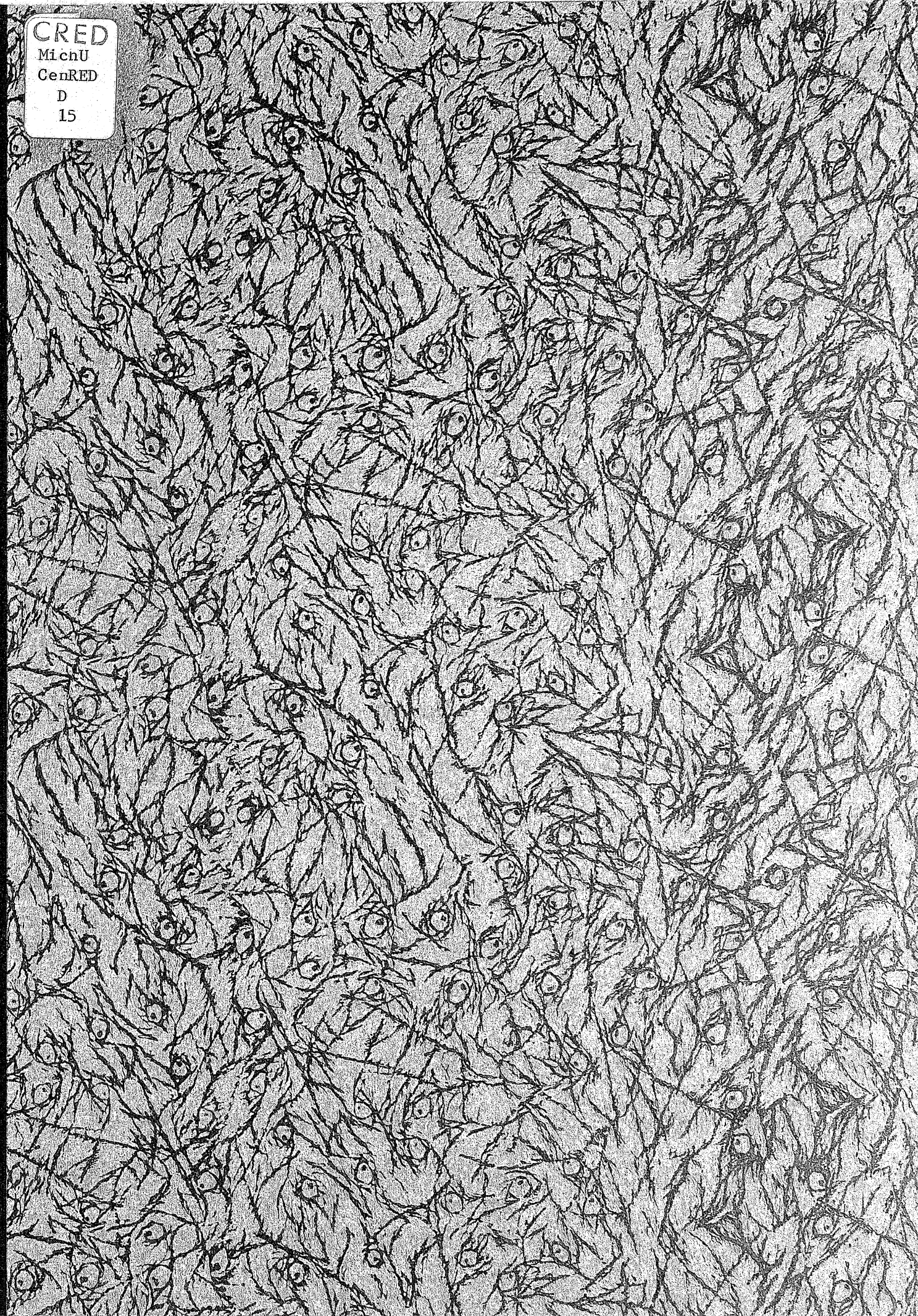CENTER FOR RESEARCH ON ECONOMIC DEVELOPMENT
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LABOR MOBILIZATION: THE MOROCCAN EXPERIENCE

by

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ABBREVIATIONS

C.S.P.N.   = Conseil Supérieur de la Promotion Nationale (Supreme Council of Promotion Nationale).

C.S.P.P.N.   = Conseil Supérieur du Plan et de la Promotion Nationale (Supreme Council of Planning and of Promotion Nationale).

D.G.P.N.   = Délégation Générale à la Promotion Nationale (General Delegation to Promotion Nationale).

D.R.S.   = Defense and Restoration of Soils.

I.L.O.   = International Labour Office.

I.V.S.   = International Voluntary Service.

O.E.C.D.   = Organisation for Economic Cooperation and Development.

O.R.M.V.A.H.   = Office Régional de Mise en Valeur Agricole du Haouz [Marrakech] (Regional Office for the Agricultural Development of the Haouz [Marrakech]).

O.R.M.V.A.O.   = Office Régional de Mise en Valeur Agricole de Ouarzazate (Regional Office for the Agricultural Development of Ouarzazate).

O.R.M.V.A.T.   = Office Régional de Mise en Valeur Agricole du Tafilalt [Ksar Es Souk] (Regional Office for the Agricultural Development of the Tafilalt [Ksar Es Souk]).

P.N.   = Promotion Nationale.

S.C.E.T.   = Société Centrale [Française] pour l'Equipement du Territoire ([French] Central Firm for the Outfitting of the [National] Territory).

S.R.I.   = Stanford Research Institute.

U.S.A.I.D.   = United States Agency for International Development.

U.S. P.L. 480   = United States Public Law 480 [basic document for the U.S. surplus commodity disposal program].

CHAPTER 1

INTRODUCTION

The shortage of capital has always been viewed as one of the crucial bottlenecks in the process of economic development--although recently the emphasis seems to have shifted to the shortage of skilled manpower as the critical area. Whether capital is defined to include only physical capital or also human capital (i.e., training, education, and health), capital formation still constitutes the cornerstone of the theory of, and plans for, economic development. Almost by definition, underdeveloped countries are short on capital. And the way to remedy this shortage is through capital formation.

Section I considers how labor mobilization fits into capital formation. Section II presents an overview of the employment situation and labor mobilization in Morocco. Section III contains a brief outline of the work.

I. The Theory of Labor Mobilization

It is usually assumed that there exist only two alternative sources of capital formation: one is domestic savings; the other is foreign capital inflow either through direct business investment or through international loans and grants. There exists, however, a third possibility which Ragnar Nurkse was among the first to explore systematically in 1953 in his work on Problems of Capital Formation in Underdeveloped Countries (especially Chapter ii).[1] Nurkse starts out with the observation that the underdeveloped countries--and especially, but not exclusively, those with high population density--suffer from large-scale unemployment: even with unchanged techniques of production, a large part of the population engaged in agriculture could be removed without reducing agricultural output. He goes on to note that the surplus people could be taken away from the land and be set to work on producing real capital.

Working on capital projects is only one among three of the possible uses of the underemployed. The other possibilities are either purely

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[1](Nurkse, 1953).

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welfare support work such as leaf-raking, or the direct production of "consumption" goods such as the digging of village wells. Actual programs usually contain elements of all three. Furthermore, even though Nurkse's theory was formulated in terms of rural underemployment, it can be easily applied to urban unemployment and underemployment as well. If the rural underemployed can be set to work on irrigation canals, the urban unemployed can certainly be set to work on low-cost housing.

This process of unorthodox capital formation through labor mobilization is based on the assumption that labor is available for a labor mobilizing works program. This premise, however, gives rise to problems both of definition and of measurement. On the conceptual side, what must be defined are the notions of unemployment and underemployment, since these phenomena are the ones responsible for the existence of a labor surplus, which constitutes a labor reserve: this, in turn, represents the 'virtual' savings, or the potential labor-savings (or épargne-travail). No universally acceptable definitions have emerged so far despite many a conference, study and publication by numerous organisms and individuals. The definition of unemployment used in the more developed countries--whereby a person is unemployed if he or she does not presently hold a job and is looking for work--seems to be gaining international acceptance.[1] It is the concept of underemployment which still remains to be satisfactorily defined. The confusion here seems to arise from the diversity of its manifestations, which has given rise to a multitude of terms to qualify unemployment and underemployment. The most current are visible, invisible, disguised, hidden; they are by no means the only ones.[2] It is not our purpose here to review all of these terms or to introduce new ones. Suffice it to say that they are all intended to describe one phenomenon, namely that in underdeveloped countries available labor is not fully utilized either because the workers are idle part or all of the time, or because they are engaged in low productivity activities. If the concepts themselves have not yet been unequivocally defined, it is to be expected that attempts at measurement

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[1] See (I.L.O., 1959), p. 45. Even this definition of unemployment and its application in underdeveloped countries are, however, being criticized from many quarters. In particular, Myrdal rejects what he calls the "volitional" approach: see (Myrdal, 1968), Part 5 (especially Chapter 21) and Appendix 16.

[2] See (Myrdal, 1968), Appendix 6 for "A Critical Appraisal of the Concept and Theory of Underemployment."

will be less than satisfactory. Myrdal's conclusion on South Asia that data-gathering efforts there have produced results that are far from sat-isfactory[1] is echoed in a recent study[2] which considered the available data for the underdeveloped countries in general.

For our present purpose it is not important that no generally accept-able definition and measurement scheme has yet been devised for unemploy-ment and underemployment. What is important is that there is agreement among most writers (1) that labor in underdeveloped countries is not fully utilized, and (2) that something can/should be done not only to alleviate the employment problem but also to turn the apparent scourge of unemploy-ment and underemployment into a boon as one of the means to a better future for all. Interest in labor mobilization through works programs in the im-mediate postwar period stemmed from its potential contribution to capital formation. Some recent developments have given new emphasis to the whole idea. They relate to an increased awareness of the employment problem (associated with the population explosion), a recognition of the importance of agricultural development, a concern about spreading the benefits of growth more evenly, and finally the growing share of commodity aid in for-eign aid.

The population problem is directly reflected in the supply side of the employment problem. From 1950 to 1965 the labor force in the less developed countries rose at an annual rate of 1.7 per cent; this rate is expected to go up to 2.2 per cent for the period 1965-1980 and to 2.3 per cent for the decade 1970-1980. These represent massive increases as can be seen by comparing them with the corresponding rates for the more de-veloped countries: 1.1 per cent, 1.0 per cent and 1.0 per cent, respec-tively.[3] By themselves however these large increases on the supply side would not represent a very serious problem if they were offset by at least equivalent increases on the demand side. This condition has not been, and in the near future is not likely to be, satisfied in most underdeveloped countries. In particular the non-agricultural sectors, although they have grown faster than agriculture, have not provided employment at a corre-sponding rate. Thus for all less developed countries, whereas output in

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[1] (Myrdal, 1968), p. 1027.

[2] (Turnham, 1970), p. 10.

[3] (Turnham, 1970), Table 5, p. 34.

industry rose at the rate of 7.1 per cent in the period 1955-1965, employ-
ment in that sector increased by only 4.4 per cent.[1] That is, while the
supply of labor has grown (at an accelerating rate), the demand for it has
not grown nearly as fast. The gap between the two will continue to widen
unless something is done to control the population/labor force growth rate
on the one hand and, on the other, to provide more jobs. Works programs
are directly related to the second aspect. In the short run they provide
temporary jobs at least to some of the unemployed and underemployed. In
the long run it is hoped that the work accomplished through them will cre-
ate more jobs, and permanent ones.

The emphasis on the employment problem has led to some rethinking
about the entire strategy of development. Formerly it used to be that
most plans would incorporate a massive effort toward industrialization.
Such a strategy did not always create enough jobs although in some cases
it may have been successful in achieving the desired output target. This
is why many observers have now come to the conclusion that agricultural
development must play a prime role in improving employment prospects in
underdeveloped countries.[2] The rediscovery of agriculture adds even more
importance to works programs.

Not only can a works program contribute to an increase in capital
formation and employment, but it can also represent a way of "spreading"
the benefits of economic growth more widely among the population. In fact
there is an increasing concern, among development theorists and policy
makers alike, that the "quality" of growth may be as important as its
quantity. That is to say, the already highly skewed distribution of in-
come[3] should not be allowed to be accentuated further. The spreading ef-
fects of the works program are to come partly from the wages (if any) and
other incomes that it distributes directly, but mostly from the effects of
these expenditures on the future productive capacity of the agricultural
sector.

Finally, another factor in the renewed interest in works programs is
the growing share of commodity aid (especially food aid) in foreign aid.

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[1](Turnham, 1970), Table 1, p. 131.

[2](Turnham, 1970), p. 162.

[3]For some quantitative information on income distribution, see (Turnham,
1970), pp. 97-108.

To take a specific example, in Morocco the average share of food aid in total aid rose from 25.2 per cent in the period 1960-1965 to 38.8 per cent for 1966-1969.[1] This increasing proportion of food aid may represent an unfortunate turn of events from the viewpoint of the aid recipients. They must nevertheless adjust to this new--and probably lasting--development by making good use of food aid. One way of doing so is through a works program. To put things in very simple terms, a small-works program of the type discussed above requires (at least) four distinct elements: the laborers; administrative, technical and supervisory staff; tools, materials and equipment; and food to feed the workers. The laborers are to come from the labor reserve. The staff, tools and materials will have to be provided by the government from its own resources, increased taxation, or through external assistance. As for the food, it can originate from three alternative sources. One is domestic procurement, which is a form of taxation. Another is commercial food imports. And the third is foreign food aid.

In summary, the importance of a works program stems from its (potential) contribution to capital formation and to agricultural development, the creation of present and future employment, its role in spreading the benefits of growth more widely, and the availability of food aid.

II. Labor Mobilization in Morocco

Morocco represents almost a textbook example with respect to the preconditions for labor mobilization. During the preparation of the first Five-Year Plan (1960-1964), the employment picture was found rather dismal due to the combined actions of two factors: on the one hand, the high (Muslim) population growth rate (at 2.9 per cent per year) results in a fast increase of the labor force (at over 2 per cent per year); on the other hand, the expected growth of the industrial and other non-agricultural sectors would not create enough employment to absorb even just the addition to the labor force. In fact the 1960-64 Plan estimated that the number of unemployed and underemployed would be greater at the end than at the beginning of the planning period.

On the basis of Plan figures, the rate of urban unemployment and

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[1]These figures are computed from the data shown on Table A4.5 in Appendix 4.

rural underemployment can be computed to be, respectively, 29 per cent and 52 per cent by 1965, as shown on Table 1.1. The definition of labor force

Table 1.1 — The 1965 Employment Situation in Morocco
(estimated in 1960)

Sectors	Labor Force (number) (1)	Unemployed or Underemployed (number) (2)	Rate of unemployment or underemployment (percent) (3)
Non-agriculture	1,940,000	570,000	29.38
Agriculture	3,390,000	1,750,000	51.62
Total	5,330,000	2,320,000	43.53

Sources: (1) (Plan 1960-64), p. 50.
          (2) (Plan 1960-64), p. 54.
          (3) Calculated: (3) = (2)/(1).

(or active population) recommended by the United Nations is the one used in Morocco: the active population includes all persons working or seeking work during a given period.[1] Morocco has also adopted the standard definition of unemployment.[2] As for underemployment the figure is obtained according to the labor surplus approach. This is one of the most widely used types of measurement. It compares the maximum labor input that the existing labor force could supply with the minimum labor input needed to achieve the present output. The difference between the two represents the labor surplus or labor reserve (expressed in man-days or man-years). This approach suffers from many shortcomings, which need not be dwelled upon here.[3] But it is the most relevant insofar as the theory of labor mobilization is concerned. The actual method used in Morocco[4] assumes that an adult man can provide 250 workdays annually and an adult woman 150 workdays. The number of man-days required for a unit of each agricultural activity is

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[1] (Recensement 1960, II), p. 165.

[2] See for instance the instructions given the census takers in 1960: (Recensement 1960, II), p. 167.

[3] The labor surplus approach as well as alternative approaches to measurement are discussed in (Myrdal, 1968), Chapter 21 and Appendix 6: and (Turnham, 1970), pp. 10-19 and Chapter III.

[4] This is described in (Plan 1960-1964), pp. 51-53; and also in (Tiano, 1963), pp. 10-13.

then computed. Given these two sets of data on the one hand, and the labor force and the levels of the various activities on the other, estimating the magnitude of underemployment becomes a matter of simple arithmetic. In 1960, rural underemployment was put at 300 million man-days, out of a total potential labor supply of 670 million. The underemployed men alone could provide 140 million.[1]

These figures must, however, be treated with extreme caution. As was previously mentioned, the concept of underemployment--let alone its measurement--cannot be easily and satisfactorily defined. One of the main sources of difficulties is that most definitions attempt to transplant Western (industrialized society) concepts into non-Western settings. In particular it is usually assumed that a given activity constitutes employment only if it is obviously productive. And "obviously," if people spend their time, say, just visiting each other or going from festivities to festivities, they are not productively employed. The next step in this line of logic is that, therefore, any time which is not spent on formal work--after allowing a given number of days for nonproductive activities-- is being wasted, and could be utilized in a more productive fashion.

In the context of the Moroccan countryside, and probably in most "traditional" societies, such a reasoning is usually quite unrealistic. Take the case of the peasant in the Haouz plain around Marrakech,[2] an area which is quite typical of most arid and semi-arid regions of Morocco. The principal characteristic of agricultural activity in this region is that the means of production are separately owned by various people: one owns a piece of land, the other the water rights, a third one the draught animals, another the seeds, and still another one the financial means, etc. What the vast majority of workers have is their labor. Each year associations for production are formed among the owners of the various means of production; and each year they are dissolved after the harvest. The formation of these associations--truly a challenge to entrepreneurial spirit-- necessitates long negotiations among the various owners and last several weeks in September-October before the start of the plowing season. With his very limited--if any--financial resources, the farmer usually cannot

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[1](P.N. au Maroc, 1964), p. 19.

[2]This area has been studied in detail from the viewpoint of the rural employment problem in (Pascon, 1966), Parts I and II.

afford to buy the means of production. Whether or not he becomes a tenant or a mere laborer thus depends a great deal partly on his negotiating skills and, at least to an equal degree, on his social and personal relations with the owners who might lend him their productive factors. Cultivating these relations, especially during the period of negotiations, is thus particularly important. Any casual observer, seeing these farmers apparently idle, talking among themselves while waiting to exchange a few social amenities with landowners, might conclude that they are wasting their time, that they are "under-employed," etc.... But are they really? It is true that during this period, all the comings and goings, all the talking do not appear to be directly productive in terms of immediate output or income. Consider, however, the alternatives that confront these farmers. A farmer could go and work somewhere else, let us say on a P.N. worksite, and earn DH 4.00 per day.[1] But if he did so, another who stayed at the village might improve his chances of getting the land. Supposing this second one does conclude the association with the landowner, then how does the first one stand? He earned DH 4.00 for the one day he worked on Promotion Nationale, but what he lost was a chance to have as much as half of the next harvest if he had stayed around and succeeded in becoming a tenant or sharecropper. Thus insofar as each individual farmer is concerned, the expected value of his time is not zero: it is positive and may even be quite high.

