustry model that integrates
supply and demand effects upon production levels, will be unobtainable, especially on an interregional scale.

In the restricted case of concrete impact studies, however, an operational alternative is available (Oosterhaven 1981a; ch. 8). It uses endogenous primary inputs, interregional output coefficients and reciprocal technical coefficients (so-called working-up coefficients) to estimate forward production effects in a finite round-by-round approach. To deal with backward linkages, the traditional model has to be adapted to prevent double-counting already established forward production effects. This may be done in a round-by-round way or more roughly by using a simultaneous approach. In doing so, import and export substitution effects have to be considered too (see Oosterhaven 1981a; ch. 8 and 9, for further details).

The model used in the present application uses the simultaneous variant to deal with backward linkages. It may be summarized mathematically as follows:

\[ x = p' + i^b + c^b + f^{\text{ex}} \]  
\[ p' = E x^{\text{ex}} + B'_a x^{\text{ex}} \equiv (E + B'_a) x^{\text{ex}} \]
\[ i^b = A_c x \]
\[ c^b = Q_c x \]
\[ f^{\text{ex}} = 0 \]
\[ VA = v^r x \]
\[ NI = k^r x \]
\[ LA = e' x \]

where:

- \( x \) is a 48 x 1 column vector with production changes for 24 sectors in the Northern Netherlands and in the Rest of the Netherlands, respectively;
- \( p' \) is a 48 x 1 column vector with forward production effects due to increased agricultural supply;
- \( i^b \) is a 48 x 1 column vector with backward production effects due to net increased intermediate demand;
- \( c^b \) is a 48 x 1 column vector with backward production effects due to net increased consumption demand;
- \( f^{\text{ex}} \) is a 48 x 1 column vector with exogenous final demand changes, which are zero in the present case;
- \( E \) is a 48 x 5 summation matrix with 5 ones on the first row and zeros elsewhere;
- \( x^{\text{ex}} \) is a 5 x 1 column vector with exogenous increases in the production of seed potatoes, winter wheat, sugar beets, milk and meat;
- \( B'_a \) is a transposed 5 x 48 matrix with per row interregional intermediate output coefficients (from the above agricultural products to the processing sectors) that are multiplied by the corresponding reciprocal technical coefficients (so-called working-up coefficients for the wholesale in seed potatoes and winter wheat and for the sugar-, the dairy- and the meat industry in the North and in the Rest of the Netherlands); i.e., \( B'_a \) contains \( b^r_j / a^r_j \) indicating the forward effect on the production of sector \( j \) in region \( s \) per unit of production of sector \( i \) in region \( r \);
\(A_c\) corrected 48 x 48 matrix with net interregional intermediate input coefficients \(a_{ij}^c\), with zeros on the rows for agriculture and the food industry based on animal products;

\(Q_c\) is a corrected 48 x 48 matrix with net interregional consumptive input coefficients \(q_{ij}^c\), with zeros on the same rows as \(A_c\), i.e., these coefficients indicate the net consumption expenditures on products from sector \(i\) in region \(r\) per unit of additional production of sector \(j\) in region \(s\),

\(VA\) is extra national gross value added at market prices,

\(v'\) is a 1 x 48 row vector with value added coefficients per regional sector,

\(NI\) is net national investment (recurring after the depreciation terms expire),

\(k'\) is a 1 x 48 row vector with marginal capital/output ratios per regional sector,

\(LA\) is extra national employment in man-years, and

\(e'\) is a 1 x 48 row vector with marginal employment coefficients.

Oosterhaven et al. (1981) provides further details and sources of data.

