AN ASSESSMENT OF INVESTMENTS IN LAND RECLAMATION

A STUDY FROM THE POINT OF VIEW OF THE NATIONAL ECONOMY
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UNE ÉVALUATION DES INVESTISSEMENTS DANS LES TERRES NOUVELLEMENT MISES EN VALEUR DU POINT DE VUE DE L'ÉCONOMIE NATIONALE

EINE GESAMTWIRTSCHAFTLICHE BEURTEILUNG VON INVESTITIONEN FÜR NEUGEWONNENES LAND

UNA EVALUACIÓN NACIONAL ECONÓMICA DE INVERSIONES EN TIERRAS RECIENTES RECUPERADAS

REPORT OF THE 'DUTCH AGRICULTURAL INVESTMENT COMMISSION'

H. VEENMAN & ZONEN N.V. / WAGENINGEN / THE NETHERLANDS / 1960
International Institute for Land Reclamation and Improvement
Institut International pour l'Amélioration et la Mise en valeur des Terres
Internationales Institut für Landgewinnung und Kulturtechnik
Instituto Internacional de Rescate y Mejoramiento técnico de Tierras

POSTBUS 45 / WAGENINGEN / HOLLAND
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FOREWORD

Investment is vital to the welfare and prosperity of the Dutch people. Much thought is given to the question of which investments yield proportionately the greatest advantage to the national economy, and the part which the Government should play in promoting such investment, in the public interest. These studies go back to well before World War II.¹)

But changes in material conditions and theoretical knowledge brought about by the war made many of these opinions obsolete. Hence the need for a new investigation into all the aspects, social and economic, of national investment.

Dutch agricultural interests took the initiative in setting up a Commission, the "Agricultural Investment Commission"⁴), to study the theoretical bases of the evaluation of agricultural investment, and to work out a concrete method of calculation for them.

The Commission decided to concentrate on a thorough study of one specific investment project, and for this purpose chose the reclamation of the polder of Eastern Flevoland, a part of the former Zuider Zee.

The full report which was prepared by Dr. R. J. P. van Glinstra Bleecker of the Central Planning Bureau has been published in Dutch under the title of "A Specimen of national economic evaluation of investments applied to the reclamation of Eastern Flevoland", Ministry of Agriculture, The Hague, 1958. Copies may be obtained from the Government Service for Land and Water Use, Maliebaan 21, Utrecht.

In view of the interest which other countries have shown in the work of the Commission, it was thought useful to publish an English version of the Report. Although it is based entirely on Dutch conditions and facts, and consequently some of the data are of limited application, it is hoped that the report may serve as a springboard for similar studies on development projects elsewhere in the world. For this reason the International Institute for Land Reclamation and Improvement has undertaken to provide the English version for which a partial recast was considered desirable. This adaptation was effected by Ir. D. J. Maltha, Director of the Centre for Agricultural Publications and Documentation, Wageningen. The summary has been written by Dr. Ir. A. W. G. Koppejan, Central Planning Bureau.

¹) For instance, the report of the Lovink Committee "for the institution of a renewed investigation into the advantages that may be expected from the enclosure and reclamation of the Zuider Zee", Netherlands Govt. Printing & Publishing House, The Hague, 1924.

⁴) For its composition see: Appendix I.
GENERAL LAY-OUT OF EASTERN FLEVOLAND

1. main road (primary road)
2. secondary road
3. tertiary road
4. polder road
5. town or village
6. industrial site
7. suitable for arable farming
8. suitable for horticulture
9. suitable for mixed farming
10. fish hatchery
11. forest
12. canal
13. lock with bridge
14. pumping station
15. boundary of polder sections (6.20 m and 5.20 m below sea level)
1. INTRODUCTION

The Agricultural Investment Commission sets out in its report the lines along which the national economic evaluation of a major investment project should be developed. The report shows how the employment situation, foreign exchange position and similar factors play their part, and how, in addition, various imponderable and indeterminable factors should also be taken into account, and how they have done this.

The Commission has not expressed an opinion on the method of evaluating wages, rates of exchange and similar factors. This falls within the field of Government decision, a field into which the Commission has not ventured. But once these are known, the method of calculation described can be applied. By applying the same method to different projects, a basis for comparison can be obtained.

1.1. THE RECLAMATION OF EASTERN FLEVOLAND

Eastern Flevoland, the project to which the present study relates, is the third of five polders which have been or are to be reclaimed in the former Zuider Zee. Map 1 shows the location of these polders in the Netherlands. The first one, the Wieringermeer Polder (50,000 acres) was reclaimed in 1930, the second, the North-Eastern Polder (120,000 acres) in 1942. These two polders have in the intervening time been brought fully under cultivation and have been settled (photograph 1, page 15: aerial photograph, showing some farms).