In view of these considerations, one may quarrel with any figure on underemployment in Morocco--and in any country for that matter. The official estimate of over 50 per cent underemployment appears to be rather high. Nevertheless hardly anybody would argue that the problem is non-existent. This is in part what has led the Moroccan government to initiate some form of labor mobilization in the early 1960's.

Morocco is among the few underdeveloped countries with a truly sys-tematic program designed to make use of the unutilized labor force.[2] It has in fact several programs. The Entraide Nationale (or National Mutual

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[1] DH = dirham: U.S. $1.00 = Moroccan DH 5.05.

[2] Other recent experiences of labor mobilization include those in China, "community development" in India, the Rural Public Works Program in East Pakistan, the various programs of animation rurale and service civique in French-speaking African countries, and the successors to the "worksites for unemployment" in North Africa. They have met with varying degrees of success.

Help) includes a self-help part (building of schools, orphanages, etc.) but is mainly a welfare undertaking. It receives U.S. P.L. 480 commodities through the agency of the Catholic Relief Service and the American Joint Distribution Committee. The Community Development program built 6024 housing units during the 1965-1967 Plan period.[1] The World Food Program is also active: besides financing a large school lunch program, it has participated in several rural housing projects. Under the 1968-1972 Plan its activities will increase substantially. It will take part in the construction of 90,000 rural dwelling units, mainly through the provision of foodstuffs as wage payments. The Moroccan government will put up DH 100 million in cash for this program.[2] Finally there is the Promotion Nationale program which has been in existence since 1961: the 1968-1972 Plan provides for a cash expenditure of DH 451.7 million[3] for it. This study will concentrate exclusively on Promotion Nationale for various reasons. First, it is the program with the longest continuous existence. Secondly, through the nature of work undertaken, it constitutes a works program designed to add to capital formation--to a much higher degree than the other programs. And, finally, it was by far the biggest program in the 1960's, and will remain so in the future, both in terms of total expenditures and of mandays employed.

III. Plan of Work

The present study is an attempt to review and evaluate the performance of Promotion Nationale in its ten years of existence. The next chapter describes the aims and the workings of Promotion Nationale, and its institutional framework.

Chapter 3 analyzes in detail a series of ten projects realized under the Promotion Nationale program.

Chapter 4 examines the impact of Promotion Nationale on the population in general and on the Promotion Nationale labor force in particular: it will rely heavily--but not exclusively--on the results of a survey of Promotion Nationale workers conducted in the region of Goulmima, Province of Ksar Es Souk.

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[1] (Plan 1968-1972), Vol. II, p. 731.
[2] (Plan 1968-1972), Vol. II, p. 732.
[3] (Plan 1968-1972), Vol. II, p. 174.

Chapter 5 attempts to define the impact of Promotion Nationale on the national economy through the various aggregates: a linear programming model will be developed.

A concluding chapter presents an overall appraisal of Promotion Nationale.

CHAPTER 2

THE AIMS AND ORGANIZATION OF PROMOTION NATIONALE

Prior to 1961, the government of Morocco had opened "worksites for the relief of unemployment" (chantiers de chômage) from time to time. These worksites were designed to meet localized emergency conditions, especially in times of severe droughts or floods. The work was concentrated in urban areas or on country roads and, as a rule, had little or no economic value. In essence these early worksites were a way of disguising charity, of channeling an income supplement to the "worker" without making it too obvious. An effort was made to change this state of affairs at the beginning of the 1960's.

The conditions leading to the creation of Promotion Nationale, and the role and goals assigned to it are reviewed in Section I. The institutional framework is described in Section II. Some comments on the existing organizational structure are offered in Section III.

I. Role and Aims

In the early part of 1961 the country was faced with a particularly severe drought. As had been usual up to that time, "worksites for the relief of unemployment" were opened in various parts of the country in the spring. One thing had changed, however, namely the existence of a new awareness of and concern about not only urban unemployment but also rural underemployment as well. During the preparation of the first Five-Year Plan (1960-1964), in considering the employment situation the planners came to the conclusion that unemployment and underemployment constituted the most serious social and economic problems in Morocco.[1] Various means could be used to improve the situation. Among other things, the planners proposed that the worksites be turned into a more productive venture. This recommendation was implemented. On July 15, 1961, a royal decree (dahir no. 1-61-205) created the Promotion Rurale program which, a few months later,

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[1] (Plan, 1960-1964), p. 55.

became <u>Promotion</u> <u>Nationale</u>.[1] The change from simply "rural" to "national" probably indicates that the action was to encompass the urban unemployed as well as the rural underemployed. Thus, at least in its origins, Promotion Nationale (P.N.) was an undertaking designed to make the best out of a bad situation: since the unemployed or underemployed received an income supplement from the government anyway, why not require from them some compensation under the form of labor contribution?

Promotion Nationale was born in the emergency drought conditions of 1961. But it had deeper <u>raisons</u> <u>d'être</u> than these short-term circumstances. There exist at least three sets of interacting reasons: the importance of rural underemployment and urban unemployment; the poverty of the marginal regions; and the existence of possible activities which were both simple and productive. With all due reservations, it may be reiterated that the official estimates put the rate of rural underemployment at around 50 per cent in Morocco (see Table 1.1). In particular in 1960, out of a potential supply of 670 million man-days, 300 million remained unused--with the men accounting for 140 million. Of these, 80 million were located in what is known as marginal regions.[2] This brings in the second factor in the creation of Promotion Nationale, namely the existence of marginal regions. In Morocco, the term "marginal regions" is used to designate the Saharan and the mountain (especially Rif) provinces. These areas are marginal in two senses: they are mostly border provinces and, more importantly, they are poorer than the other provinces because they have been left at the margin of the general economic development. In general they are under-equipped in terms of infrastructure (relative to the provinces of the plains and the Atlantic) and they have the greatest number of underemployed. This disequilibrium among the various parts of the country could create serious economic, social and political problems. Promotion Nationale was partly designed to remedy this situation. Finally, before the unemployed and underemployed could be usefully put to work, it was necessary to find areas

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[1]Throughout this study the term "Promotion Nationale" is used in its original French form. The reason is that no English equivalent was deemed satisfactory for conveying the intended meaning. Phrases such as "National Development Works" translate only a part of the meaning. In this context, "promotion" does indeed imply development; but it also includes a sense of improvement in the quality of life and an uplifting of the population's value and skills that the word development usually does not carry.

[2](<u>P.N</u>. au <u>Maroc</u>, 1964), p. 19.

of action where this type of intervention would be appropriate. The projects would have to be technically simple, would require relatively little capital investments and a lot of unskilled labor, and they must not be completely unproductive like the worksites for the relief of unemployment. Such areas of action were/are quite numerous in Morocco: the fight against erosion on over 3 million hectares, new or improved irrigation for 3.25 million hectares, infrastructure works (roads, tracks), and equipment or community works (wells, cattle shelters, community buildings)[1]--these are only some of the more obvious possibilities. The availability of these relatively simple and yet productive (at least for the first two groups) projects, together with the need to do something for and in the marginal provinces and the widespread prevalence of unemployment and underemployment, constitute the official reasons which prompted the initiation of Promotion Nationale in Morocco.

The proclaimed aims[2] of Promotion Nationale have essentially remained unchanged from 1961 to 1970. It is stated that Promotion Nationale's "mission" is fourfold: to mobilize the rural underemployed; to associate the population to the development effort; to slow down the migration to the urban areas by improving the economic and social conditions in the countryside; and, finally, to develop the road infrastructure of the marginal regions.[3] It must be noted that this fourth aim no longer appears in the latest (June 1970) statement. It is not clear whether its nonappearance signifies that this consideration will be ignored in the preparation of future P.N. programs.

The place of Promotion Nationale in the economic development of Morocco can best be understood by putting it properly in its role as a part of the effort to develop the rural areas in general and the agricultural sector in particular; and also as an effort to involve the population in the development action. The former can be seen to be directly economic; but the latter, though indirect, is no less economic. Thus to determine

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[1](P.N. au Maroc, 1964), p. 15.

[2]These aims are repeated in almost all official Promotion Nationale publications. Among the earlier statements see (P.N. au Maroc, 1964), or (P.N. Bilan, 1961-1966). The latest statement available at the time of writing appears in (P.N. Aide-Memoire, 1970).

[3](P.N. Bilan, 1961-1966), p. 1.

the place in national economic activity of Promotion Nationale over its
ten-year existence, one must look at the priority ranking given in the suc-
cessive Plans to agriculture, the mobilization of the population, and the
concern with the employment (and thereby the population) problem. Briefly
stated, the first Plan[1] (written in the late 1950's) recognizes and analyzes
in some detail the conditions that made the initiation of an undertaking
such as Promotion Nationale imperative. As a result Promotion Nationale
was created in this Plan period, and the idea of Promotion Nationale gained
increasing acceptance among technicians and administrators. The second
Plan[2] reaffirms and consolidates the existence and role of Promotion
Nationale. The third[3] continues the work, eliminates the less productive
or nonproductive projects and tries to expand P.N. activities in the more
profitable areas.

II. The Institutional Framework: A Description

Before examining the results and performance of Promotion Nationale,
it is necessary to know how it works on the institutional side. The P.N.
projects can be classified according to either of two different schemes:
one is functional (in terms of the kinds of projects), the other is admin-
istrative (in terms of who administers the project). The functional classi-
fication is left for discussion at a later time. The administrative group-
ings are presented here first by way of an introduction to the institutional
aspects of Promotion Nationale.

During the first two years, P.N. projects were administered directly
by the provincial and local authorities, with some occasional advice from
the technical services. Starting in 1963, probably in an effort to elicit
a greater degree of involvement and interest in Promotion Nationale from
the various technical services, the P.N. program was divided into two parts.
Part I projects are run by the technical services[4] as part of their regular

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[1](Plan, 1960-1964).

[2](Plan, 1965-1967).

[3](Plan, 1968-1972).

[4]The term "technical services" refers to the operational ministries or de-
partments. Those which are specifically involved with Promotion Nationale
projects include (1) the Water and Forestry Service, (2) the Direction of
(Agricultural) Land Development, (3) the Public Works Service. The Local
Authorities, the Provincial Services, and special programs such as the

programs. The technical service pays all cash expenditures out of its own budget. These include the cash wages of skilled and unskilled workers, small equipment, supplies and transportation. Promotion Nationale provides only the payment in kind. Part I is also known as Category A. Part II projects require the technical approval of the relevant technical service, which also may--but does not have to--provide some technical supervision during their execution. But they are run by the provincial and local authorities and financed directly by Promotion Nationale itself on its special budgetary account. Part II projects are divided into three different groups. For Category B, Promotion Nationale incurs all expenditures, both in cash and in kind. Under Category C the unskilled workers receive only a payment in kind and no payment in cash; the wages of skilled workers and all other cash expenditures are paid by Promotion Nationale. For Category D, the unskilled workers receive no payment at all; Promotion Nationale pays the skilled workers and other expenditures.

At the time of the creation of Promotion Nationale, two main principles governed its institutional aspects: "maximum administrative simplification" and "permanent links with the Provinces." An effort was made to keep the administrative machinery to the strict minimum because the creation of a new service would have involved an additional demand for scarce skills and further expansion of an already complex system.[1] The P.N. institutions and their functions are specified in detail in the royal decree creating Promotion Nationale.[2]

At the national level the Conseil Supérieur de la Promotion Nationale or C.S.P.N.--which later became the Conseil Supérieur du Plan et de la Promotion Nationale or C.S.P.P.N.--is chaired by the King. It includes all ministers and public administrators whose departments are in any way concerned with the conception, formulation, financing, and execution of Promotion Nationale programs. This means that practically all ministers and administrators of public agencies sit on the C.S.P.N. This Council was

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D.E.R.R.O. (Développement Economique et Rural du Rif Occidental) are also usually listed as "technical services" in the classification of projects under Promotion Nationale.

[1](P.N. au Maroc, 1964), p. 26.

[2]This decree is reproduced as an annex to (P.N. au Maroc, 1964), pp. 190-191.

originally scheduled to meet in May for the purpose of approving the Pro-
motion Nationale program for the following fiscal (or agricultural) year.
Since 1965, however, the programs are for the calendar rather than the fis-
cal year, and the S.C.P.N. usually meets a little earlier than May. In
fact in the last few years the C.S.P.N. (or C.S.P.P.N. later on) has met
twice a year: first, late in the year to establish the P.N. program for
the following year; and second, early in the year to review P.N.'s per-
formance in the previous year.

A permanent secretariat was established to keep Promotion Nationale
working during the rest of the year when the S.C.P.N. is not in session.
This Délégation Générale à la Promotion Nationale (D.G.P.N.) is headed by
a Delegate General appointed by and directly responsible to the King,
whose functions are to present yearly reports, to prepare and submit annual
drafts-programs, to see that the decisions of the S.C.P.N. are duly and
properly executed. This involves coordinating the Promotion Nationale
activities of the various technical services and keeping in touch with
the provinces. The Delegate General is assisted in his task by a small
staff; he can also appeal to a Technical Committee made up of representa-
tives from the various technical services. The D.G.P.N. as an agency was
originally on its own. Later on it was transferred, successively, to the
State Secretariat for Planning (at which time C.S.P.N. became C.S.P.P.N.),
and to the Ministry of Agriculture and Agrarian Reform. Finally in late
1969 it became a co-ministry in the Ministry of Promotion Nationale and
Handicrafts. (Thus the old D.G.P.N. and Delegate General are formally no
longer in existence.) These various changes could be interpreted as an
increase in the attention devoted to Promotion Nationale and the problems
underlying its existence. But in terms of staff, they have involved very
little--if any--expansion. As the organization stands in 1970 the Ministry
consists of two separate divisions: one for Handicrafts, the other for
Promotion Nationale. The Promotion Nationale Division is made up of an
Accounting Section and a Planning Section; the latter, in turn, consists
of the "Planning" Office, the Study Office, and the Preparation Office.

At the provincial level,[1] the governor chairs the Provincial Council

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[1]The administrative divisions of Morocco are, from the top down, the
province (headed by a governor), the cercle (headed by a supercaïd), the
caïdat or commandement (headed by a caïd). Then come the communes, which
elect municipal councils.

of Promotion Nationale, made up of administrators, representatives of the technical services, and elected representatives of the communes. He is responsible for the drafting of an annual P.N. program for his province and for the proper execution of the approved program. The day to day operations are supervised by a caïd who heads the P.N. section in the governor's office. (This role was formerly assumed by an army officer.) At the local level the supercaïd, in consultation with the local representatives and the technical services, draws up the program request for Promotion Nationale and assures that the projects are properly executed.

What has just been presented may be called the backbone of P.N. institutions. There exist limbs to this body which also play vital roles. There are, first of all, the technical services which carry out Part I of the P.N. program as mentioned earlier. The technical services function in a way similar to the central part. At the national level the ministries have a P.N. section. Then the provincial technical service has a P.N.-Bureau. Finally there are local "technical service - Promotion Nationale" agents. As an example one may consider the case of the Office Régional de Mise en Valeur Agricole du Haouz or O.R.M.V.A.H. in Marrakech, which depends on the Ministry of Agriculture. (The province of Marrakech has six cercles; the O.R.M.V.A.H. has operations in four of them.) The Promotion Nationale Bureau of the O.R.M.V.A.H. is headed by an agent technique who is a full-time civil servant. He directs all P.N. activities of the O.R.M.V.A.H. Each cercle has one adjoint technique and one conducteur de travaux, both full-time civil servants. The adjoint technique prepares the fiche technique which contains a very simple kind of technical feasibility study for each project, and supervises the O.R.M.V.A.H.'s P.N. activities in his area. In addition, another adjoint technique at the central O.R.M.V.A.H. - P.N. Bureau acts as a secretary-treasurer-record keeper. The conducteur de travaux supervises the actual day to day work on the projects and ensures that the work conforms to the blueprint shown in the fiche technique. He has usually been trained at the School for Conducteurs de Travaux in Rabat. Finally, on each project, the worksite leader or chef de chantier is a permanent employee of O.R.M.V.A.H.--although some chefs de chantiers are occasionally recruited from private enterprises when there are a great many worksites in operation.

Another limb to the central body of Promotion Nationale institutions is made up of the apparatus for handling the payment in kind (the payment

in cash being handled by the central body and the technical services). Payment in kind means mostly wheat and, earlier, flour or other cereal-based foodstuffs. The unskilled worker receives five kilograms of wheat per day (the equivalent of DH 2.00). Prior to March 1969 the totality of the payment in kind came from the U.S. P.L. 480 program. Now four kilograms are supplied through P.L. 480 and one by the Moroccan government. The handling of the wheat, from dockside to project site, has been assigned to the Cereals Board or Office Chérifien Interprofessionnel des Céréales, with a central office in Rabat and branch offices in the provinces. This office enters into contractual agreement with the Office National des Transports to ensure timely deliveries of wheat to sites and in amounts specified by the Promotion Nationale Division in Rabat. In fact the wheat is received by, stored in, and delivered from local agricultural cooperatives--the Sociétés Coopératives Agricoles Marocaines and the Coopératives Marocaines Agricoles.

This completes the description of the formal P.N. institutional framework.

III. The Institutional Framework: Comments

The most outstanding feature of the whole organization is that, except at the very bottom, the administration of Promotion Nationale occurs mostly as an appendix to the normal activities of all departments involved or at least as one among many responsibilities of the persons dealing with it. Although originally designed for Promotion Nationale only, the C.S.P.P.N. now has an economy-wide scope and Promotion Nationale receives very little attention.[1] Similarly the Ministry is shared by Promotion Nationale and Handicrafts. For the governor and supercaïd, Promotion Nationale is only one activity--probably a minor one so far as they are concerned--that is to be performed besides their primary administrative and other roles. Thus for most offices and people involved in its administration, Promotion Nationale is a part-time activity. This basic fact has many far-reaching implications which in the end determine whether P.N. projects will succeed

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[1] In fact the Conseil Supérieur du Plan et de la Promotion Nationale has now become an organ for reviewing the yearly execution of the Plan. Promotion Nationale does not even have a separate specialized commission of its own but has to share one. The various commissions of C.S.P.N. are for (1) Promotion Nationale and Handicrafts, (2) Culture, (3) Tourism, (4) Commerce, Industry, Energy, Mines, Sea Fishing, and Merchant Marine, (5) Education and Training of Cadres, Health, Youth, Sports and Justice, (6) Infrastructure, Transportation and Housing, and (7) Telecommunications and Moroccan Radio-Television.

or fail.