The above model is easily solved by a substitution of Equations (2), (3), (4) and (5) into Equation (1). Next, the result has to be inverted and substituted into Equation (6), (7) and (8). From this follows:

\[VA = v' (I - A_c - Q_c)^{-1} (E + B'a) \chi^{ex}\]  

(9)

\[NI = k' (I - A_c - Q_c)^{-1} (E + B'a) \chi^{ex}\]  

(10)

\[LA = e' (I - A_c - Q_c)^{-1} (E + B'a) \chi^{ex}\]  

(11)

5. THE NATURE OF THE ESTIMATED COSTS AND BENEFITS

Before the presentation of our empirical results we will briefly state the premises on which our cost-benefit analysis is based. We follow the guidelines of the national committee on policy analysis (Eerste deelrapport van de Werkgroep 1974; Tweede deelrapport van de Werkgroep 1975). Thus, we use a discount rate of 10% and present net benefit instead of a benefit/cost ratio, because the latter gives misleading information if important intangibles are involved. Furthermore, we use prices of 1979, the base-year 1980 and a plan-horizon of 2040. Because plan A, i.e. the enforcement of the present winter dike, will for legal reasons be executed if the other alternatives are rejected, we will use plan A as the base situation with which the alternatives will be compared. We will consider the planned meadow bird sanctuaries as a perfect shadow-project (Klaassen and Botterweg 1976) for the present function of the area for meadow birds (see Rapport van de Werkgroep 1980 for the empirical underpinning of this assumption). The economic costs and benefits of the sanctuaries are about equal and will not be mentioned.

The following economic costs and benefits are involved in these land-reclamation plans.

In accordance with the official guideline (Eerste deelrapport van de Werkgroep 1974) only directly necessary costs are treated as costs. All other costs are treated as benefits.

In view of the aims of the alternatives these direct costs include the additional investment costs for dikes (compared with the base plan A) and also the agricultural investments necessary to exploit the new land. Because the land is at present extensively used for agriculture, replacement investments will be avoided as a direct consequence of executing the alternatives. These avoided investments are treated as negative direct costs.
Because of the abundance of labour both nationally and regionally, we assume that labour costs have a shadow price equal to zero. So, they are not treated as (national or regional) economic costs. On the benefit side we use gross value added at market prices as a measure instead of agricultural turnover. So, we reckon already with direct intermediate (non-factor) cost in this more efficient way. This means that they need not be included in the direct costs.

The direct economic benefits include the value added which is reached at respectively 5, 11, 18, 30 and 40 modern arable farms planned under the alternatives B1, B2, Ct, E1 and E2. Supposedly seed potatoes, winter wheat and sugar beets will be grown. Before this situation is reached present cattle breeding protection will have to be reduced slowly. The corresponding reduction in value added is subtracted and forms a negative direct benefit. Parallel to this process, the new land has to be made fit for permanent exploitation by means of temporarily growing colza or rape seed. This represents a temporary direct benefit.

The indirect economic benefits related to the above mentioned reduction in present use, temporary exploitation and permanent exploitation, are estimated by Equation (9). Besides indirect benefits, we also have indirect costs which are treated as negative benefits. They include indirect investments in the North and in the Rest of the Netherlands in all sectors that experience a permanent rise of production, due to the respective alternatives. With regard to temporary exploitation, investments are not considered necessary. The reduction in cattle-breeding, however, will lead to reduced replacement investments, mainly in the dairy and the meat industry. Most indirect investments are estimated with Equation (10) (see Oosterhaven et al. 1981, for deviations).

Economic damage to fishery is probably negligible because the lower wet shallows fall outside all traces. This aspect was only of interest in the case of the rejected plan D. Besides the above mentioned economic costs and benefits, several intangibles are involved.

The speed of realization of the plans is the most important safety aspect for the inhabitants and for material objects behind the new dike, because the safety of all traces is about the same. Realizing plan E2 takes one year more than E1 and Ct, and these two in their turn take one year more than B1 and B2. Objections raised against the plans will probably further delay the decision-making process. This does not hold for plan A, which only violates expectations and will therefore probably encounter fewer objections.

The old dike is considered to have some cultural-historic and landscape value. Moreover, it offers slightly more safety, because of its function as a back-dike. So, its conservation favours all alternative plans above plan A.

Employment, both direct and indirect, has been an important argument. Its importance generated 11 different regional estimates for the rejected plan D! (See Oosterhaven 1981a; ch. 9 for a methodological discussion.) To estimate indirect employment Equation (11) is used (see Oosterhaven et al. 1981, for details).