Construction of the ring dyke around Eastern Flevoland began in 1950. This dyke was completed in September, 1956 and after nine months' almost continuous pumping by the three pumping stations (photograph 2, page 21) this polder (133,000 acres) emerged in 1957. For the future, there remain the Southern Flevoland (100,000 acres) and Markerwaard (150,000 acres) polders.

For each of these projects, an overall plan is drawn up. This shows the proposed layout of each polder; the course to be followed by roads and waterways, the division into plots,
the location of towns and villages, of pumping stations, sluices and bridges, and also the areas to be afforested (mainly land unsuited to agriculture). Map 2 gives in broad outline the layout for Eastern Flevoland. In view of its small scale, this map does not show the sub-division into plots.
One of the main foundations on which the layout plan is based is a provisional but nevertheless fairly extensive soil map obtained by means of underwater borings. The main canals which will discharge the water to the pumping stations are also dredged under water. This greatly facilitates draining of the polder.
As soon as the bottom land emerges a start is made with a second, very detailed mapping of the soil (photograph 3, page 26). The soil of Eastern Flevoland consists mainly of fertile clay and sandy clay.\textsuperscript{1}

The reclamation of the sea bottom consists mainly of the construction of an intensive drainage system. For this purpose main ditches, ditches and open trenches are dug, the last with, inter alia, rotary trenchers (photographs 4 and 5, page 29). After a few years, when the soil has dried out and settled sufficiently, these open trenches are replaced by tile drains. This too is now done entirely mechanically, by means of tile drainage machines (photograph 6, page 34).

Naturally, intensive drainage cannot be carried out on the whole polder at the same time. Those parts which have to wait a year or more for reclamation are therefore sown from the air with reeds (photograph 7, page 39). This has the advantage that weeds, which hamper later work, are prevented from getting a hold. Moreover, the reeds, by accelerating evaporation, hasten the drying of the soil, which not only speeds up the process of 'ripening', but also makes the ground fit to walk and drive on earlier. The reeds can easily be removed later by burning them off.
Following the regular slope of the polder bottom to the west (varying from 6 feet below sea level at the coast, to 13 feet below sea level in the centre of the former Zuider Zee), the polder has been divided into two sections, with a water level to be maintained in the open canals at 17 and 20 feet below sea level respectively.

At the same time as the detailed drainage is being constructed, roads are built, to facilitate communication. As soon as the weeds have been removed from a section of the polder, the drainage completed and the soil levelled, the land is sown with crops, at first mainly to counteract dispersion of the top soil by the wind. A number of reclamation farms, run by the State, are built; these are managed by agricultural supervisors of the polder directorate. As soon as the proposed number of farms in the section have been built, these are leased to carefully selected settlers. The Government, which finances the whole reclamation and colonisation, thus remains the owner of the land and buildings. The standard plot length will be 1,000 metres, and the width will vary from 250 to 350 metres. The average size will therefore be 75 acres. Each farm is composed of from \( \frac{1}{2} \) to 1\( \frac{1}{2} \) plots, i.e., from 37\( \frac{1}{2} \) to 112\( \frac{1}{2} \) acres.

Map 2 further shows that a town Lelystad, is to be built in the polder, as well as five villages, of which one, Dronten, will be somewhat larger than the others. The location

\textsuperscript{1} See publication No. 4 of the International Institute for Land Reclamation and Improvement, H. Smits and Dr. A. J. Wiggers, "Soil Survey and Land Classification as applied to reclamation of sea bottom land in the Netherlands", Wageningen, 1959.
of Lelystad in the extreme west of Eastern Flevoland is explained by the fact that this
town must function as a centre not only for this polder, but also for the polders still to
be made, Southern Flevoland and Markerwaard, and possibly also for part of the North-
Eastern polder, which has already been completed. The population of this town will in due
course number 25,000 to 30,000, and even more if industry settles there to any major
extent.
As in the two preceding polders, the farms will be situated along the roads, giving easy
access to and from the villages, which in the main will form centres for agricultural wor-
kers, and for services and institutions meeting the primary requirements of the polder
population (schools, churches, shops, etc.).