First, as a general rule, Part I projects (run by the technical services) work better than Part II projects (run by the local authorities). This is certainly because of continued technical supervision of the former, but also because in general the local authorities and the supercaïd do not have much time to devote to the supervision of the latter.

Secondly, confusion results even among people who are part of the P.N. machinery as to the proper procedures, despite many a memorandum. The aspect that has most often given rise to confusion concerns the proper channels for and timing of sending the "opening notice" before a given worksite is initiated. A certain rigidity in that area results in longer and longer delays in the payment in kind.[1] Such a situation in general produces a crisis, and only then will it be remedied. (The effects of such delays on the specific project and on other future P.N. projects are quite detrimental: low productivity due to low morale, strikes, and workers' fleeing P.N. work--these are only a few.)

Thirdly, there exist some duplications in the present institutions. One instance of duplication resides in the fact that, to effect the cash payments, the technical services and the local authorities have each their own paymasters. This is certainly a waste of scarce resources, since the paymaster of one service cannot be "lent" to another, and paymasters are far from being in excess supply. It also produces delays in the payment in cash. Another sort of duplication resides in the fact that, at least for Type A projects, the payments in cash and the payments in kind are handled by two different offices. Surely this is wasteful, and the two ought to be put into one hand. This proposal would be opposed by each office, however. The local authorities are reluctant to turn control of the payment in kind to the technical services because that would take away one means of political control over the workers. Similarly the technical services would be most inimical to the idea of turning control over part of their budgetary credit to an outside authority.

Thus the existing institutional system is not close to being free of faults. It is not devoid of merits, however. One that deserves to be

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[1]It must be noted that this particular rigidity in turn derives directly from the fact that the wheat used as payment in kind comes in as foreign aid which has to be accounted for: hence the need for control, entailing lengthy and voluminous bookkeeping.

mentioned is the introduction of the "P.N. way" to the technical services: the technical services now think of Promotion Nationale as a way of doing things--a labor-intensive technique. This adoption and acceptance of the "P.N. way" by the technical services represents no small achievement: it militates against any radical remodeling of the existing institutional framework.

Nevertheless, two questions must be asked and tentative answers provided. The first is: Can the existing system be improved? The answer is undoubtedly that it can, and even that it should in order for Promotion Nationale to continue its work with an acceptable degree of success. The second question then is: How could it be improved? There are at least two alternative answers depending upon whether one takes a piecemeal or an integrated approach. The piecemeal approach would consist in trying--through localized and limited reforms--to attenuate existing rigidities and defining more clearly the lines of responsibility and rules of procedures. The integrated approach would accomplish these aims, and others as well, by the formal bringing together into one department of all the dispersed elements of the P.N. apparatus. This formal step need not involve the creation of new jobs, recruiting of new staff members, or incurring any new budgetary expenditures. The elements of this new unit--which might be called the Promotion Nationale Service--already exist. The administrator is there in the form of the provincial P.N. caïd. The technicians likewise are already there in the various technical services. The concentration of the administrative function in one unit might even result in some economy in manpower because some of the personnel now running the P.N. programs of various technical services would be freed for other duties. The same applies to financial resources as to manpower. No new expenditures will be created. What will happen is simply a partial transfer of credit from some of the old technical services at least insofar as the budget is concerned. It may be noted that the first and most important step in the formation of a separate P.N. apparatus has already been taken. This occurred when in late 1969 Promotion Nationale, together with Handicrafts, was erected into a ministry of its own for the first time. In effect the present proposal consists only in advocating that the logical next step be taken in formalizing the existence of Promotion Nationale.

In addition to the merits already stated one may mention several beneficial effects of the integrated approach. One of the first results

will be the attentuation or elimination of the major problems in the existing setup. There will be a clearer definition of the lines of responsibility, a reduction in the friction arising from the unduly large amount of paperwork as well as a reduction in unnecessary duplications of functions. Secondly it implies that the staff will deal with and only with Promotion Nationale and on a full-time basis. This may reduce or entirely eliminate the existing lack of interest which is sometimes exhibited by some--either intentionally, or unintentionally because they are already overburdened with their other responsibilities. Thirdly, the proposed setup will lessen the load on these overburdened officials; they might then perform their other functions more efficiently.

But there are also some problems associated with the proposal. One is that Promotion Nationale would then simply become another technical service, fighting for its share of the budgetary pie like the other technical services, with no guarantee that it will not be outcompeted and, as a result, that the effort devoted to the "P.N. idea" will not be drastically reduced. Secondly, the formalization of Promotion Nationale as a separate entity will probably be interpreted by the other technical services to mean that they no longer will have to make an effort to use the "P.N. way" as much as possible. They will then adopt capital intensive methods and the net result, despite the existence of Promotion Nationale, might be a smaller volume of employment than is achieved under the present system. Thirdly, at the local level there may be competition between Promotion Nationale and the other technical services. Unlike at the national level, competition here will be not for financial resources but for labor, especially skilled labor. Here too Promotion Nationale might not come up on top; and if the present Promotion Nationale wage rate were to be kept, it will surely be the loser as it now is in many areas where worksites of the technical services and of Promotion Nationale exist simultaneously and side by side.

Thus the institutional reform proposed here should not be carried out in isolation. It affects the very nature of Promotion Nationale. Consequently it must be envisaged in the entire context of the P.N. experience. A change in the institutions will be of little or no use unless accompanied by the appropriate adjustments in the various aspects of Promotion Nationale. Among these aspects one may include a clearer definition of the goal of Promotion Nationale at the national level (e.g., employment

vs. productivity), a systematization and standardization of the criterion of choice among projects and of allocation of funds at the local level, and finally a revision of the remuneration system. This last aspect would involve the examination of two questions, namely those relating, first, to the payment in kind and, secondly, to the level of wage rates (which is generally acknowledged to be too low).[1]

The problems associated with the present proposal can by no means be ignored. But in our opinion they are not enough to outweigh the merits of the proposed system. The piecemeal approach will work only as a stopgap measure, and may for instance be used to gain time to study the problems mentioned and find remedies to them. In the end, however, the overall approach will impose itself as being both necessary and desirable for the continuation of the "P.N. way" as an efficient and profitable proposition.

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[1] See Chapter 4 below.

CHAPTER 3

THE PROMOTION NATIONALE PROJECTS

The types of projects undertaken under the P.N. program can be
grouped under three main headings: land improvement (or mise en valeur),
road building or infrastructure, and community works or equipment. Land
improvement includes all those projects relating to the retention of soil,
the extension of cultivable land and/or grazing area, and the control and
use of waters. They all have an impact on the conditions of production in
the agricultural sector, either directly as in the case of small- and
medium-scale irrigation, or indirectly as in the case of reforestation and
"defense and restoration of soils" or D.R.S. Under infrastructure are
grouped all those projects which involve the building or maintenance of
dirt roads. Finally, equipment refers to various types of construction
activities either in the urban areas (e.g., sewage systems) or in the rural
areas (e.g., marketplaces) or in both (e.g., health centers, schools).

Ten projects will be analyzed here. All fall under the heading of
land improvement. Three are of the small-scale irrigation type (Group I),
four of the medium-scale irrigation type (Group II), and three are D.R.S.
projects (Group III). There are several reasons why only land improvement
projects and why these specific projects were chosen for detailed study.
First, land improvement constitutes the economically more interesting part
of Promotion Nationale: they are the P.N. projects which can be considered
to be in the nature of directly productive investment. Secondly, the ef-
fects of land improvement projects are more readily measurable than those
of infrastructure or equipment work. A third reason is simply that it was
possible for me to visit these projects--and many others similar to them--
and to interview the people directly concerned by their effects. Finally,
one may also cite the fact that for a few of these projects the necessary
data had already been presented, at least partially, in various reports
and/or could be derived from such reports.[1]

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[1]Projects 05, 06 and 07 have been studied in (S.C.E.T., 1966 b); part of
Project 08 (Ajdir III) was analyzed in (I.V.S., June 1969).

The methodology to be followed is presented in Section I. The projects and the elements of the analysis are described in Section II. Section III presents the results, compares them with the results of other studies, and puts them in the proper perspective.

I. The Methodology

The aims of this analysis are twofold. One is to evaluate each project in order to find out whether it was an economically worthwhile undertaking. The other is to compare the projects in the three groups considered here. These two aims do not explicitly or directly contain any attempt at choosing among the various projects. There is no longer anything to choose since they have been completed. However, the methodology developed here can certainly be applied to future projects to establish the best combination of alternative projects.

The evaluation and comparison of different projects can be accomplished with three measures or criteria:[1] the present value, the benefit-cost ratio, and the internal rate of return. One criterion is more appropriate than the other two depending on the situation under consideration.[2] The criteria used in the present study are the benefit-cost ratio and the internal rate of return.

The benefit-cost ratio is defined as the discounted present value of benefits over the discounted present value of costs or, in mathematical notation,

$$\frac{B}{C} = \frac{\displaystyle\sum_{t=1}^{N} \frac{B(t)}{(1 + d)^t}}{\displaystyle\sum_{t=1}^{N} \frac{C(t)}{(1 + d)^t}}$$

where $B(t)$ = the benefits from the project in year t,

$C(t)$ = the costs of the project in year t,

d   = the discount rate, and

N   = the length (in years) of the period of analysis.

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[1] The main points in the theoretical development of this type of project analysis can be found in (Eckstein, 1958), Chapters III-IV and (McKean, 1958), Part 3. An overview of this field is provided by (Prest and Turvey, 1967).

[2] The respective advantages and weak points of the different criteria have given rise to much controversy. For a concise statement, see (Seagraves, 1970), pp. 438-439.

The ratio of present values is preferred to the alternative form--the ratio of annual benefits to annual costs--because of the peculiar time structure of benefits and costs for the projects under study. For all of them the costs are considerable in the first few years and become almost negligible a few years later. The benefits, on the contrary accrue only slowly at the beginning and in large magnitudes later on. This asymmetry can be attributed to the agricultural nature of the projects (e.g., fruit trees must be x years old before they start producing, and y years old before they reach maturity output) and, in some cases, to the assumptions made regarding the time lag between a given investment and the resulting increase in production. If the ratio is greater than unity, the project can be said to be profitable or economically justifiable in the sense that over time it generates more resources than it uses up. The benefit-cost ratio can of course be used to compare, i.e. to rank, various projects. However, given that the streams of benefits and costs do not necessarily have the same time paths from one project to another, the ranking will not be unique. It will vary with the discount rate being used. Projects whose costs are concentrated in the early years and benefits in later years will rank very low for high discount rates, and high for low discount rates. This makes any comparison based on the benefit-cost ratio highly unreliable in the sense that it does not provide a unique ranking among different projects. Hence the need for a criterion giving a less arbitrary ranking. This criterion is the internal rate of return.

The internal rate of return r is defined by the formula

$$\sum_{t=1}^{N} \frac{B(t) - C(t)}{(1 + r)^t} = 0$$

to be the discount rate which equates the present values of benefit and cost streams. The higher r, of course, the more profitable the project. According to Descartes' rule of sign, the definitional equation may have multiple roots if the sequence of net benefits changes sign more than once. This possibility does not create any problem in the projects considered here, however, since in all cases the flow of net benefits changes sign only once. Furthermore, it will be assumed that future opportunities will resemble current ones so that the problem of reinvestibility does not arise.[1]

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[1] (Seagraves, 1970), p. 439.

This assumption is entirely justified for the projects considered here because two of the conditions giving rise to Promotion Nationale are likely to persist in the foreseeable future. These are the existence of rural underemployment and the vast possibilities of, and needs for, undertaking numerous projects similar to those analyzed in the present study.

In order to compute the benefit-cost ratio and the internal rate of return, certain parameters must be selected. They relate to the period of analysis, and the discount rate. The considerations which must be taken into account in this selection include of course the aims of the analysis, namely evaluation and comparison. In addition, they must encompass the length of the project's life, the time it takes for the effects of the project to be fully felt, and the availability of capital. In theory the period of analysis should extend over the life of the project. Potential project life is over 30 years for Group I projects (small-scale irrigation), over 40 years for Group II (medium-scale irrigation), and over 50 years for Group III (defense and restoration of soils). To allow for risk elements, the periods of analysis have been chosen substantially shorter than the theoretical lives of the various projects: 15, 20, and 30 years, respectively. As for the proper rate of discount to be used in computing the benefit-cost ratio, in the ideal one would take the opportunity cost (or shadow value) of capital[1] in the agricultural sector since the projects studied here are all agricultural. One "rough" estimate puts this rate at 8.0 per cent in Morocco,[2] based on the institutional lending rate to agriculture adjusted for risk. This, however, appears to be too low for various reasons. One is that medium- or long-term Moroccan government bonds are issued at 6.5 - 7.0 per cent. Secondly, the Banque Nationale pour le Développement Economique makes loans at an interest rate of 7.0 per cent, mostly in non-agricultural sectors. Thirdly, in the late 1950's - early 1960's the return on private investment in non-agricultural enterprises (actual dividend payments) averaged 9.5 - 10.0 per cent.[3] One must thus assume that the shadow value of capital in the entire economy is around 7.0 per cent at the lowest, and at least 9.0 to 10.0 per cent in the non-

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[1]On the controversy surrounding the choice of discount rate and the different considerations that should govern such a choice, see (Baumol, 1968) and also (Seagraves, 1970), pp. 440-450.

[2](S.R.I., 1967), p. 26.

[3](Belal, 1968), pp. 284-285.

agricultural sector. Presumably, capital is more abundant in the non-agricultural than in the agricultural sector. The shadow price of capital must thus be higher in agriculture than in other sectors. The projects analyzed here are very small relative to total investment, so that the present study should reflect (rather than try to correct) the distortions caused by the existing relative scarcity of capital between the various sectors. Consequently the appropriate discount rate must be at least 10.0 per cent. It is not clear by how much this should be adjusted for risk. Since selecting one single rate of discount rate would clearly be quite arbitrary under these circumstances, it appears preferable to present the results for three different rates--10, 15 and 20 per cent--in the belief that the "true" rate of discount must lie within that range. If one were really pressed to pick one and only one rate, the middle value should be chosen. In fact there exists another way of choosing one single rate, which consists in taking the average return to investment in agriculture. In this instance, it would be possible to take the average internal rate of return for all ten projects as the discount rate. This was not done, however, because this value (14.0 per cent) falls within the range already considered.

The benefit-cost ratio as well as the internal rate of return are based on a comparison of benefits from and costs of the project. The way benefits and costs are specified thus determines to a great extent the nature of the results. For the present study, cost is defined to include initial costs, opportunity costs (if any),[1] and yearly maintenance costs. Initial costs include all expenditures in cash (for wages, supplies, and equipment) as well as payment in kind. Opportunity costs can best be seen in the following terms. When, for instance, some crops are displaced by other crops as a result of an improvement, the total value of the latter should not be attributed to the improvement. The value of the former must be netted out since it represents what would have been produced on the given land area without the improvement. This is done by entering the value of the alternative use of the land--the opportunity costs--as an element of cost. The yearly maintenance costs are determined by the following considerations. For all projects it is assumed that the landowners voluntarily

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[1]The term "opportunity costs" is used here as a shorthand for the cost of displaced activities: e.g., the loss of output for those crops which are no longer grown after the improvement is completed.

incur an annual cost, mostly in labor contribution, equivalent to one per cent of the present value in year 1 of total initial costs for the upkeep of the project. In addition the State is also assumed to contribute one per cent for small-scale irrigation and D.R.S. projects, and four per cent for medium-scale irrigation projects. The State contribution may for instance be for repair supplies and equipment, or technical supervision. The one per cent figures are more or less arbitrary but, on the basis of past performance, they are probably more than adequate; the four per cent figure is based on an official estimate on how much it costs the State to maintain (large-scale) irrigation works in good repair.[1] To summarize, the yearly maintenance costs are 2 per cent of the present value in year 1 of initial costs for Groups I and III, and 5 per cent for Group II.

The calculation of benefits consists in evaluating the effects of the project (say, through the availability of more water) on the output of various crops. Benefits are defined as the value of the additional output of various crops attributable to the project under consideration. In addition, the concomitant savings are also included. The method for evaluating benefits can be further specified. First, the prices used are the prices obtained by the farmers at the nearest market. Since these are agricultural crops, their prices are generally subject to wide seasonal variations. Whenever such variations are reported by the sources, no attempt is made to "average" the various prices. Instead, in order to make the analysis as conservative as possible, a price close to the lower end of the range is chosen.[2] Secondly, the value of the additional output is net of production costs. This is accomplished by subtracting 20 per cent from the gross value,[3] and by excluding outputs which are also inputs to production. In the projects considered here they were essentially reed (used as support

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[1](Plan 1960-1964), p. 41.

[2]Theoretically one should use a weighted average under these circumstances --unless the projects alter the timing of output. The projects do not alter this timing. But detailed enough information on the timing of output is not available to allow the computation a weighted average.

[3]The figure of 20 per cent is used in studies of medium-scale irrigation projects contained in (S.C.E.T., 1966b), p. 35. It is probably on the high side. Another study finds that in the Tessaout region a typical farming unit generates annually a gross output of DH 3 125.00 and incurs production costs of DH 302.00--i.e., less than 10 per cent: see (Lahlimi, 1967), p. 28. The higher figure is chosen in order that the analysis, if it should err, would err on the conservative rather than the over-optimistic side.

for the grape vine) and cattle feed (alfalfa).

Some final notes on project, benefit and cost are indispensable. First, in order to avoid the type of overcounting due to the attribution to the project of benefits which, strictly speaking, arise from other sources, particular attention has been paid to the precise delimitation of "the project" and of its effects in terms of both cost and benefit. This has proved especially important in the case of medium-scale irrigation projects. They consist of three parts: the dam, the canal (canal de tête-morte), and the irrigation network inside the perimeter. It would obviously be erroneous to consider the project to be made up of only the first two elements and attribute all the benefits to them. The irrigation network must be included as an integral part because without it the benefits from the dam and the canal alone would be very low, perhaps even nil. Secondly, some provision must be made for the risk element which is particularly important in Moroccan agriculture. In the areas where the present projects are located, droughts and floods can produce extreme variations in output. In this analysis the risk element is taken into account in two different ways: by choosing a low price when the price varies over a wide range, and by taking short periods of analysis. From the theoretical standpoint, it would have been more appropriate to use expected benefits and costs. The elements necessary for such an analysis are, unfortunately, not available.

II. The Projects

The method of analysis having been specified, it is now possible to proceed with the analysis itself. The projects will be presented according to the three-group classification previously specified. For each group, an introductory paragraph or two put the projects into the proper context. The projects themselves are then briefly described, and the elements of costs and benefits are derived. The results for all groups (in terms of benefit-cost ratios and internal rate of return) are presented in the next section.