Two remarks have to be made. Firstly, the estimates for temporary employment involved in building the dikes, farm-houses etc., may not be added to the estimates of permanent employment. To indicate the difference we speak of man-years and working places. Secondly, it has to be stressed that the economic benefits of employment (i.e., wages and incomes of independents) are already included in the estimates of the value added. So, mentioning employment as an
intangible only refers to its socio-psychological value, and the latter only in so far as this value is not yet monetarized, i.e., not expressed in a higher wage or income.

Last but not least we have to mention environmental damage as an intangible. It involves several aspects. The existing values are considered to be extremely high. On this point all experts are of the same opinion. The uncertainty about the consequences of executing one of the alternatives is large. This appears from the difference in opinion between experts on the size of the consequences.

The unbroken spatial and ecological coherence of the summer polders, ‘kwelders’ and land reclamation works is considered to be very valuable for bird life. This means that all plans have an important advantage above E2, which implies the complete loss of summer polders and ‘kwelders’. The summer polders taken separately are of importance as a meadow bird area, a function which will be conserved in the sanctuaries. Moreover they contain so-called ‘dobben’, i.e., excavated pools with ringdikes. These ‘dobben’ have a different salinity and therefore an interesting, varied flora and fauna. The ‘kwelders’ have a unique vegetation and a very important function as breeding, resting, moulting, eating and high water refuge areas for large numbers of, partly rare, shallow and migratory birds. Finally, the solid, higher land reclamation works, serve as important eating areas, especially for birds of passage. The damage done to the above mentioned environmental functions will be indicated just as in the official report (Rapport van de Werkgroep 1980).

6. NATIONAL RESULTS VERSUS REGIONAL RESULTS

The empirical results of our analysis will now be presented in three variants. First, the usual national cost-benefit analysis is presented. Secondly, we present a regional cost-benefit analysis which is fit to assist the regional authorities in reaching a decision under the present type of financial arrangements. Thirdly, we will construct a regional cost-benefit estimate for a completely autonomous North, i.e., we assume that there will be no national subsidies whatsoever. In view of the natural gas deposits in the North, capital might become abundant, i.e., receive a shadow-price of almost zero. The latter possibility will, however, not be dealt with.

The national cost and benefits of the plans B1, B2, Ct, E1 and E2 are presented in Table 1. For layout reasons we do not follow the exact balance-form. The figure zero indicates the absence of a significant difference from plan A. Table 1 shows that none of the alternatives may be called attractive from a

| TABLE 1. National Costs and Benefits |
|-------------------------------|-------|-------|-------|-------|-------|
| Costs (-) and benefits (+)   | B1    | B2    | Ct    | E1    | E2    |
| Direct costs (in millions)  | -10.5 | -14.5 | -20.3 | -72.2 | -82.9 |
| Direct benefits (id.)       | +2.9  | +7.0  | +13.1 | +23.4 | +29.9 |
| Indirect benefits (id.)     | -3.4  | -0.6  | -3.7  | +13.5 | +19.1 |
| Net benefits (in millions)  | -11.0 | -8.2  | -3.6  | -35.4 | -34.1 |
| Speed of realization        |       |       |       |       |       |
| Conservation of old dike    | +157  | +224  | +326  | +804  | +1224 |
| Temporary empl. (man years) | +3    | +15   | +46   | +112  | +161  |
| Permanent empl. (work places)| /0   | /0    | /0    | /0    | /0    |
| Flora and fauna             | /0    | /0    | /0    | /0    | /0    |
| Function for breeding-birds | /0    | /0    | /0    | /0    | /0    |
| Function for migratory birds| /0    | /0    | /0    | /0    | /0    |
| Spatial and ecological coherence | /0 | /0 | /0 | /0 | /0 |

Source: Oosterhaven et al. (1981).
national point of view. A comparable conclusion was drawn before in the case
of plan D (National Department for the Maintenance of Dikes 1979). Plan Ct
is economically least unattractive. The social-psychological value attached to
having work must be very large to compensate both the negative economic
outcome and the environmental damage.

Two remarkable aspects of Table 1 need further explanation. Firstly, the
direct costs of the E-plans are much higher than those of the alternatives. This
is caused by the dikes which have to be built in much weaker soil. Secondly, we
see negative indirect benefits. These are caused by the reduction in the present
level of cattle breeding, which has much larger indirect effects than arable
farming. The latter is too small in the case of the B-plans to compensate the
indirect loss, mainly concentrated in milk and meat production.