1.2. THE STRUCTURE OF THE REPORT
Chapter 2 deals with a number of theoretical subjects.
The Commission took as its starting point the assumption that the quantities of labour,
land and capital for investment purposes are already fixed. The problem then becomes
how best to use these quantities. This means a choice will have to be made from among
a number of projects. An important factor in making this choice is the rate of return on
investment.
The Commission next discusses its method of calculating this return. In this method, use
is made of accounting prices wherever the prevailing prices differ from the economic
equilibrium prices. Such situations may occur inter alia as a result of Government
measures.
The Commission has also used accounting units for wages, rates of exchange and rates
of interest in appropriate cases.
The report also takes into account the primary indirect returns and costs. These are re-
turns and costs occurring in the supply industries.
For determining the rate of return on investment the Commission has expressed the results
of its calculations as a percentage of the average annual costs and not as a percentage
of the invested capital. In this chapter this policy is explained. They have incidentally
made no allowance for the trend increase in productivity in agriculture or for the multiplier
effect. Detailed reasons are also given for this.
In the final section of this chapter, the Commission points to the uncertainties that still
remain, despite estimated rates of return, such as the imponderables and unforeseeable
changes in costs and returns.

Then in an analytical chapter (3) a short supplementary explanation is given of the
calculations, this being done separately for the investment period and for the working
or production period.

By the investment period is meant the time during which the polder is being prepared for cultivation by
drainage (including the construction of dykes and pumping stations, drying, and the digging of drainage
canals) and by reclamation (covering the construction of roads, ditch digging, building of farms and houses a.s.o.).

In the production or working period the polder is completely finished and the land is being farmed. In practice these two periods overlap. During the reclamation phase the land that has already been recovered is being worked by the Government to get the greatest possible advantage from it, and, more important, to make it ready to be handed over to the future farmers in the best possible state for cultivation. Moreover, the land is allocated to private farmers gradually because the construction of houses and farm buildings proceeds gradually. Government working and the proceeds obtained from it cannot be separated from the other reclamation activities.

However, to prevent the investment costs from being incorrectly reduced by the proceeds from farms worked in the interim by tenants, a date has been fixed by which, on average, the investment phase must be concluded and the polder therefore ready for working by tenant farmers. This date is 1962: the length of the investment period has thus been put at 12 years. Interest on the investments has been calculated up to that date. As it proved impossible to keep separate from the reclamation costs those costs that relate to temporary working by the Government before the land is ready for allocating to tenants, the proceeds from Government working had to be included in the accounting statement.

The Commission took as starting point the situation in the first six months of 1950. This applies to both prices and reclamation plans. In view of the aim of the report, there were no pressing reasons to take the most recent data possible as starting point.

When data are available about more projects, a common new base period can be adopted if desired. Nevertheless, the extent to which the results have been affected by price changes that have occurred since then has been studied by means of a method of approximate calculations. To do this, the calculations have been repeated with approximate indices on the basis of the prices in the first six months of 1955.

The programme drawn up in the base period for the civil engineering works and the agricultural works was as follows:

**Civil Engineering works:**
- 1950 Start of dyke construction
- 1956 draining
- 1962 completion of civil engineering works

**Agricultural works:**
- 1957 start of reclamation
- 1965 completion of land allocation

Chapter 4 contains a survey of a number of imponderables which have also to be taken into account in an evaluation of Eastern Flevoland in relation to the Netherlands.
2. THEORETICAL OBSERVATIONS

2.1. STARTING POINTS

For a proper understanding of the present problem it should be realised that allocating priorities to investment projects is not so much an end as a means. The real aim of a list of priorities, and of decisions based on such a list whether or not to carry out certain projects, and in what order, is to achieve the best possible results. The problem of determining the priority of Government investments forms part of the much wider problem of how a country can, over a period of time, utilise its resources of labour, land and capital so as to ensure the optimum prosperity of that country. To achieve this, all decisions concerning investment and consumption should be integrated. The macro-economic question of optimum savings ought to be considered among others. For from the consumption point of view, increased saving and investment mean a sacrifice today in order to enjoy the benefits in the future. The Commission does not go further into the very difficult problem of how the group of questions outlined above could be universally solved.

An endeavour might also be made to solve the problem outlined above in two phases, the first being the macro-economic phase, i.e., the determination of the quantities of capital, labour and land which will be used for investment and for consumption purposes respectively. Then the micro-economic decisions would have to be taken about the investment goods and consumer goods which ought preferably to be produced.

In the report the macro-economic part of the problem is for convenience sake regarded as solved beforehand. It has therefore been assumed that the quantities of labour, capital and land for investment purposes are fixed. The problem then consists of the way in which (i.e. by the implementation of which projects) these resources must be employed to make the maximum contribution to prosperity. In actual fact this amounts to the following: those projects should be chosen which while being carried out with the given quantity of capital, labour and land, give an optimum yield. An important aid in making this choice is provided by calculating the rate of return on investment.