A. Group I: Small-Scale Irrigation

The three small-scale irrigation projects are located in the province of Marrakech. This is an area classified as semi-arid. Water is a scarce and precious commodity, so scarce and precious that, like land, it belongs to private individuals. In fact, it is often said that the three factors

of production in this and other water-short areas of Morocco are land, water, and labor. Annual contracts for land and water are negotiated separately since water is a bachelor.[1] Rents for either or both are paid by part of the harvest. For instance, water rights can be rented at one-sixth of the crop for cereals and one-half for vegetables or alfalfa. For land, the rent may be two-fifths of the crop.[2] Thus a man who has to rent both land and water may end up with from two-fifths to as little as one-tenth of the crop depending upon whether he grows cereals or vegetables --assuming that he does not also have to hire additional labor besides his family's and his own. This shows that in some cases water (or, more precisely, the cost of water) is as important as land for purposes of agricultural production. This importance of water has long been recognized by the Moroccan farmer who, for centuries, has been bringing water to his fields from miles away either overground with dirt ditches (seguia) and/or underground with tunnels (khettara). The traditional means are, however, very inefficient. It has been estimated that, on the average, the existing system delivers only 40 per cent of the water that could be tapped from the rivers or the sources. This overall productivity can be raised to 80 or 90 per cent[3] by relatively simple improvements, such as cementing or concreting the existing networks to protect them from floods and reduce infiltration. It is intuitively evident that undertaking such improvements must be "profitable." The following analysis in fact bears out this expectation.

Project 01, the Ain M'Kelkem source in the Cercle des Rehamna-Sud, consisted in repairing the source and the attached canal which regularly caved in every year following heavy rains. The source was cemented; concrete walls were put on the 750 metre long underground canal and the 240 metre long open air canal. Work started in 1968 and, even though the entire project was not completed until mid-1969, its effects were already felt by the end of 1968. Project 02, the El Kouhliyne source in the Cercle des Ait Ourir, was essentially similar to Project 01. It was completed in 1968. Project 03 is the improvement of the Taddarte seguia in the Cercle de Marrakech Banlieue. It consisted in building a small (67 metre long) diversion dam on a river to feed the seguia, and putting concrete walls on

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[1](Haouz, 1968), p. 53.

[2](Haouz, 1968), p. 53; see also (Lahlimi, 1967).

[3](Haouz, 1968), p. 64.

322 metres of underground canal and 1848 metres of _seguia_. The project was started in 1968 and completed in 1969.

All three projects were carried out as part of the Promotion Nationale program of the Office Régional de Mise en Valeur Agricole du Haouz (O.R.M. V.A.H.), that is, as Part I projects. Their respective initial costs are presented in Table 3.1.

Table 3.1 - Initial Costs of the Three
Small-Scale Irrigation Projects

	Project 01 Ain M'Kelkem	Project 02 El Kouhliyne	Project 03 Taddarte
Cash initial expenditures (DH):			
1968	17,264	32,712	63,008
1969	54,804	-	23,413
Payment in kind (DH equivalent)[a]			
1968	7,854	10,414	11,152
1969	29,470	-	12,924

Source: Bureau-P.N. of the O.R.M.V.A.H.

Note: [a] The payment in kind is obtained by multiplying the number of man-days actually used by DH 2.00. This procedure introduces a slight upward error (maybe up to 10 per cent) due to the fact that the skilled workers do not receive any payment in kind but are paid all in cash.

Strictly speaking, the improvements have a direct effect only on the waterflow. This effect is shown on Table 3.2. But in fact the greater and more certain availability of water shows up in the agricultural production with a very short time-lag. It is this second impact of the improvements that is of greatest interest for the economic evaluation of the projects. The magnitude of the impact can be determined from a comparison of the situation without the improvement and the situation with the improvement. The two situations in the three projects studied here are shown in Appendix 1 (Table A1.1). They can be briefly characterized as follows. First, in Projects 01 and 02 the cultivated land area increased from 101.5 to 150 hectares and from 59 to 73 hectares, respectively. In Project 03 no similar expansion of cultivated area was registered, but the number of fruit trees rose from 4650 to 6950. Secondly, some reshuffling occurred in the allocation of the land area among the various crops. Of the twenty-five crops whose areas are listed for the three projects (excluding fig), five

Table 3.2 - Effects of the Improvements on the Waterflow

	Project 01 Ain M'Kelkem	Project 02 El Kouhliyne	Project 03 Taddarte
Waterflow without the improvement: Maximum (litre/second) Minimum (litre/second)$\underline{a/}$	4.34 1.45	7.71 3.66	318.54 119.49
Waterflow with the improvement: Maximum (litre/second) Minimum (litre/second)	15.61 6.15	13.93 4.56	429.66 180.77

Source: Bureau-P.N. of the O.R.M.V.A.H.

Note: $\underline{a/}$ These are "normal" summer minima. In fact the absolute minima
are zero when the diversion dam and/or khettara, seguia and
source are destroyed by heavy rains.

saw their areas reduced, eight unchanged and twelve increased. There is a
highly significant tendency for yields to be lower in those crops whose
areas were reduced or remained stable than in those whose areas increased.[1]
Thirdly, no decrease in yields has been reported. This is what is to be
expected because the completion of the various projects could not possibly
result in a worsening of the overall conditions of production.

It is now possible to establish the streams of costs and benefits for
each project. In order to avoid cluttering the text with too many numeri-
cal tables, however, the total benefits and costs, as well as the details
of their derivations, appear in Appendix 1. For Project 01 the benefits
arise from the increase in yields and/or land areas of apricot, grape, olive,
and orange; in addition there are the benefits to cattle raising, and the
savings in repair costs. The costs include the opportunity costs attribut-
able to the displacement of barley, wheat, tomato and zucchini, the ini-
tial costs, and the maintenance costs. For Project 02 the benefits derive
from barley, corn, wheat, carrot, turnip, tomato, zucchini, apricot, grape,
olive, orange, and the savings on repair costs. The opportunity costs
arise from a reduction in the herd of sheep and cows; the other cost items
are the same as for Project 01. For Project 03 the benefits are attributable
to barley, corn, wheat, vegetables, apricot, grape, olive, orange and the

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[1]The mean yields are, respectively, DH 475.35 (σ = 135.72) and DH 2222.33
(σ = 921.25). The F-ratio is 42.521, which is significant at better than
the 0.1 per cent level. These figures are based on the situation without
the improvement.

savings on repairs. Unlike in the two previous cases there are no immediately perceivable opportunity costs; the other cost items are the same.

The last step in the computations is fairly straightforward. The processing of the data as prepared in Appendix 1 yields the final results presented in Table 3.7 for all projects.

B. Group II: Medium-Scale Irrigation

The four medium-scale irrigation projects are located in the Cercle of Goulmima, Province of Ksar Es Souk. This area is considered to be transitional between the (Atlas) mountain and the (Sahara) desert. In fact almost all activities there, as in the desert proper, are carried out in oases or palm groves located along more or less permanent rivers and/or around wells. Water is the crucial element. Whatever was said previously about water in the province of Marrakech applies here, only with added strength. But what is more, whatever little rainwater is received falls during a very few days of the year, and on those days during only a few hours. Typically these occasional rains result in flashfloods. Among other things, two effects of this situation must be noted. First, the floods carry away good soil, crops and usually part of the physical infrastructure for irrigation. Secondly, most of the rainwater is lost to cultivation because only a very small part of it has time to infiltrate the soil. It is to remedy this unfortunate state of affairs that projects like the four studied here are undertaken. They are aimed partly at reducing the damage resulting from floods. But their main purpose is to harness the floodwater and put it to good use. For instance, in the Cercle of Goulmima alone, only 45 per cent of the potentially cultivable area is actually cultivated[1] at the present time as a result of the failure to make good use of the floodwater. There is ample room for improvement here.

Some technological limitations exist, however. The floods are as violent as they are sudden. Consequently no attempt has yet been made to use the water when the flood is at its height. What is being done at the present time is to let the flood crest go by and then catch the "flood tail" water. This is accomplished through the use of such devices as building dams with "fusible" portions which are gradually carried away by the flood but which can be reconstructed rapidly, easily and inexpensively with

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[1](S.C.E.T., 1966b), p. 31.

rocks and meshed wires. The water can be used for three purposes: to increase the supply of water on the existing palm grove, or to expand the permanently cultivated area of the palm grove, or to bring into temporary cultivation areas that otherwise would have remained dry and sterile. In fact it is usually a combination of all three.

The four projects studied here are typical of other projects in this area designed for the purposes previously stated. The core of the project is a medium-size low dam varying in length from under fifty meters to over two hundred meters. The dam consists of concrete foundations and sides. The central part may be concrete; but more often it consists of a few sections made up of rocks held together by meshed wire. Each section is designed to "melt" away as the flood water reaches a certain volume. In addition to the dam, a project has a fairly large concrete canal (known as the "dead-head" canal) to bring the water from the dam to the area of intended use, and an irrigation network of smaller canals in that area. Even where an irrigation network already exists it is usually inefficient and very precarious. Therefore part of the project is to install and/or improve the necessary irrigation network: this part of the project is referred to as perimeter equipment.

For the purpose of the present analysis it is assumed that the construction of the dam starts in the first year and takes one year; the dead-head canal is started in the second year and takes two years; and the perimeter equipment is initiated in the third year and takes three years.[1] Thus the entire project should be completed in five years. This is indeed the case for Projects 05, 06, and 07. Project 04 will take seven years because a two-year gap exists between the time when the dam was completed and the time when work on the dead-head canal started. The projects to be analyzed are Tadiroust (04), Tazmout (05), Tazourmit (06), and Yfegh (07). The respective initial cash expenditures and payments in kind are shown on Table 3.3.

As with the small-scale irrigation projects, the improved conditions in water availability are translated into increased yields and/or increased cultivated land area almost immediately. The existing and future cultivated areas for each perimeter are shown on Table 3.4. A few assumptions are necessary for deriving from this table the benefits attributable to the

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[1]These are the assumptions made by the engineers who designed these projects: see (S.C.E.T., 1966b), pp. 33-43.

Table 3.3 - Initial Costs of the Four
Medium-Scale Irrigation Projects
(dirhams or dirham equivalent)

	Project 04 Tadiroust	Project 05 Tazmout	Project 06 Tazourmit	Project 07 Yfegh
1966				
Cash expenditures	720 928	-	-	176 735
Payments in kind	95 072	-	-	45 792
1967				
Cash expenditures	0	283 932	349 850	52 500
Payments in kind	0	121 672	115 650	35 000
1968				
Cash expenditures	0	89 130	388 531	76 125
Payments in kind	0	38 390	137 208	49 176
1969				
Cash expenditures	91 001	217 405	516 806	23 625
Payments in kind	42 824	115 020	213 836	14 176
1970				
Cash expenditures	142 907	128 275	128 275	23 625
Payments in kind	73 568	76 630	76 630	14 175
1971				
Cash expenditures	51 906	128 275	128 275	-
Payments in kind	30 744	76 630	76 630	-
1972				
Cash expenditures	51 906	-	-	-
Payments in kind	30 744	-	-	-

Sources: (S.C.E.T., 1966a), (S.C.E.T., 1966b), (S.C.E.T., 1969).

Table 3.4 - Total Existing and Future Cultivated Areas
in the Medium-Scale Irrigation Projects
(hectares)

Project	Existing Palm Grove	Flood Irrigated Area	Extension of Palm Grove
Project 04: Tadiroust	240	310	50
Project 05: Tazmout	200	1300	0
Project 06: Tazourmit	200	1300	0
Project 07: Yfegh	125	150	0

Sources: See Table 3.3.

various projects. First, the yields on the existing palm grove start increasing the year after the canal is completed and are felt in their entirety at the end of three years. Secondly, production on the flood

irrigated areas starts when the dead-head canal is completed and attains
the full potential after ten years. Thirdly, the extensions of the palm
grove start after the perimeter has been fully equipped and reach the max-
imum output after eight years.[1] The streams of benefit and cost appear in
Appendix 1.

C. Group III: Defense and Restoration of Soil (D.R.S.)

The erosion of land by water, and sometimes by wind also, is a prob-
lem which plagues many a tropical or equatorial country. Its most spec-
tacular manifestations are entire hillsides scarred with deep ravines.
"Top erosion," whereby a thin slice of the topsoil is carried away year
after year, is certainly less obvious but its long run effects are no less
disastrous than those of the more evident kind of erosion. The resulting
losses are well-known: loss of crop land, faster siltage of dams, etc.
In Morocco it is estimated that erosion takes away 60,000 hectares of good
land every year.[2] This problem, together with the existence of underemploy-
ment, was one of the official reasons cited for initiating the Promotion
Nationale program.

The fight against erosion can take various forms. The most widely
used approach is reforestation, and there is some of that in Morocco. An-
other is known as "defense and restoration of soils" or D.R.S. To some
extent this is only a variant of reforestation in that it involves the
planting of trees. It is indeed reforestation, but it is also more. To
put it briefly, the D.R.S. treatment attempts to keep the land from being
eroded away by planting trees on horizontally parallel banquettes and by
building small dry rock dams. The dams and banquettes are designed to slow
down the flow of rainwater and help it to infiltrate into the soil. The
distinctive feature of D.R.S. is that it tries not simply to slow down the
erosion process but it tries to do so in a positive way, that is, in a di-
rectly productive way. This is achieved by using mostly or wholly fruit
trees instead of forest trees, by leaving enough room between tree rows to
allow the plantation of cereals or other crops, etc. The last three Pro-
motion Nationale projects to be studied here are D.R.S. projects.

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[1]For assumptions two and three, 8 and 5 years, respectively, are retained
in (S.C.E.T., 1966b), p. 36. But actual experience since 1966 has shown
that these periods were going to be too short. Hence longer periods, cor-
responding to the revised estimates, have been selected here.

[2](P.N. au Maroc, 1964), p. 13.

Project 08, the Al Hoceima D.R.S. project, is located 5 to 7 miles outside the provincial capital of Al Hoceima. It consists of four perimeters: Ajdir I through IV. Similarly Project 09, the Imintanoute D.R.S. project (located in Imintanoute, Province of Marrakech), is made up of four different perimeters, themselves divided into consecutively numbered plots: Talainine II to V, Inzuma I to IV, N'Daina I to III, and Douirane I to IV. One or more plots from one or more perimeters are treated every year: 15 plots were treated in 9 years. Project 10, the Sahrij D.R.S. project, is located in the Cercle des Sraghna Zemrane, Province of Marrakech. The areas treated for each project and the corresponding initial costs are shown in Tables 3.5 and 3.6, respectively. It must be noted that initial costs here include the cost of planting the original trees as well as the cost of replacing the mortality victims up to five years old.

The streams of total benefits and total costs are shown in Appendix 1. For the Al Hoceima project (08) the benefits derive from almond trees and forest trees. The costs include the initial costs, the opportunity costs attributable to the loss of 20 per cent of the wheat-grown area, and the maintenance charges. For the Imintanoute project (09) the benefits stem from barley, almond trees and carob trees. The cost items are similar except for the fact that there was no immediately discernible opportunity

Table 3.5 - Total Areas Treated in the Three D.R.S. Projects
(hectares)

Year	Project 08 Al Hoceima	Project 09 Imintanoute	Project 10 Sahrij
1961	-	56	-
1962	-	399	-
1963	-	100	-
1964	-	200	-
1965	672	300	-
1966	245	408	-
1967	284	149	-
1968	313	209	500
1969	0	14	1000

Sources: (08) Water and Forestry Service, Al Hoceima.
(09) Water and Forestry Service, Amizmiz and Imintanoute; Promotion Nationale Section, Province of Marrakech.
(10) O.R.M.V.A.H.

Table 3.6 - Initial Costs of the Three D.R.S. Projects
(dirhams or dirham equivalent)

Year	Project 08 Al Hoceima		Project 09: Imintanoute		Project 10: Sahrij	
	Cash Expenditures	Payments in Kind	Cash Expenditures	Payments in Kind	Cash Expenditures	Payments in Kind
1961	-	-	37 290	11 760	-	-
1962	-	-	164 037	87 390	-	-
1963	-	-	156 730	21 000	-	-
1964	-	-	131 546	42 000	-	-
1965	282 130	184 922	160 740	63 000	-	-
1966	105 676	89 032	282 142	85 680	-	-
1967	129 334	85 140	133 074	31 290	-	-
1968	135 845	82 762	80 502	43 890	393 656	106 344
1969	39 581	32 356	53 299	2 940	236 394	63 706
1970	28 427	22 048	-	-	73 776	18 444
1971	19 243	14 516	-	-	66 664	16 666
1972	10 866	8 196	-	-	38 616	9 654
1973	1 563	1 180	-	-	27 688	6 922

Sources: See Table 3.5.

cost. As for the Sahrij project (10) the benefits arise from almond trees. The cost items are similar to those of Project 08, with the opportunity costs coming from the loss of 20 per cent of the area grown in barley. The total areas treated for each project are, respectively, 1514, 1835 and 1500 hectares.

III. The Results

Before presenting the results, it must be noted that the present calculations do not--and could not--include all benefits and costs. Some of the omitted benefits or costs are potentially quantifiable, others may not be and belong to the "intangibles." Among the omitted costs figures prominently the possible lowering of the water table as a result of the improved irrigation systems tapping more water from the sources and/or rivers in the case of the small-scale irrigation projects. There were some fears expressed by technicians that, if these projects were carried out in large numbers, the ultimate result would be a lowering of the general level of the water table. Such a phenomenon would mean that some of the systems whose tapping levels are higher than the resulting water table level would become partially or completely deprived of water, and the yields on the fields that they irrigate would be drastically reduced. This is certainly

a real cost, but it would be very hard to quantify without substantial hydrological studies. Another example of cost not accounted for can be taken from the Imintanoute D.R.S. project (09). Prior to the beginning of D.R.S. work there, the hillsides were used as grazing area for sheep. With the initiation of D.R.S., sheep and all other farm animals are banned from the hillsides. This is certainly a cost to the animals' owners because they now have to find an alternative pasture area. In this case, however, this cost was deemed to be more than made up by a benefit which also was not counted in the analysis. This benefit stems from the fact that the farmers now cut the grass that grows along the D.R.S. banquettes between the various trees. This grass is fairly abundant and can be used to feed the sheep as well as the cattle. (Previously the grazing area was so poor that only sheep could survive on it. Now both sheep and cattle can benefit from the hillsides' grass.) Also in this area one effect of the project was to produce a noticeable lowering of the temperature, especially in the summer season. This cooling off phenomenon--probably attributable to the increased humidity of the soil--is certainly appreciated by the inhabitants; it may also somehow be beneficial to their crops. Unfortunately, there does not seem to be any way of taking this intangible benefit into account. Furthermore the D.R.S. works, by reducing the amount of soil carried away and by slowing down the water flow, have many other effects which may be considered benefits. They may raise the water table by infiltrating more water. They may reduce the rate of silting of dams situated downstream. And they can cause the seguia situated in the valley to be carried away by floods less often. Another type of intangible benefit is associated with small- and medium-scale irrigation projects: more water means more water not only for irrigation purposes but also for domestic uses (cooking, drinking, and washing). Finally, the increase in land value has not been included although data were available in some cases: its inclusion would constitute double-counting.[1]

The results are presented on Table 3.7 for all ten projects. Columns (1) - (3) contain the benefit-cost ratios for three alternative discount rates: 10, 15 and 20 per cent. Column (4) shows the internal rate of return. An analysis of variance performed on these results shows that the most profitable projects--the ones with the highest internal rates of

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[1]See (McKean, 1958), p. 152.