In view of the above results one may wonder why the Province first favoured
plan D and at present opts for Ct. To clear this contradiction we have to look
at the regional costs and benefits, the estimation of which requires some additional
assumptions.

The regionalization of value added, indirect investments and employment
follows directly from the model contained in Equations (1)-(8). The results relate
to the three northern provinces, but they give a relatively good description of
the actual decision-making situation of the province of Friesland, as the effects
in the other two northern provinces are small.

A regionalization of the direct costs requires further discussion. The central
government will pay the direct cost of the dike for plan A. The additional dike
costs and layout costs for the new polders, however, will only partially be paid
by the central government. We suppose that about half will be paid centrally.
Some 10% of this half will be paid by the inhabitants of the North, because that
is their average share in the nationally levied taxes. The other half has to be
paid by the land owners. Thus, they represent regional costs, except for the E-
plans, which contain state owned land.

Some intangibles, such as the speed of realization and the conservation of
the old dike, mainly concern the regional population. So their valuation does
not change with the spatial level of the analysis. This does not hold good,
however, for the environmental damage. From the objections raised it follows
that inhabitants of the Rest of the Netherlands also feel involved. The (approx-
imately) 10% living in the North, live closer to the projects and feel, according
to the objections raised, relatively more involved (see National Association for
the Conservation of the Shallows (1975, 1978) ). We suppose that the regionally
incurred environmental damage may be put at one third of the national damage.

Finally, the bird sanctuaries play regionally another part than nationally.
The lower regional valuation of the environmental damage, places a relatively
higher weight on the non-realized economic benefits, than will be the case
nationally. So we present separately the effects of disregarding the meadow bird
sanctuaries.

Table 2 shows in principle why the Province of Friesland favours plan Ct.
This plan has a clear economic attractiveness for the regional population, although
it is economically not as attractive as plan E2. The social-psychological value of
the work created with plan E2 gives preference to E2 even more. There is no
doubt about the fact that the Province would have favoured plan E2, if its
former preference for plan D had not been rejected by the central government
because of its environmental damage. The same may be expected for plan E2.
Therefore it is quite rational to choose the second best Ct, as it has at least some
TABLE 2. Regional Costs and Benefits

<table>
<thead>
<tr>
<th>Costs (-) and benefits (+)</th>
<th>B1</th>
<th>B2</th>
<th>Ct</th>
<th>E1</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct costs (in millions)</td>
<td>-6.7</td>
<td>-9.2</td>
<td>-13.0</td>
<td>-34.2</td>
<td>-37.6</td>
</tr>
<tr>
<td>Direct benefits (id.)</td>
<td>+2.9</td>
<td>+7.0</td>
<td>+13.1</td>
<td>+23.4</td>
<td>+29.9</td>
</tr>
<tr>
<td>Indirect benefits (id.)</td>
<td>-3.0</td>
<td>-1.1</td>
<td>+2.3</td>
<td>+9.7</td>
<td>+13.7</td>
</tr>
<tr>
<td>Net benefits (in millions)</td>
<td>-6.8</td>
<td>-3.3</td>
<td>+2.4</td>
<td>-1.1</td>
<td>+6.0</td>
</tr>
<tr>
<td>Speed of realization</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Conservation of old dike</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Temporary empl. (man years)</td>
<td>+120</td>
<td>+170</td>
<td>+248</td>
<td>+612</td>
<td>+947</td>
</tr>
<tr>
<td>Permanent empl. (work places)</td>
<td>-6</td>
<td>+7</td>
<td>+32</td>
<td>+86</td>
<td>+124</td>
</tr>
<tr>
<td>Total environmental damage</td>
<td>1/2-0</td>
<td>1/2-</td>
<td>1/2-</td>
<td>1/2-</td>
<td>1/2-</td>
</tr>
</tbody>
</table>

Source: Oosterhaven et al. (1981).

chance in the Hague because of the more moderate environmental damage involved.