Table 3.7 - Results of the Benefit-Cost Analysis

Project or Group	Benefit-Cost Ratio			Internal Rate of Return (%) (4)
	d = .10 (1)	d = .15 (2)	d = .20 (3)	
1: Ain M'Kelkem	1.571	1.309	1.101	23.0
2: El Kouhliyne	1.186	0.956	0.776	14.0
3: Taddarte	4.016	2.825	2.044	33.1
4: Tadiroust	0.927	0.636	0.444	9.1
5: Tazmout	0.925	0.631	0.442	9.1
6: Tazourmit	2.042	1.363	0.931	19.1
7: Yfegh	1.331	0.956	0.705	14.3
8: Al Hoceima	0.504	0.266	0.149	5.0
9: Imintanoute	0.815	0.523	0.366	8.0
10: Sahrij	0.574	0.334	0.203	5.0
I: Small-scale irrigation	2.258	1.697	1.307	23.4
II: Medium-scale irrigation	1.306	0.896	0.630	12.9
III: D.R.S.	0.631	0.374	0.239	6.0
All Projects	1.389	0.980	0.716	14.0
F-Ratio	2.511	3.947	5.811	6.243
Significance Level	-	0.10	0.05	0.05

return--are the small-scale irrigation projects with 23.4 per cent (σ = 5.5). Then come the medium-scale irrigation projects with 12.9 per cent (σ = 2.4), and the D.R.S. projects are last at 6.0 per cent (σ = 1.0). The differences between the group means are significant at better than the 5 per cent level.[1] The benefit-cost ratios also confirm the profitability ranking of the groups of projects. Although the differences among the various group mean benefit-cost ratios are not significant when the discount rate is 10 per cent, they are significant at the 10 and 5 per cent levels when the discount rate is 15 and 20 per cent, respectively.

The results obtained here become more meaningful when compared with the results of other studies of similar projects. There exist three groups of such studies.[2] For P.N. projects, there are the I.V.S.[3] reports and the S.C.E.T.[4] study. For non-P.N. projects, the Stanford Research Institute

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[1] To say that the differences between sample means are significant at the x per cent level is a shorthand for the statement that there is only an x per cent risk that these observed differences could be the result of an accident. In empirical economic research the 5 per cent level is considered to be "significant" and the 1 per cent level "highly significant."

[2] The specific references are given in the sources for Table 3.8.

[3] International Voluntary Service.

[4] Société Centrale pour l'Equipement du Territoire.

has done some analyses. During the period 1969-1970, the two I.V.S. volunteers stationed in Al Hoceima and Ouarzazate wrote a series of brief reports. They examined various aspects and problems of Promotion Nationale in their respective regions and carried out benefit-cost analyses of several specific projects. The I.V.S. results shown here come from these studies. The S.C.E.T. is a French engineering firm which, under the French technical cooperation program, has been involved in Morocco's Promotion Nationale since 1964. It has been active in the provinces of Béni-Mellal, Marrakech, Tétouan, and especially Ksar-Es-Souk where it has been closely associated with the more successful projects. Its participation covers most phases of P.N. projects. The S.C.E.T. engineers, in cooperation with the regional Offices de Mise en Valeur Agricole, carry out technical feasibility studies as well as studies in adapting various methods to the "P.N. way." In addition, they also supervise directly the actual work on the projects. The results used here come from a summary and an evaluation of their experience, written in late 1966. In 1966-1967 the Stanford Research Institute (S.R.I.) undertook a series of studies on Moroccan agriculture. Among them was an analysis of various projects in the Lower Moulouya irrigation perimeter. The aim was to find the best projects and to establish five-year programs for carrying them out. Several of these projects have been included in the present comparison.

The results of the I.V.S., S.C.E.T., and S.R.I. analyses are presented in Table 3.8. The assumptions of these various studies are not consistent with each other, nor with those of the present study. The differences lie not only in the definitions of benefit and cost, but also in the choice of period of analysis. They are, however, not so great as to foreclose any comparison between these results and those of the present study, especially if the figures on Table 3.8 are taken to indicate no more than rough orders of magnitude. Only the internal rates of return are shown since they are more "reliable" than the benefit-cost ratios.

The general conclusions from such a comparison are twofold. First, projects in the P.N. program have a higher internal rate of return than those outside it. The mean is 13.2 per cent for the ten projects analyzed in this study and those in Group A of Table 3.8, as opposed to 9.9 per cent for non-Promotion Nationale projects in Group B of the same table. The difference is, however, not statistically significant. Thus the projects undertaken under Promotion Nationale are no worse than those carried

Table 3.8 - Results of Other Studies of Agricultural Projects

Project Number and Name	Project Type (1)	Internal Rate of Return (%) (2)	Author(s) (3)
A. P.N. Projects			
2-01. Ternata (Zagora)	Group I	11.4	I.V.S.
2-02. Draa Valley	"	9.1	"
2-03. Ktaoua (Draa)	"	7.0	"
2-04. Tazmout (Goulmima)	Group II	14.0	S.C.E.T.
2-05. Tazourmit (Goulmima)	"	24.5	"
2-06. Yfegh (Goulmima)	"	23.5	"
2-07. Ajdir III (Al Hoceima)	Group III	4.0	I.V.S.
2-08. Asmoud (Al Hoceima)	"	4.0	"
B. Non-P.N. Projects[a/]			
2-09. Cereals project	Lower Moulouya	25.0	S.R.I.
2-10. Range Management project	"	14.0	"
2-11. Triffa Main	large-scale irrigation	20.0	"
2-12. Sector 27	"	8.0	"
2-13. Sector 28	"	9.0	"
2-14. Triffa East	"	6.0	"
2-15. Triffa High Service	"	5.0	"
2-16. Zebra Collective	"	5.0	"
2-17. Zebra Remainder	"	5.0	"
2-18. Bou Areg Central	"	6.0	"
2-19. Bou Areg Remainder	"	6.0	"

Sources: 2-01 to 2-03: (I.V.S., April 1969).
2-04 to 2-06: (S.C.E.T., 1966b), pp. 34-43.
2-07 to 2-08: (I.V.S., January 1969), (I.V.S., June 1969).
2-09   : (S.R.I., 1967), p. 49.
2-10   : (S.R.I., 1967), p. 59.
2-11 to 2-19: (S.R.I., 1967), p. 185.

Note: [a/]Projects 2-09 through 2-19 are all part of an integrated regional development plan in the delta region of the Lower Moulouya. This plan involves large-scale irrigation as well as other schemes. The S.R.I. study considers several alternatives. The figures presented here relate to gross output and total costs, with the assumption that 90 per cent of potential output will be achieved and a 25 per cent contingency markup on costs.

out under other programs. If anything, they are better. Secondly, water-related projects are more profitable than other types. In particular, small- and medium-scale irrigation projects are more profitable than all others: 15.1 per cent vs. 9.3 per cent for those appearing in Table 3.11. And small- and medium-scale irrigation are more profitable than large-scale

irrigation: 16.2 per cent vs. 7.8 per cent, the difference being signifi-
cant at the 10 per cent level.

Thus the results of other studies do not seem to contradict the
findings obtained here. The present results are somewhat higher than the
other results (14.0 vs. 10.9 per cent), despite the fact that the assump-
tions made in this study are consistently and purposely on the conservative
side. However, the difference is not statistically significant. One may
thus conclude that, although the projects studied here can be considered
to be among the showcase projects of Promotion Nationale, they are not much
more profitable than other similar projects in the agricultural sector.
In particular, the difference with P.N. projects analyzed by other people
is very small: 14.0 vs. 12.3 per cent.

It is important that the results obtained here be put in the proper
perspective. First, it must be remembered that land improvement consti-
tutes only one of the three types of P.N. projects (the other two being
infrastructure and equipment),[1] and that the three sub-groups represented
here do not include all of land improvement. Secondly, these projects
may be typical of similar projects in their areas but it is not known
whether they are typical of similar projects in other areas. In addition,
thirdly, it is not even sure that they are representative in their areas.
Consequently, the results cannot--or, at least, should not--be considered
to be typical of all projects of this nature, and even less to Promotion
Nationale as a whole.[2] These projects are more or less showcase displays.
What made them particularly successful (at least for Groups I and II) was
a combination of various factors such as--among other things--good design
and good execution by the technical services[3] and local authorities, popu-
lar interest and participation. What the results show is not that Promotion

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[1]Over the period 1964-1969, in each year land improvement constituted an
average of 63.0 per cent of all P.N. worksites and 51.5 per cent of all
P.N. man-days: see (P.N. Bilan, 1964 through 1969).

[2]These are only 10 projects: the average yearly number of land improve-
ment P.N. worksites is 1186 in the period 1964-1969: see (P.N. Bilan,
1964 through 1969).

[3]All ten projects analyzed here were realized in Part I (or Category A)
of the P.N. program: Projects 01-03 and 10 by the Office Régional de Mise
en Valeur Agricole du Haouz (Marrakech), Projects 04-07 by the Office
Régional de Mise en Valeur Agricole du Tafilalt (Ksar Es Souk), Projects
08 and 09 by the Water and Forestry Services in Al Hoceima and Imintanoute,
respectively.

Nationale is or has been a success but that it can be or can become a worthwhile undertaking even in the narrow economic sense. We say "even in the narrow economic sense"--of measurable benefit and cost--because it may be argued that Promotion Nationale has been successful in achieving certain goals which are not directly economic in their nature. Among them may be the generation of popular participation in the development effort, or the attenuation of potential sources of political problems such as un- or underemployment, or the poverty of the marginal regions.[1]

One last note must be added. The study so far has not considered the income distribution aspect of these projects. For programs such as Promotion Nationale it is of the utmost importance that the workers also be those who benefit from the works--or at least that some, preferably most, of them benefit. If after their completion the projects do not increase the means of production at the disposal of most workers, Promotion Nationale becomes no more than a channel for a temporary subsidy in the form of wage payment. It would then be no different, and no better, than the "worksites for the relief of unemployment" upon which it is supposed to improve. The benefit-cost ratios and the internal rates of return may all be very favorable, but they do not say anything about who gets what. The question of who gets all of those benefits is at least as important as the fact that the benefits exceed the costs. This consideration must always temper any optimism in the interpretation of the statistical results. The next chapter will try to determine, among other things, whether the P.N. workers do benefit from the projects on which they work.

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[1]These various aspects are considered in Chapter 4, Section III.

CHAPTER 4

PROMOTION NATIONALE AND THE PEOPLE

People are ultimately what development is all about. Its success depends on people. Its fruits--when and if they come--go to people. This is especially true of works programs like Promotion Nationale. This chapter is an attempt at establishing more clearly the nature of the interrelationships between people and the P.N. program.

Ideally what would be needed to gain an insight into these questions is a country-wide survey of P.N. workers and projects. This, however, has not been possible due to the material and time limitations inherent in any one-man undertaking. The next best thing is to concentrate on one specific region. A survey of P.N. workers was conducted in the cercle of Goulmima (Province of Ksar-Es-Souk) during the early part of June 1970.[1] Its results constitute the source of the major part of the information used in this chapter. The region of Goulmima is probably not representative of all Morocco. But it is representative of most of Morocco south of the Atlas mountains and, at least in such aspects as poverty, of the Rif region as well. These two regions absorb about three-fourths of the P.N. effort every year. Thus, although the survey does not produce results that are "typical" in all of Morocco, its results are acceptable as representative of the greatest part of Morocco insofar as Promotion Nationale is concerned.

The impact of Promotion Nationale--through the payment and spending of wages--is undoubtedly felt by the entire community where projects are undertaken. To that extent one might wish to survey the entire community which, for the purpose at hand, is neither necessary nor practical. It appears more desirable and useful to study the people that are directly concerned, namely the P.N. workers themselves. The major characteristic of this labor force is that it is exclusively male. In all, 251 workers were interviewed at five different worksites situated within a radius of 25 miles from the town of Goulmima. There were 206 unskilled laborers,

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[1]A detailed description of the nature and circumstances of this survey is provided in Appendix 2. This survey will be subsequently referred to as the Goulmima survey.

35 skilled workers (all masons), and 10 supervisory workers (<u>chefs</u> <u>de</u> <u>chantiers</u>, <u>caporaux</u>, and <u>pointeurs</u>).

Their age structure is shown in columns (1) and (2) of Table 4.1.

Table 4.1 - Age Structure of the P.N. Labor Force in
Goulmima and of the Rural Active Muslim Males
in Ksar Es Souk Province

Age Group (years)	P.N. Labor Force (Goulmima)		Rural Active Muslim Males (Ksar-Es-Souk)	
	Number (1)	Percent (2)	Number (3)	Percent (4)
Less than 15	4	1.6	2 551	2.8
15-24	72	28.7	18 865	20.8
25-44	105	41.8	42 817	47.1
45-64	68	27.1	21 414	23.6
65-74	0	0.0	3 644	4.0
75 and over	2	0.8	1 489	1.6
Age not declared	-	-	42	0.1
All ages	251	100.0	90 822	100.0

Sources: Goulmima survey.
(<u>Recensement</u> 1960, II), p. 459.

The mean age is 34 years, with minimum and maximum of 12 and 85, respectively. Compared to the rural male labor force in the province of Ksar-Es-Souk (columns 3 and 4) it appears that the P.N. labor force is slightly younger: 72.1 per cent are below the age of 45 and 99.2 per cent below 65 as opposed to 70.7 per cent and 94.3 per cent, respectively, for the larger labor force. Of all 251 workers, 188 are married and 63 are not. Among the 74.9 per cent that are married the mean number of children was 3.4, with the following distribution:

0	child :	21
1-2	children:	50
3-4	children:	61
5-6	children:	40
7 and more	children:	16

(The highest number of children reported was 11.) This implies that the mean number of persons per family (as distinct from the household) among the P.N. labor force is 5.4. Another survey shows the corresponding figure to be 4.3 for the rural population in the Tafilalt region,[1] which includes Goulmima. Thus it would appear that Promotion Nationale tends to

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[1](Mennesson, 1965).

attract people with families larger than average which, as it turns out, are also poorer than average. This fact is very relevant to the question of whether or not Promotion Nationale is a vehicle for income transfer, which is taken up in the next section.

This chapter examines the impact of Promotion Nationale on income (Section I) and on employment (Section II). Section III attempts to determine the level of popular participation in the selection of projects and in the enjoyment of benefits therefrom.

I. Impact on Income

A. The Remuneration System

The distinguishing feature of food for work programs is that their workers are paid partially or wholly in foodstuffs. P.N. "workers" can be grouped into four different categories. The unskilled workers constitute the great majority. A second group is constituted by animals, or more precisely, workers who bring their animals--especially mules--to carry rocks, water, etc. A third group is made up of the skilled workers who, on P.N. projects, are almost exclusively masons. The supervisory personnel constitute the last category. They include the supervisor (surveillant des travaux), the foreman (caporal), the supervisor-trainee, and the timekeeper. Their respective remunerations before 1970 and starting in 1970 are shown on Table 4.2.[1] Thus under Morocco's Promotion Nationale, up to 1970 the

Table 4.2 - The Remuneration of P.N. Workers
(in dirham equivalent per day)

Worker Categories	Prior to 1970			1970		
	Payment in kind (1)	Payment in cash (2)	TOTAL (3)	Payment in kind (4)	Payment in cash (5)	TOTAL (6)
Unskilled worker	2.00	2.00	4.00	1.60	2.40	4.00
Worker with animal	4.00	2.00	6.00	3.60	2.40	6.00
Masons	-	8.00	8.00	-	8.00	8.00
Supervisor	-	8.00	8.00	-	8.00	8.00
Corporal, supervisor-trainee, timekeeper	2.00	4.00	6.00	1.60	4.40	6.00

Sources: (1)-(3): (P.N. au Maroc, 1964), (P.N. Bilan, 1961 through 1969),
(P.N.: Trois Années, 1964).

(4)-(6): (P.N. Aide-Mémoire, 1970).

[1]There exists another member of the supervisory staff who does not appear on Table 4.2: the worksite leader (chef de chantier). The reason is that

great majority of the unskilled workers receive half their wage in cash
and half in kind, while the supervisory and skilled workers are generally
paid all in cash.

On the basis of consumer theory alone, one would assume that a ra-
tional consumer would always wish to receive all cash (as opposed to part
in cash and part in kind) in all circumstances since if he needed the food-
stuffs he could go out and buy them with the cash. Thus one would expect,
and many observers contend, that the P.N. workers would prefer to receive
cash instead of the wheat part of their remuneration. Indeed in many
places the workers do go and sell their sack of wheat on payday, sometimes
only a few yards from where they just got their P.N. payment.

The survey findings in the Goulmima region, shown on Table 4.3, do
not confirm this expectation.[1] Out of 251 workers, only 48 stated that

Table 4.3 - P.N. Workers' Attitude Towards Payment in Kind

Worker Category	"Would you prefer to receive cash instead of wheat?"									
	YES		NO		INDIFFERENT		OTHER[a/]		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Supervisory	4	40.0	3	30.0	2	20.1	1	10.0	10	100.0
Skilled	13	37.1	5	14.3	8	22.9	9	25.7	35	100.0
Unskilled	31	15.0	72	35.0	94	45.6	9	4.4	206	100.0
All	48	19.1	80	31.9	104	41.4	19	7.6	251	100.0

Source: Goulmima survey.
Note: a/ "I am paid all in cash," "It is up to the State to decide."

they would prefer to receive cash instead of the wheat: of these, 17 did
not receive wheat but only cash in the first place! The great majority
either favor the existing system or are indifferent. Does this mean that
they value wheat as much as cash? The evidence would indicate that this
is so.

Twice a month the workers are paid for their twelve days of work:
for the unskilled, DH 24.00 in cash and a 60 kg sack of wheat worth DH 24.00

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he is almost always a full-time employee of the technical service. In the
cases where he is not, he receives DH 13.00 a day, all in cash.

[1]The results obtained here may, however, have been influenced by the cir-
cumstances of the survey--which was conducted either at the supercaïd's
office and/or with the help of his aides as interpreters: see Appendix 2.

in theory. When asked whether they would accept a certain amount of cash
instead of the wheat sack only 20 (7.97 per cent) said they would take
DH 12.00, 21 (8.37 per cent) DH 15.00 or DH 18.00, and 23 (9.16 per cent)
DH 21.00. As for the unskilled workers alone, the corresponding figures
are 3, 3, and 4. This means that 98 per cent of the unskilled workers
value wheat at about the P.N. exchange rate. One may wonder why this would
be so. Are these workers simply behaving in a quite irrational fashion?
This is definitely not the case, as will be seen presently in studying
their spending pattern for the cash part of their wages.

When asked what he spent his cash wages on, the average worker named
three different items. The number of times each item was mentioned and
the corresponding percentage have been grouped in columns (1) and (2) of
Table 4.4. Foodstuffs constitute the largest group by far (over 70 per
cent), out of which wheat and flour represent more than one-fourth. In
view of this it is hardly surprising that the majority of workers see no
particular advantage in being paid all in cash. Their behavior may in
fact be more rational than that of the hypothetical rational consumer pre-
viously referred to. Given the market conditions in his area, at times
Promotion Nationale may represent a cheaper way of acquiring wheat than the
market when transport and other costs are duly taken into account. Thus
one may conclude that while consumers usually prefer cash to payment in
kind, there exist circumstances under which they might prefer payment in
kind to cash. This would be the case, for instance, if the payment in kind
takes a form which falls nicely into their consumption pattern--as wheat
apparently does in this region.

While wheat and flour are important, it is sugar and tea which are
the most popular items. This is hardly surprising in view of the fact that
in Morocco extremely sweet mint tea constitutes the national drink which
is enjoyed at any time of day. This is so true that some families would
skip a meal in order to buy more sugar for the tea. In some cases mint tea
has become an addiction, not unlike alcoholic beverages in other non-Muslim
societies. Together with wheat and flour, sugar and tea constitute more
than half of all items mentioned. This fact may have other ramifications
beyond Promotion Nationale itself.

Clothing also is very popular; it is in fact second only to tea and
sugar. The other items are fairly minor. The main thing which stands out,
however, is that virtually all of the cash wage is consumed. The only form

Table 4.4 - Spending Pattern of P.N. Cash Wages and
Consumption Pattern in the Rural Areas of Morocco

	Consumption of P.N. Cash Wages		General Consumption in Rural Areas Percentage (3)
	Frequency (1)	Percentage (2)	
Foodstuffs of which:	534	70.54	75.90
tea and sugar	(279)	(36.86)	
wheat and flour	(147)	(19.42)	
meat	(42)	(5.55)	
vegetable	(34)	(4.49)	
other$^{a/}$	(32)	(4.23)	
Clothing	175	23.12	8.10
Housing$^{b/}$	10	1.32	5.30
Hygiene$^{c/}$	15	1.98	2.30
Transportation, entertainment, miscellaneous$^{d/}$	23	3.04	8.40
TOTAL	757	100.00	100.00

Sources: (1) and (2):   Goulmima survey;
           (3):   (Consommation 1959-60), p. 129.
Notes: $^{a/}$"Foodstuffs," dates, oil.

   $^{b/}$Rent, kerosene.

   $^{c/}$Soap.

   $^{d/}$School supplies, cigarettes, tobacco, cycle needs, debt repayment, entertainment.

of saving was debt repayment: but it only was mentioned twice out of 757 times!

These findings of the Goulmima survey do not by any means constitute an attempt at estimating the consumption pattern of the rural dweller. But it is interesting to put them side by side with the consumption pattern in rural areas derived by a 1959-60 survey on consumption. This is done in the last column of Table 4.4. Despite the admitted difference in their nature, one cannot help concluding that there exists definitely some family resemblance between columns (2) and (3).

As was briefly mentioned above, the findings here do have larger implications. One of the oft-stated reasons for initiating or continuing a works program is that the wages paid the workers will contribute to a widening of the domestic market, and hence will contribute to the growth of

domestic industries through increased demand. The results shown on Table 4.4 raise doubts about this notion. It is true that all P.N. payments are consumed, thereby expanding the domestic market. But relatively little is spent on domestically manufactured goods, mainly clothing. Thus the market expansion effect is rather small. A potential source of more serious problems, however, is the fact that a large share of the goods demanded are imports. Foremost among them are tea and sugar; and in some years wheat and flour may also have to be brought in from abroad in sizeable quantities.[1]

B. The Regional Redistribution Effects

Among the four aims of Promotion Nationale, two seem to imply an official policy of using it for income transfer, if not from the rich to the poor, at least from the richer (or useful) to the poorer (or marginal) provinces of the country. One statement mentions the improvement of the conditions of living and of production in the disinherited areas, and the social development of their inhabitants. The other says that part of Promotion Nationale's "mission" is to develop the (road) infrastructure of the marginal regions.[2] The question then is: Has Promotion Nationale in fact been successful as a vehicle of income transfer, which it was in part designed to be? The answer will consist of two parts. This one will consider the regional distribution of P.N. activities. The next will study how important Promotion Nationale is in fact in the livelihood of individual workers.

The "marginal" provinces include the border provinces of Oujda, Ksar-Es-Souk, Ouarzazate, Agadir, Tarfaya, and the Rif provinces of Tétouan, Tanger, Nador, and Al Hoceima. The "other" provinces include the Atlantic provinces of Casablanca (now: El Jadida, Khouribga, and Settat), Kénitra, the prefectures of Casablanca and Rabat-Salé, and the central provinces: Taza, Fès, Meknès, Béni-Mellal and Marrakech. Marginal in this case is a euphemism for poor. The marginal provinces are poorer and more crowded than the other provinces.[3] Per capita agricultural income in the former

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[1]In the years 1960 to 1968, tea and sugar accounted for 11.74 per cent of all imports on the average, with a high of 18.65 per cent in 1965 and a low of 7.20 per cent in 1968. For wheat and flour, the corresponding figures are 6.08 per cent, 12.10 per cent in 1967 and 2.55 per cent in 1963. The four items put together average 17.81 per cent over this period. See (Annuaire Statistique, 1960 through 1967) and (Situation Economique, 1968).

[2](P.N. Bilan, 1961-1966), p. 1.

[3]In the following discussion, the province of Tarfaya is not included due

is less than half that in the latter: DH 157.12 vs. DH 326.29.[1] Population-
tion density per square kilometer of arable land is almost three times as
high in the former as in the latter: in 1960 they were 282 and 100; by 1968
the figures had risen to 344 and 125, respectively.[2] A slight reduction in
the ratio of the densities can be perceived between those two years, from
2.82 to 2.75. This may indicate an improvement in the relative position of
the marginal provinces, which can be attributed to different causes. One
possible explanation is that the population in the marginal provinces has
not increased as fast as in the rest of the country either because of a lower
natural growth rate or because of domestic migration from the former region
to the latter. Another is that arable land increased relatively faster in
the marginal region: this may or may not be attributable in part to Promo-
tion Nationale. Or it could be a combination of these two phenomena. Due
to the lack of more detailed information it is not possible to determine at
this point, first, whether the decline in the ratio is significant; and,
secondly, what is causing the decline.

Per capita agricultural income and population density on arable land
(or its inverse) both provide a good measurement of poverty, at least in
Morocco. The two are inversely correlated. In regressing arable land den-
sity on per capita agricultural income, the following equations are obtained:

$$Y = 348.83 - 0.573 \ X_1$$
$$(41.71) \ (0.174) \qquad R^2 = 0.4560$$

$$Y = 352.81 - 0.483 \ X_2$$
$$(42.80) \ (0.147) \qquad R^2 = 0.4546$$

where Y = per capita agricultural income,

X_1 = inhabitants per sq. km. of arable land in 1960,

X_2 = inhabitants per sq. km. of arable land in 1968.

The regression coefficients are significant at better than the 1 per cent level.
This correlation is important for the following discussion to the extent
that even though data on agricultural income must be treated with caution
due to the existence of auto-consommation or subsistence consumption, data
on population and arable area (and hence on arable land density) are usually

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to lack of information. Neither are the two prefectures, partly for lack
of data but mainly because they do not have any rural or agricultural popu-
lation.

[1] See Table 4.5 below. The differences are significant at the 10 per cent
level.

[2] See Table 4.5 below. The differences are significant at better than the
1 per cent level.

more reliable. Thus the following discussion is in terms of both income and density.

In comparing the P.N. effort in the various provinces, it is obvious that one cannot take the raw number of man-days employed in each year. Clearly if one assumes that the rate of underemployment is uniform all over the country, a province with a large population will be able to absorb or produce a greater number of P.N. man-days than one with a smaller population--other things being the same. The number of man-days must therefore be adjusted for differences in population size. One possible deflator would be the rural population. The resulting criterion could be called "P.N. per capita." It would be expressed in terms of P.N. man-days for every rural inhabitant. One unit of "P.N. per capita" would have the following interpretation: each and every inhabitant of the province could have worked on a P.N. project for one day during the year, if each one had wished to do so. For institutional reasons, however, only males can work on P.N. worksites. Thus it appears that a more appropriate deflator would be the rural active male labor force. This is indeed what has been done here: the 1960 "rural active males" is the deflator. The resulting unit will still be loosely called "P.N. per capita" for lack of a better term. Only the words "active male" need be inserted in front of "inhabitant" in the definition given above.

The results of analyses of variance performed on agricultural income, arable land density and P.N. per capita over nine years are reproduced on Table 4.5. From 1961 to 1969, the P.N. per capita in the marginal provinces was, on the average, more than 2.5 times that in the other provinces. In every year, except 1965, the differences are significant; for four out of the nine years they are highly significant. Available data are thus consistent with the proposition that Promotion Nationale has indeed been a vehicle for income transfer from the richer to the poorer provinces. This hypothesis of course assumes that the rate of taxation is no higher in the poorer provinces than in the rest of the country. (Strictly speaking it is only necessary that this rate not be more than 2.5 times higher.) There is every evidence that this is the case, in view of the fact that the peasants in especially poor provinces like Ksar-Es-Souk and Ouarzazate pay insubstantial amounts of--in some cases, no--direct taxes.

Table 4.5 - Analysis of the Regional Distribution of P.N. Activities

	Marginal Provinces	Other Provinces	All Provinces	F-Statistic	Signif-icance Level
1960 per Capita Agricultural Income (DH/Year)	157.12	326.29	236.07	2.812	0.10
1960 Arable Land Density (inhab./ sq. km. arable land)	281.75	99.86	196.87	25.148	0.01
1968 Arable Land Density (inhab./ sq. km. arable land)	343.50	125.43	241.73	29.278	0.01
Promotion Nationale per capita (man-days per rural active male/year)					
1961	9.416	2.657	6.262	79.362	0.01
1962	16.281	5.826	11.402	33.511	0.01
1963	11.506	5.348	8.632	7.638	0.02
1964	14.130	6.583	10.608	6.460	0.02
1965	11.200	6.171	8.853	1.695	-
1966	20.214	8.305	14.656	6.112	0.01
1967	18.131	8.028	13.416	2.909	0.10
1968	20.201	7.731	14.382	6.221	0.02
1969	22.667	6.427	15.088	12.086	0.01
Mean	15.972	6.342	11.478		

Source: See Appendix 3, Tables A3.1 and A3.2.

B. The Effects on Individual Income

The other aspect of the question is to ascertain the importance of P.N. wages in the incomes of the workers. The results of the Goulmima survey show that Promotion Nationale plays an extremely large role in providing a supplement to the workers' incomes, especially their cash incomes. Only 6 out of 251 workers said that they had any other source of cash incomes[1] besides Promotion Nationale. The average cash wage received on

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[1] The question was: "Do you have any other sources of income?" From conversations with persons who have had long experience in this area, it became evident that "income" would be interpreted by the workers to mean "cash income," not including the output of their land which was not sold. This was confirmed in cross-checking the various answers. In particular, even though only 2.39 per cent said that they had any sources of income other than Promotion Nationale, 68.92 per cent reported that they owned some land.

Promotion Nationale is DH 210.16 per year, with the supervisory worker getting DH 1556.00, the skilled worker DH 281.77 and the unskilled worker DH 132.66. These figures must be interpreted in terms of the general economic situation of the worker.

The overwhelming majority of the P.N. workers interviewed are peasants. Their livelihood depends directly on whether they own any land, and if so, how much. Table 4.6 shows the pattern of landownership and income for the P.N. workers. Significantly fewer supervisory workers than other

Table 4.6 - P.N. Cash Wages and Landownership
Among P.N. Workers

Worker Category	Own No Land % (1)	Own Some Land % (2)	Mean Size of Land-holding Moud[a] (3)	Value of Corresponding Output[b] DH (4)	Mean Cash Income from P.N.(DH) (5)	Mean Total Income DH (6)= (4)+(5)	Share of P.N. in Total Income % (7)= (5)/(6)
Supervisory	40.0	60.0	3.300	333.48	1556.00	1889.48	82.35
Skilled	31.2	68.6	1.657	167.45	281.77	449.22	62.72
Unskilled	17.5	82.5	1.563	157.95	132.66	290.61	45.65
All	20.3	79.7	1.647	166.24	210.16	376.40	55.83
F-Ratio	-	3.083	5.815	-	83.704	-	-
Level of Significance	-	0.05	0.01	-	0.01	-	-

Source: Goulmima survey.

Notes: [a] Strictly speaking, a moud is a measure of volume for grains used to indicate the "decalitre" (or 10 litres) which is equivalent to 0.35 cubic feet. It is also used as a measure of area: it then designates the area which can be sown with a "decalitre" or moud of wheat. Clearly this area is not fixed, and varies with the fertility of the soil and with how densely the grains are sown. But, on the average, the moud in the southern Moroccan palm groves is about 0.1 ha or 0.2471 acre.

[b] Valued at DH 1010.55 per hectare (see Table A3.3 in Appendix 3).

workers own land because many of them are full time civil servants or permanent employees of the technical services. (The average size of their holdings is however twice that of the other groups.) Fewer skilled workers than unskilled workers own land probably because they have to spend more time off the land practicing their trade. However it may also be that they originally had to acquire these skills precisely because they did not own enough (or any) land.

The small sizes of the holdings show that it is the poorer inhabitants who tend to work on P.N. projects. If it is assumed that each P.N. worker is the head of a household (close to three-fourths are married; of these 79.8 per cent own land), it comes out that the average P.N. worker household owns about one-fifth of the average household's landholding in the region: 1.645 vs. 8.7 mouds.[1]

Very detailed agricultural engineering studies of this area show that the crop patterns and the yields do not vary too widely from one village or palm grove to the next. The average total yield has been estimated to be DH 1010.55 per hectare.[2] Applying this value to the landholdings and assuming that Promotion Nationale and land are the sole sources of income to the workers, it comes out--as shown on Table 4.6--that the proportion of income derived from Promotion Nationale is inversely related to the size of the landholding. However if the P.N. payments in kind to the unskilled workers are included (by multiplying their cash income by 2) the difference between skilled and unskilled workers is almost nil: 62.724 per cent vs. 62.683 per cent! The important point to be made here is not, however, that supervisory and skilled workers derive a greater proportion of their incomes from Promotion Nationale than do unskilled workers. Rather it is that Promotion Nationale contributes a very sizable share of the incomes of all P.N. workers: 55.9 per cent if only cash is considered, and 63.5 per cent if payment in kind is also included. It is not known what proportion of all households every year have one or more of their members work on Promotion Nationale: but for those that do, Promotion Nationale can in no way be considered to be a marginal factor.

II. Effect on Employment

In 1960, agricultural income per capita in the province of Ksar-Es-Souk was DH 165.00 per year.[3] This would work out to DH 874.50 for the typical P.N. family of 5.3 persons and DH 709.50 for the general average family of 4.3 persons. Assuming an increase of one per cent for agricultural per capita income, the corresponding figures for 1970 are, respectively,

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[1] This figure is derived from data on four neighboring palm groves, presented in Appendix 3, Table A3.3.

[2] See Appendix 3, Table A3.3.

[3] (Plan 1968-1972), Vol. III, p. 20.

DH 965.99 and DH 783.73.[1] The average income from land and Promotion
Nationale estimated here (DH 376.40) is, however, less than half the lower
figure. The findings thus have two possible implications. First, the P.N.
workers are much poorer than average: this is the more likely alternative.
Or, secondly, the households of the workers included in this survey must
have other sources of income besides their land and Promotion Nationale.
Such possibilities would include occasional and temporary work off the
fields for the skilled workers, and working as farm laborers either locally
or in more distant places for the unskilled laborers. This brings us into
the question of employment and underemployment, which is at the core of
the problem at hand.

Attempts at measuring the level of underemployment, as when estimat-
ing the availability of labor to Promotion Nationale, use a group as the
unit. Ultimately, however, underemployment can make sense only at the
level of the individual worker. The survey conducted in Goulmima partially
investigated this question. The main characteristic of the Goulmima survey
is the fact that the sample was made up exclusively of P.N. workers. For
the study of such a large question as underemployment, however, a more ap-
propriate sample would have included members of the rural labor force at
large, or at least of the male labor force. Despite this severe limita-
tion the survey nonetheless yields some interesting results which may pro-
vide clues to the answers to the larger problem.

Almost by definition, the presence of a worker on a P.N. worksite is
proof that he is underemployed or at least he felt that he would earn more
there than elsewhere. Thus it becomes quite relevant to find out whether
the workers have looked for work elsewhere before coming to the P.N. work-
site, and what other activities they would have engaged in had there been
no P.N. worksite.

The results concerning these questions, as well as the length of
time spent on Promotion Nationale, are produced in the next three tables.
The proportion of those who looked for work before coming to the P.N. work-
site is unexpectedly low: 47.4 per cent. It could be attributed to the
socio-economic tasks mentioned by Pascon.[2] This is quite unlikely, however,

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[1] It is interesting to note that the output corresponding to the average
landholding in the cercle of Goulmima (8.7 mouds) falls almost exactly
halfway between these two figures. The halfway point is DH 876.86, while
the output from 0.87 ha is DH 879.18. In this respect the region of
Goulmima is thus quite representative of at least the whole province.