Finally, Table 3 shows the regional effects of disregarding the meadow bird sanctuaries. It clearly indicates the regional attractiveness of disregarding these sanctuaries. All plans now become economically more attractive, which holds good especially for the smaller plans. This strengthens the regional preference for plan Ct.

The above regional analysis holds good for the present financial and power arrangement between central and provincial government. To make a sharp distinction with the existing regional division of finance and power, we will simulate the costs and benefits for a completely autonomous North. This simulation requires several additional assumptions.

Firstly, all direct, formerly national costs will become regional, because the whole project will have to be financed autonomously. Secondly, present legal objection procedures will disappear. The project may be executed immediately after the regional parliament has made a decision. So only the physical limitation on the speed of realization remains. The procedural limitation practically disappears. Thirdly, it might very well be possible that the regional employment effects will become higher, because an autonomous region is probably a little more self-sufficient. Moreover, an autonomous regional government will surely buy more regionally than the present institutions involved in executing the project. That is why we round off the estimates upwards by approximately 10% in the case of permanent employment and by about 25% for temporary employment.

Table 4 shows the results of these assumptions. With meadow bird sanctuaries the E-plans completely lose their regional attractiveness, because all costs have to be paid regionally. It is conceivable that the socio-psychological value is regionally valued higher than nationally, in which case plan Ct may have some attractiveness. It may, however, also be argued that the outcome of the decision of an autonomous North will be the same as the probable national decision, viz. plan A.

TABLE 3. Regional Effects of Skipping Meadow-Bird-Sanctuaries

<table>
<thead>
<tr>
<th>Costs (-) and benefits (+)</th>
<th>B1</th>
<th>B2</th>
<th>Ct</th>
<th>E1</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net benefits (in millions)</td>
<td>+27.7</td>
<td>+26.8</td>
<td>+24.0</td>
<td>+23.3</td>
<td>+21.3</td>
</tr>
<tr>
<td>Permanent empl. (work places)</td>
<td>+42</td>
<td>+42</td>
<td>+42</td>
<td>+42</td>
<td>+42</td>
</tr>
<tr>
<td>Function for meadow-birds</td>
<td>1/2-</td>
<td>1/2-</td>
<td>1/2-</td>
<td>1/2-</td>
<td>1/2-</td>
</tr>
</tbody>
</table>

Source: Processed figures from the official report (Rapport van de Werkgroep 1980).
If the bird sanctuaries are omitted all plans become more attractive economically (see Table 3). Now it becomes plausible to assume that the region might favour plan Ct, as it does in the present situation. The arguments, however, will be completely different and will be more genuine, because considerations of a probable national rejection of a larger plan play no part. The larger E-plans remain economically unattractive, notwithstanding the omission of the sanctuaries.

7. CONCLUSIONS

On theoretical grounds it is argued that an integrated cost-benefit and input-output analysis is the best way to tackle the economic evaluation of projects with large indirect economic effects. If the initiative for such projects is taken by regional authorities, whereas the finance and the final decision is a national question, it is argued that the analysis has to be an interregional one.

The land reclamation plans for Northern Friesland offer a good example of such projects. Their agricultural character, which implies the presence of important supply effects on processing sectors, poses a theoretical problem. It is shown that these forward linkages may be dealt with endogenously if the demand-driven input-output model is adequately reformulated and adapted to the problem at hand (see Oosterhaven 1981a; ch. 8 and 9).

Important for decision-making is the empirical conclusion that plan Ct and especially E2 seem attractive from a regional point of view. From a national point of view, however, plan A seems most attractive. So, under the present decentralization of finance and power, the choice of the Province of Friesland for plan Ct is quite rational. Although it is second-best it may be just acceptable to the central government, whereas plan E1 obviously is not.

Most remarkable, however, is the outcome of the simulation for an autonomous North. In that case the regional preference seems almost equal to the national one. So, speculatively, we might conclude that a complete decentralization might have led to the same decision. A decision, however, reached with fewer conflicts and in less time.

As the regionally incurred environmental damage is less than the national one, the plans of an autonomous North would probably have involved the omission of the meadow bird sanctuaries. In that case plan Ct would again have been the most attractive, but on completely different and more genuine grounds.

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