[2] (Pascon, 1966), Part I.

since the survey took place in early June, a time of harvest and not yet of negotiations or festivities. Two other alternative explanatory hypotheses relate to the nature of the labor market in this area. First, given the type of work available, these workers may have felt that Promotion Nationale represented the optimum solution in their effort-minimizing/income-maximizing calculations. To illustrate: the average product per available man-day spent in agriculture in this area has been estimated to be DH 3.66.[1] This is less than the total P.N. earnings of an unskilled worker (DH 2.00 in cash, DH 2.00 in kind), and certainly much less than those of a skilled worker (DH 8.00 in cash). Secondly, there may have been a manifestation of the "discouraged worker" phenomenon: a worker may not have gone out to look for work because he somehow "knew" that the

Table 4.7 - Search for Employment and Length of Time
Spent on Promotion Nationale

	Looked for Work Elsewhere Before Coming to P.N. (%)	Number of Years on P.N. (Years)	Number of 2-Week Periods per Year on P.N. (2-week periods)
By Worker Category			
Supervisory	50.0	6.30	17.400
Skilled	57.1	5.60	6.514
Unskilled	45.6	3.32	4.966
All	47.4	3.76	5.677
F-ratio	0.8046	9.7516	37.9727
Level of Significance	-	0.01	0.01
By Employment Search Category			
Did not look for work	-	3.27	5.06
Looked for work	-	4.29	6.36
F-ratio		5.4354	4.1816
Level of Significance		0.025	0.05

Source: Goulmima survey.

labor market was saturated. In fact the labor market accessible to these workers is very limited. Out of 251 workers, 4 came to work on motorized bicycle (3 of whom were supervisors), 59 on bicycle and all the remaining 188 had to come on foot. The furthest distance travelled by these workers

[1]See Appendix 3, Table A3.3.

--in this case, a mason--from home to work was 30 km (about 19 miles) on bicycle. However the largest employer--and probably one of the very few for masons and unskilled workers in this area--was the Ziz dam construction situated near Ksar-Es-Souk at a distance of over 50 miles. Clearly, short of moving there these workers could not have access to that employment. Thus a hypothesis combining the discouraged worker phenomenon and the at- traction of P.N. money appears to be the one most consistent with the data in explaining the relatively low number of workers who looked for work else- where. In addition, there is the possibility of a voluntary element. Pro- motion Nationale may be what the worker wants, certainly because of the wages but also because the flexibility of the two-week P.N. employment period fits conveniently into the timing of his other occupations. In fact, to the question "Have you looked for work somewhere else before coming to the present worksite?", two or three workers answered that they looked for work elsewhere only when no P.N. worksite was in operation in their area.

Table 4.8 - Frequency Distribution of Length of Work
per Year on Promotion Nationale

Number of Two- Week Periods	Supervisory Workers	Skilled Workers	Unskilled Workers	All Workers
2 or less	1	5	60	66
3 - 5	0	16	92	108
6 - 9	1	10	42	53
10 - 19	1	2	8	11
20 and over	7	2	4	13
Mean (number of periods)	17.400	6.514	4.966	5.677

Source: Goulmima survey.

In order to appreciate the value of P.N. money the workers presum- ably must have had prior experience on P.N. worksites. This is indeed the case. Although there were about 50 beginners the great majority had pre- viously worked on P.N. worksites for periods of up to 10 years--that is, ever since Production Nationale was officially instituted. (Three of the supervisors and two of the masons reported periods in excess of 10 years, probably because they were confusing working for the technical services with working for Promotion Nationale. For them, perhaps, both are "the government.") The average period of work on Promotion Nationale is 3.76 years, with the supervisory and skilled workers indicating significantly

longer periods. This does not mean that for all those years they have
worked continuously and on a full time basis on P.N. worksites. One year
a man may decide to work because his crops failed. The next he may be
more fortunate and not feel as pressing a need. And even if some do work
every year only very few do so on a year-round basis.

The mean working period on Promotion Nationale comes out to about
5.7 two-week periods (almost three months) a year. Again the supervisory
and skilled workers work for very significantly longer periods. (See
Tables 4.7 and 4.8.) The unskilled worker apparently spends 10 weeks a
year on Promotion Nationale--about two and a half months. Can it be con-
cluded that the "rate of underemployment" is about 20 per cent? This is
possible. However this may be an under-estimate due to the fact that in
this area, and probably in other areas still, P.N. employment is rationed.
With very few exceptions, workers--especially unskilled ones--are not per-
mitted to work two successive periods, in order that as many workers as
possible can be reached by Promotion Nationale. Thus the 5 periods must
not be compared to the theoretical 24, but rather to 12. The effect is
to double the rate of underemployment to 40 per cent. This however can
constitute no more than a very rough estimate.[1]

One feature which comes out of the findings shown on Table 4.7 is
that those who do look for employment elsewhere work for Promotion Nationale
more weeks per year than those who do not. This is probably evidence that
even though the workers are not fully satisfied with what Promotion Nationale
has to offer, it still represents the best source of income for them--second
after land only.

What indeed are the alternatives to Promotion Nationale? The find-
ings are shown on Table 4.9, classified according to worker category and
to landownership status. The importance of "work in the fields" is to be
expected. The very fact that almost half mention it is proof that there is
excess labor in agriculture. For at the moment the survey is taken they
are working on Promotion Nationale and not in the fields; thus they prob-
ably feel that their presence on the fields would not add to the output of
the other members of the family. It is interesting to note that almost all

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[1]This 40 per cent estimate is not far from the mean figure of 34.4 per
cent obtained independently from the S.C.E.T. studies. See: Appendix 3,
Table A3.3. (It is reiterated that figures such as these can only be con-
sidered as rough orders of magnitude.)

Table 4.9 - Alternative Activities of P.N. Workers

	"Nothing" (1)	Work in Fields (2)	Work at Home (3)	Trade (4)	Seasonal Emigration (5)	Long-Term Emigration (6)	All Activities (7)
By Worker Category							
Supervisory							
- Frequency	2	3	0	2	3	0	10
- Percentage	20.0	30.0	0.0	20.0	30.0	0.0	100.0
Skilled							
- Frequency	10	7	2	0	16	0	35
- Percentage	28.6	20.0	5.7	0.0	45.7	0.0	100.0
Unskilled							
- Frequency	43	112	5	1	42	3	206
- Percentage	20.9	54.4	2.4	0.5	20.4	1.4	100.0
All							
- Frequency	55	122	7	3	61	3	251
- Percentage	21.9	48.6	2.8	1.2	24.3	1.2	100.0
By Landownership Status							
Own no land							
- Frequency	16	17	1	0	17	0	51
- Percentage	31.4	33.3	2.0	0.0	33.3	0.0	100.0
Own some land							
- Frequency	39	105	6	3	44	3	200
- Percentage	19.5	52.5	3.0	1.5	22.0	1.5	100.0

Source: Goulmima survey.

those that would have worked in the fields (105 out of 122) own land. As previously mentioned, the survey took place during harvest time. Thus this could mean that they hired outside labor to do their harvesting while they worked on Promotion Nationale--a very unlikely proposition in view of the small sizes of their landholdings and of the fact that P.N. wages are almost always lower than the wages he would have to pay harvesters. Or it could mean that other members of the family do the harvest and/or he himself comes back after work to do it or help do it. This last alternative is indeed quite possible--and even probable--for many workers. In this area work on P.N. worksites starts around 6:30-7:00 o'clock in the morning and is usually over by 3:00 o'clock in the afternoon. This leaves them enough daylight to do work in their own fields if they so wish.

Seasonal emigration is the next alternative to P.N. work, with "nothing" coming a close third. Could it be that the proportion of those who

would do "nothing" if they were not on Promotion Nationale provides an indication of the level of open unemployment? Trading and working at home barely need to be mentioned. However, the low frequency of "long-term emigration"--probably to the cities, very rarely abroad--makes one wonder where the oft-talked about rural exodus is coming from. P.N. workers being generally among the less well-off, could this mean that it is those who are fairly well-to-do who are leaving the countryside? Or, alternatively, those who work on Promotion Nationale are less prone to migrate to the cities? This last aspect, if it exists, would be one of the more promising aspects of Promotion Nationale and could bear more detailed studies.[1]

III. Popular Participation

The general impression that one gets in studying the findings presented so far is that Promotion Nationale must certainly be very important for the community, and especially for the workers' families. This, however, does not constitute the whole picture. One can distinguish three stages at which Promotion Nationale affects the people and their feelings towards the whole program. The first one is at the preparatory stage when project selection takes place. Then comes the execution of the program itself. Finally, and probably of greatest importance, is the final stage: what effects does it all have on the worker's livelihood? Virtually everything that has been discussed so far is directly related to the execution stage. It is now proposed to examine the interactions at the other two stages; for they, too, determine how the worker perceives Promotion Nationale, and consequently the extent to which he will cooperate in the whole exercise.

A. The Peasant in the Preparatory Phase

During the preparatory phase, in theory the peasant is to participate in the selection of projects collectively and indirectly through the village or communal council. He can, and in many instances does, present a list of the projects he would most like to see undertaken in his area in the following year. But in the end he has very little influence on what is finally selected. This is due to the form of local administration in

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[1]It must be remembered that the Goulmima survey sample does not include those--if any--who have already emigrated.

Morocco, which is a somewhat uneasy mixture of centralization and decentralization.

On the one hand, the elected communal council and its president in theory possess certain important prerogatives. Very generally speaking, the communal council settles by its deliberations the affairs of the commune.[1] In practice, however, things do not usually work that way. For, on the other hand, there are the local authorities, the caïd, the sheikh and the moqqadem, who are the representatives of the Ministry of the Interior. A certain rivalry seems to exist in many areas of the country between the two parts of this two-headed executive, the council president and the local authority. By the sheer power of the State, the local authorities always come up on top in the solution of any actual or potential conflict.[2]

This situation--which may be described by saying that in Morocco, the farmers are still minor in the legal sense--is recognized by the official use of the words autorité de tutelle (tutelage authority or guardian) to designate the State and its representatives. This minor's status of the local collectivities manifests itself in the selection of P.N. projects where in the end it is the local authorities who, for budgetary or other reasons, decide how many projects and which projects are to be undertaken. Some people contend that such a system tends to produce--and in some cases has produced--the selection of projects which benefit only a few, especially the retired agents of the State. It would thus be interesting to find out how many of the P.N. workers benefit from their work, and how much they benefit.

B. The Distribution of Benefits

In the Goulmima survey, one way to try to get at this question is through the study of land ownership, land distance, and whether or not the land benefits from the work. As in all traditional societies, family ties in Goulmima are very strong. Consequently questions were asked relating not only to the workers themselves but also to their relatives. The projects were all related to irrigation. Therefore the questions--and the

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[1]Dahir of June 23, 1960 (modified and completed by the dahir 1-62-279 of November 9, 1962) cited in (Ben Bachir, 1969), p. 166.

[2]For further discussion see (Ben Bachir, 1969), especially Part II, pp. 111-233; and (Chambergeat, 1965).

Table 4.10 - Landownership and the Distribution of Benefits
Among P.N. Workers and Their Relatives

	Distance from Worksite to Village	SELF				RELATIVES			
		Land Owner (%)	Land Area (moud)	Land Distance (km)	Land Bene- fitting (%)	Land Owner (%)	Land Area (moud)	Land Distance (km)	Land Bene- fitting (%)
By Worker Category									
Supervisory	5.700	60.0	3.300	3.250	40.0	90.0	6.300	4.700	60.0
Skilled	4.723	68.6	1.657	2.914	45.7	57.1	1.914	2.700	37.1
Unskilled	3.912	82.5	1.563	3.527	70.0	69.9	2.233	3.207	56.8
All	4.096	79.7	1.645	3.431	62.9	68.9	2.351	3.196	54.2
F-ratio	2.302	3.083	5.815	0.584	4.165	2.300	8.958	1.184	2.416
Significance	-	0.05	0.01	-	0.05	-	0.01	-	0.10
By Landownership Status									
No Land	4.837	0.0	0.0	0.00	0.0	31.4	1.265	1.882	23.5
Some Land	3.908	100.0	2.065	4.306	79.0	78.5	2.628	3.530	62.0
All	4.096	79.7	1.645	3.431	62.9	68.9	2.351	3.196	54.2
F-ratio	3.480	0.0	91.971	109.395	190.328	50.237	7.894	8.603	26.601
Significance	0.10	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Source: Goulmima survey.

answers--were fairly straightforward. The findings appear in Table 4.10.

Over 60 per cent of all workers feel that their lands benefit directly from the projects they are working on. And, more importantly, a greater proportion of the unskilled than of the other workers feel that way. Furthermore, over half report that their relatives benefit. These facts may be significant in explaining their participation on the worksites. If one adds the proportion of those who benefit directly (62.9 per cent) to the proportion among those who do not benefit but whose relatives benefit (16.1 per cent) then an impressive total of 79.0 per cent does benefit in one way or another, directly or indirectly. (These results must be interpreted with caution, however, for the survey included P.N. workers only and not the entire population.) At least in the Goulmima region, people work on Promotion Nationale partly because they or their relatives benefit from the P.N. projects.

When the results are broken down according to landownership status, certain characteristics of the rural society emerge. To put it very simply, if land be taken as an index of wealth, the poor have poor relatives and the rich have rich relatives. More precisely, those who themselves have land tend very significantly to have relatives who own land; and furthermore these relatives have more land than the relatives of those who do not own land. It is this significant correlation which explains why, of those who own land almost three times as many as of those who do not own land feel that their relatives benefit.

C. The Training Function

Benefits to the land constitute only one aspect of P.N. effects on the workers. There are others which may affect equally how the workers view Promotion Nationale. Among them, one may cite the social overheads, such as better roads, better public buildings, etc. Another aspect relates to training or skill-acquisition.

The term "promotion nationale" means national development, national improvement, national uplifting not only in terms of aggregate physical output of goods and services but also in terms of individual life and inner quality. Thus, by definition, "promotion" in this sense implies that the program is to carry out some training function so that the worker has a better chance to improve his lot. On the type of projects undertaken in the Goulmima region, the only kind of skills that can be taught and acquired

are those of masons. When asked whether or not they had learned any skills on P.N. worksites, only 20 out of the 251 workers (or less than 8 per cent) answered affirmatively. Such a figure is quite low. This is definitely one area where much can be done to improve the performance of Promotion Nationale.

CHAPTER 5

A LINEAR PROGRAMMING MODEL OF AN ECONOMY
WITH A WORKS PROGRAM

The last two chapters have dealt mainly with the micro aspects of
Promotion Nationale, namely individual workers and projects. At this point
the question is whether to consider its macro aspects. More precisely, is
the program large enough to justify a macro approach? On the average, total
expenditures on Promotion Nationale (both in cash and in kind) over the
period 1961-1969 amounted to

> 0.62 per cent of gross domestic product,
>
> 4.57 per cent of gross investment,
>
> 2.35 per cent of budgetary expenditures, and
>
> 10.33 per cent of public investment.[1]

Thus although Promotion Nationale represents a small effort in comparison
with the output of goods and services, it constitutes a fairly significant
undertaking relative to either total investment or public investment. Hence
an attempt at identifying its impact on the economy is both justified and
desirable.

Section I presents the model which is applied to Morocco (1961-1969)
in Section II. Some implications and alternative forms of the model are
discussed in Section III.

I. The Model

The problem is to estimate the aggregate effects of a works program.
The solution offered here is a linear programming model of an economy which
originally has a single sector producing goods and services that are con-
sumed, invested, or exported. The initiation of the works program intro-
duces a second sector whose output cannot be exported but can be consumed
or invested. However only the investable part of this output is of interest
since the consumable part does not satisfy effective demand. The invest-
able (or useful) part can go into investment for the goods and services
sector.

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[1]Sources: see Tables A4.3, A4.5, and A4.7 in Appendix 4.

The model consists of an objective function and a series of constraints. The objective is to maximize a social welfare function. The constraints consist of definitions, behavioral and functional constraints, as well as policy constraints. The variables and the parameters are first defined before the model itself is presented.

A. The Variables

- A = non-food aid actually used.
- A^* = non-food aid available (exogenous).
- C = consumption.
- F = food aid actually used.
- F^* = food aid available (exogenous).
- I = investment into the goods and services sector.
- I_x = investable part of the works program's output.
- W = welfare function.
- X = output of the works program.
- Y = output of the goods and services sector.

B. The Parameters

- a = maximum feasible rate of growth of investment ("absorptive capacity").
- b = maximum proportion of investment which can originate from the works program.
- d = social rate of discount.
- f = ratio of the works program's output over food aid.
- g = ratio of the works program's output over government expenditures.
- i = minimum rate of growth of investment.
- k = marginal capital coefficient (= inverse of the incremental capital-output ratio).
- p = population growth rate.
- q = quality-adjustment factor for the investable part of the works program's output.
- r = average rate of raising domestic resources ("rate of taxation").
- t = time index.
- T = terminal year of the program.
- u = maximum proportion of the works program's output which is investable (u for useful).

C. The Welfare Function and the Constraints

The objective function to be maximized is the sum of the discounted value of consumption in each year during the period under consideration:

$$W = \sum_{t=1}^{T} \frac{C(t)}{(1 + d)^t} .$$

The first constraint is the national income equality, which can be formulated as a definition of consumption. Since there is effective demand only for the investable part of the works program's output, the equality takes the form[1]

(1) $C(t) = Y(t) + A(t) + F(t) + I_x(t) - I(t)$.

This simply states that available resources must match their uses. The availabilities consist of the domestic production of goods and services, the net imports of goods and services (equal to total foreign aid), and the output of the works program that is available for investment. The uses are consumption and investment.

All food aid that is made available should be used, otherwise it becomes a lost resource. In addition more foodstuffs can always be commercially purchased so that

(2) $F(t) \geqq F(t)^*$.

However the sum of food and non-food aid actually used cannot exceed the total amount of aid available:

(3) $A(t) + F(t) \leqq A(t)^* + F(t)^*$.

Relations (2) and (3) together imply that no more non-food aid can be used than is made available. In other words, while non-food aid can be transformed into food aid if necessary, the reverse transformation cannot be accomplished. This reflects the aid situation for most less developed countries.

One of the main reasons (possibly the only one) for instituting a works program is the recognized widespread prevalence of unemployment and/or underemployment. Consequently it is assumed here that labor is in surplus, and capital constitutes the only limitation to output in the goods and services sector:

(4) $Y(t) \leqq Y(t - 1) + k \cdot \dot{I}(t - 1)$,

where k is the capital coefficient. Because of the form of the welfare function and of Equation (1), the model would have a tendency to keep investment low as possible. To avoid this phenomenon, which would produce

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[1]The foreign trade sector has been eliminated from the present model by using the fact that the trade gap must be filled through an inflow of external resources (both food aid and non-food aid). This relation allows the substitution of A(t) plus F(t) for the difference between imports and exports in Equation (1).

unrealistic declines in output, investment in any given year is required
to be at least equal to investment in the previous year. In fact, since
the model refers to a less developed country, it is assumed that one of
the policy goals or constraints is that investment must grow at an annual
rate of at least i:

$$(5) \quad I(t) \geq (1 + i) \cdot I(t - 1) .$$

There exists, however, an upper bound to the increase in investment. This
limitation in absorptive capacity of the economy is expressed by the con-
straint

$$(6) \quad I(t) \leq (1 + a) \cdot I(t - 1)$$

where a is the maximum feasible rate of investment.

On the one hand, the works program must at least use up all food aid
allocated to it:

$$(7) \quad X(t) \geq f \cdot F(t) .$$

This is because food aid is allocated by the donors for specific purposes,
and is not transferable from one use to another. In particular the donors
may insist, for reasons of their own, that at least a given proportion x
of food aid be used to finance the works program. If the payment in kind
accounts for a proportion h of the program's output, then it can be shown
that f is simply equal to the ratio of x over h.

On the other hand, the works program must not exceed the budgetary
expenditures earmarked for it. The cash part of the expenditures on the
works program is financed by the government. The government's expenditures
cannot exceed the sum of resources available to it. These originate from
cash external assistance [A(t)], or from domestic sources. Domestic re-
sources include tax revenues as well as domestic borrowings and treasury
advances (i.e., deficit financing). They depend on the output of goods
and services. The budget constraint on the works program is thus

$$(8) \quad X(t) \leq g \cdot [r \cdot Y(t) + A(t)]$$

where r is the average rate of raising domestic resources (or "rate of tax-
ation"). The government will usually insist that the works program must
not absorb more than a given proportion z of its total expenditures. The
reason is that there always exist competing uses for its resources: some
of these are at least as urgent and/or as productive as the works program.
Given the parameters h (proportion of payment in kind over total expendi-
tures on the works program) and z, it can be shown that g is the ratio of
z over (1 - h).

The present formulation of the "production function" of the works program approximates quite closely the actual procedure. In drawing up a program for the next one or several years, the decision-maker probably has some idea of what the amount of food aid and government expenditures will be. Given these elements and the experience of the past, he can determine what the minimum and maximum output of the works program can be on the basis, respectively, of the food aid and the government expenditures.

The output of the works program consists of a consumable part--such as cleaning the municipal gardens or the streets--for which there is assumed to be no effective (or, at least, monetary) demand, and an investable part. The investable part is determined by two factors. First, it depends on the proportion u of the output which can be considered to add to the productive capacity, such as the building of irrigation networks. Secondly, one must also take into account the possibility that the same work may not be as good when accomplished under the labor mobilization program as it would be under a private contractor. This can be due to several reasons, such as less thorough project preparation, less skilled technical supervision, use of labor intensive techniques where capital intensive ones would be more appropriate, etc. Consequently, a quality adjustment factor q must be introduced. This factor could be equal to 1 if it is deemed that there is no difference in work quality between the works program and private contractors; otherwise it is less than 1. Thus the following constraint prevails on the supply side of investable output of the works program:

$$(9) \quad I_x(t) \leqq q(t)u(t) \cdot X(t) .$$

On the demand side there exists also a limitation on the amount of investable output of the works program which can be effectively absorbed by the economy:

$$(10) \quad I_x(t) \leqq b \cdot I(t) .$$

This merely states that only a certain (maximum) proportion b of the investment into the goods and services sector can originate from the labor intensive works program method. To take the extreme case, it is clearly not possible for all investment goods to come from the works program. Assuming, for example, that the program builds all the necessary roads, irrigation canals and dams, the economy would still need generators and other types of machinery which the works program could not produce.

It is assumed in the model that it is politically infeasible to allow declines in per capita consumption. This policy constraint can be formulated

thus:

(11) $C(t) \geqq (1 + p) \cdot C(t - 1)$,

where p is the annual population growth rate.

Finally, the model contains the usual non-negativity constraints on the variables: $A(t)$, $A(t)^*$, $C(t)$, $F(t)$, $F(t)^*$, $I(t)$, $I_x(t)$, $X(t)$, and $Y(t)$ must all be greater than or equal to zero.

This completes the specification of the model. For convenience, it is presented in summary form in Table 5.1. The model consists in fact of

Table 5.1 - The Linear Programming Model of An Economy
With a Works Program: Summary

$$\text{Maximize } W = \sum_{t=1}^{T} \frac{C(t)}{(1 + d)^t}$$

subject to the following constraints:

Constraint No:	Constraint
Sub-Model I: **The Goods and** **Services Sector**	
1	$C(t) = Y(t) + I_x(t) + A(t) + F(t) - I(t)$
2	$F(t) \geqq F(t)^*$
3	$A(t) + F(t) \leqq A(t)^* + F(t)^*$
4	$Y(t) \leqq Y(t - 1) + k \cdot I(t - 1)$
5	$I(t) \geqq (1 + i) \cdot I(t - 1)$
6	$I(t) \leqq (1 + a) \cdot I(t - 1)$
11	$C(t) \geqq (1 + p) \cdot C(t - 1)$
Sub-Model II: **The Works Program**	
7	$X(t) \geqq f \cdot F(t)$
8	$X(t) \leqq g \cdot [rY(t) + A(t)]$
9	$I_x(t) \leqq q(t)u(t) \cdot X(t)$
10	$I_x(t) \leqq b \cdot I(t)$
	$A(t)$, $C(t)$, $F(t)$, $I(t)$, $I_x(t)$, $X(t)$, $Y(t) \geqq 0$

two sub-models: one for the goods and services sector (constraints 1-6, 11), the other for the works program (constraints 7-10). The two are connected by the appearance of $I_x(t)$ in equation (1), and of $Y(t)$ and $I(t)$ in relations (8) and (10), respectively.

At this point, a few comments are offered. First, the formulation of the national income equality in equation (1) specifies the fact that,

other things the same, the higher the investable part of the works program's output, the higher total investment in the economy. This brings out the importance of the usefulness factor and quality adjustment factor on the one hand, and of food aid [through relations (2) and (7)] and of non-food aid [through relations (3) and (8)] on the other hand. In theory, there is general agreement that a labor mobilization program or works program --and, through it, foreign aid in cash as well as in foodstuffs--can actively contribute to capital formation. As one of its achievements, the present model makes it possible to establish not only whether--or the conditions under which--but also how much such a program adds to investment.

Secondly, even though the model is supposed to simulate the effects of a labor mobilization program, labor does not appear anywhere in its present formulation. This is because, by assumption, labor is in surplus and, at least in the foreseeable future, will not represent an upper limit to output. A lower limit on employment could, however, be introduced. Suppose, for instance, the government has decided that employment either in absolute or in percentage terms must be above a certain level. This situation could be reflected in the model by introducing an additional policy constraint, such as

$$v\, Y(t) + v_x X(t) \geqq (1 - j) \cdot L(0)e^{nt}$$

where j is the minimum acceptable rate of unemployment, n the growth rate of the labor force, v and v_x are the labor coefficients, and $L(0)$ the labor force in the base year (the year before the program). Although the problems of measuring underemployment and making it comparable to straight unemployment are quite sizable,[1] they are not insurmountable. With the proper set of conventions, the labor coefficients can be estimated and the constraint introduced.

II. Application to Morocco: 1961-1969

In order to apply the model to a specific case, as we now propose to do, it is necessary to estimate the various parameters and establish certain initial values as well as the values of the exogenous variables. The data used in obtaining these different magnitudes are reproduced in Appendix 4.

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[1]See Chapter 1.

A. Parameters, Foreign Aid, and Initial Values

For reasons already discussed in a previous part of this study, it is estimated that the minimum appropriate discount rate in Morocco is

$$d = 0.10$$

which is the value used here.

The capital coefficient k has been estimated on the basis of the 1960-1964 Plan and the actual experience in 1951-1954. The 1960-1964 Plan projected an increase in value added of 2870 (in million of dirhams) from 1960 to 1965[1] for a total investment of 5447 in the period 1960-1964.[2] The capital coefficient used in the Plan was thus 0.52. This, however, appears to be too high in the light of past experience. Since the period just before and just after Moroccan independence in 1956 was marked by large outflows of capital and uncharacteristically low levels of investment, only the years 1951-1954 should be considered. In that period value added increased by 79.6 (in billions of dirhams at 1951 prices), while total investment amounted to 243.6 from 1951 to 1953.[3] The actual capital coefficient was thus 0.32. The value used in the model is the average of the 1960-1964 Plan figure and the one actually experienced in the early 1950's, namely

$$k = 0.42 .$$

Similarly, the minimum growth rate of investment i was determined on the basis of the Plan value and an actual value. Gross investment (in millions of constant dirhams) was planned to increase from 1219 in 1961[4] to 3010 in 1970,[5] which represents an annual growth rate of 10.5 per cent. Between 1956 and 1960[6] actual investment rose from 756 to 911 when properly deflated (in terms of 1958-59 prices)--a growth rate of 4.7 per cent. Thus the figure used here is

$$i = 0.076 .$$

The coefficient of absorptive capacity a was estimated solely on the basis of actual observations. When expressed in constant prices, net investment rose by over 15 per cent between 1951 and 1952,[7] and by over 20

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[1](Développement Industriel 1960-1964), p. 33.

[2](Développement Industriel 1960-1964), p. 2.

[3]These figures are derived from Table A4.1 in Appendix 4.

[4](Développement Industriel 1960-1964), p. 34.

[5](Développement Industriel 1960-1964), p. 41.

[6](Annuaire Statistique 1960), p. 340.

[7]See Appendix 4, Table A4.1.

per cent from 1960 to 1961.[1] Thus the maximum possible growth rate of investment is assumed to be

$$a = 0.20 .$$

In establishing the values of f and g, the output of the works program is defined to be equal in value to total expenditures on it (both in cash and in kind); and government expenditures is the sum of current (including debt service) and investment expenditures. Thus

$$f = \frac{\text{output of the works program (DH)}}{\text{food aid (DH)}} ,$$

$$g = \frac{\text{output of the works program (DH)}}{\text{government expenditures (DH)}} .$$

For year 1, f and g are set equal to the observed values of these ratios. For years 2 through 9, these values are multiplied by 2 because Promotion Nationale existed for only half the first year. They are assumed to be, respectively, the minimum ratio of the works program's output over food aid and the maximum ratio of the works program's output over government expenditures:

$$f = 0.22 \quad \text{for } t = 1 ,$$
$$f = 0.45 \quad \text{for } t \neq 1$$

(the difference between 0.45 and 0.22 x 2 being due to rounding); and

$$g = 0.016 \quad \text{for } t - 1 ,$$
$$g = 0.032 \quad \text{for } t \neq 1 .$$

The P.N. program is divided along two lines.[2] On the one hand, projects are classified into three categories according to their nature: mise en valeur (or land improvement), infrastructure, and equipment. It is assumed--and, admittedly, this is quite arbitrary--that only the first two constitute useful or productive projects. Hence

$$u = \frac{\text{mise en valeur + infrastructure (man-days)}}{\text{total Promotion Nationale (man-days)}} .$$

On the other hand, the projects fall under Part I or Part II depending on whether they are administered by a technical service or the local authorities. There is some evidence that, for various reasons discussed earlier, projects under Part I are better done than those under Part II. In many cases they are even reported to be of a quality comparable to those done by private contractors or to regular projects of the technical services.

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[1] See Appendix 4, Tables A4.3 and A4.4.

[2] See Chapter 3 for more details.

Consequently the quality adjustment factor is estimated on the basis of the assumption that Part I projects are as good as privately done projects, and Part II projects are only half as good, that is,

$$q = \frac{\text{Part I}}{\text{Total P.N.}} + 0.5 \frac{(\text{Total P.N. - Part I})}{\text{Total P.N.}} ,$$

$$q = 0.5 \left(1 + \frac{\text{Part I}}{\text{Total P.N.}} \frac{\text{(man-days)}}{\text{(man-days)}}\right) .$$

The investable coefficient is the product of q and u. It is higher with a higher proportion of mise en valeur and infrastructure projects, and with a greater share of the P.N. program administered by the technical services. A 1960 observer endowed with perfect foresight would have been able to forecast the actual values of q·u in 1961 and 1969. The values used in the model are computed on the assumption that the coefficient grew in linear fashion from the value

$$q \cdot u = 0.415$$

actually observed in 1961 to the value

$$q \cdot u = 0.600$$

actually observed in 1969.[1]

The maximum proportion b of investment which can originate from the works program can only be roughly estimated. The value used here was chosen as

$$b = 0.05 .$$

This appears to be a reasonably low figure.

The population is assumed to grow at an annual rate of

$$p = 0.025$$

on the basis of the figure used in the 1960-1964 Plan.[2]

From observed values in 1957-1960, the average propensity to raise domestic resources ("rate of taxation") has been estimated to be[3]

$$r = 0.23 .$$

The (exogenous) available foreign aid figures are taken to be equal to the observed values. Total foreign aid is obtained from O.E.C.D. publications. Food aid--which, for the present study, is assumed to come exclusively from U.S. P.L. 480--is obtained from a U.S.A.I.D. source. The values of (A* + F*), F*, and A* are shown in Appendix 4, Table A4.5.

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[1]See Appendix 4, Table A4.7.

[2](Plan 1960-1964), p. 7.

[3]This figure is derived from Table A4.2 in Appendix 4.

In addition to the various parameters and the availability (and composition) of foreign aid, initial values are needed in order for the model to start at the appropriate level. They are taken as the values observed in 1960:[1]

$$Y(0) = 8200 \, ,$$
$$I(0) = 520 \, ,$$
$$C(0) = 7880 \, .$$

It must be noted that consumption in this model includes not only consumption in the usual sense but also depreciation and changes in inventories. This is necessary for internal consistency of the data since investment is defined as net investment.

B. The Optimal Solution: Morocco, 1961-1969

1. General performance. The variable values and the shadow prices in the optimal solution are on Table 5.2 and Table 5.3, respectively. Overall the model performs remarkably well in retracing the evolution of the 1960's. Except in the first year (and for reasons discussed later), all foreign aid available is used up. The model values of the other variables are, on the average, higher than the observed values. Ignoring off-setting errors, the mean divergences between observed and model values[2] for the different values are:

Consumption C: 3.8 per cent,

Gross domestic product Y: 3.6 per cent,

Net investment I: 13.4 per cent, and

Works program's output X: 30.5 per cent.

The differences between model and observed values originate from various sources. First, the model yields optimal values. The actual observations may be feasible in terms of the present model, but they are not necessarily optimal. And even if they were optimal in terms of some other

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[1]See Appendix 4, Table A4.3.

[2]The error criterion used is

$$\frac{\sum\limits_{t=1}^{9} \dfrac{\left| V^a(t) - V^m(t) \right|}{V^a(t)}}{9}$$

where V^a = actual value of variable V,
V^m = model value of variable V.

Table 5.2 - Actual and Model Values of Variables
in the Optimal Solution: Morocco, 1961-1969
(in millions of dirhams at 1960 prices)

	C^a (1)	C^m (2)	Y^a (3)	Y^m (4)	I^a (5)	I^m (6)	I_x^m (7)
1961	7 738	8 133	7 936	8 418	631	625	0
1962	8 697	8 337	8 924	8 681	676	750	31
1963	8 950	8 562	9 399	8 996	847	900	35
1964	8 845	8 888	9 474	9 374	764	968	38
1965	8 921	9 253	9 696	9 780	783	1 042	43
1966	8 875	9 530	9 469	10 218	860	1 121	44
1967	9 483	9 780	10 125	10 689	1 162	1 206	45
1968	10 671	10 409	11 345	11 195	1 206	1 298	53
1969	10 470	10 847	11 383	11 741	1 326	1 397	58

	X^a (8)	X^m (9)	A^a (10)	A^m (11)	F^a (12)	F^m (13)
1961	34	34	400	186	152	154
1962	64	71	226	226	149	149
1963	52	76	301	301	131	131
1964	54	79	299	299	146	146
1965	47	85	412	412	60	60
1966	79	84	267	267	122	122
1967	76	82	96	96	156	156
1968	70	93	323	323	135	135
1969	67	96	300	300	145	145

Source: The actual values are computed from the data contained in
Appendix 4.

Notes: 1. The values are rounded to the nearest unit.
2. Superscripts: a = actual (observed) unit.
m = model values.
3. Consumption figures include depreciation allowances and
changes in inventories. Investment figures are net of
depreciation. For depreciation, see Table A4.4.

system, the actual welfare function probably differs from the one used
here.

Second, the model does not take into account the cyclical and other
variations (due mainly to weather factors) in the output Y, especially in
the agricultural sector.

Third, the model produces net investment much higher than the ob-
served values. This is attributable to a high absorptive capacity coeffi-
cient which allowed investment to grow at a rapid pace in the first three
years. It is also due in large part to the minimum required growth rate
of investment, which was fairly high.

Table 5.3 - Shadow Prices in the Optimal Solution:
Morocco, 1961-1969

Year	National Income Equality (1)a/	Food Aid Utilization Constraint (2)	Total Foreign Aid Constraint (3)	Productive Capacity Constraint (4)	Minimum Growth of Investment Constraint (5)	Absorptive Capacity Constraint (6)
1961	0.0b/	b/		5.75679		2.52467
1962	1.71283	.02401	1.73684	5.75679		.08901
1963	.75100	.01108	.76208	4.03844		.08808
1964	.68300	.01058	.69358	3.28489	.50239	
1965	.62100	.01008	.63108	2.59946	.84680	
1966	.56400	.00957	.57357	1.97614	.98121	
1967	.51300	.00908	.52208	1.40994	.93809	
1968	.46700	.00861	.47561	.89485	.74436	
1969	.42400	.00814	.43214	.42587	.42400	

Year		Food Aid Constraint on Works Program (7)	Budget Constraint on Works Program (8)	Supply Constraint on Investable X (9)	Absorption Constraint on Investable X (10)	Minimum Growth of Consumption Constraint (11)
1961		0.0	0.0			
1962			.75022	1.71283		.88683
1963			.34621	.75100		
1964			.33057	.68300		
1965			.31485	.62100		
1966			.29892	.56400		
1967			.28369	.51300		
1968			.26899	.46700		
1969			.25440	.42400		

Notes: a/ The column number corresponds to the constraint number in the model.

b/ Blanks are associated with basic variables, i.e., constraints that are not effective or binding.

0.0 indicates that the activity is part of an alternate optimum.

Fourth, the relatively large errors in the model values of X is caused by an over-optimistic view of how much of its resources the government was willing to put into the works program, i.e., the g coefficient (ratio of X over government expenditures) must have been chosen too high. This is in fact confirmed by computing the actual ratio of X over government expenditures. This figure approaches 0.032 (the value used in this application)

only in 1962, 1966 and 1967.[1] In the other years it remains in the neighborhood of 0.020. This means that in reality the government allocated to the works program a much smaller share of its resources than the model--on the basis of the first year's experience--assumed it would do.

Finally, the g coefficient also explains why the model values of X experienced a decline from 1965 to 1967. The cause is the drastic fall in available non-food aid which occurred in that period: this affects the output of the works program X through the budget constraint (8).

2. The first year. An analysis of the variable values and of the shadow prices yields much insight into the workings of the model. A notable feature arises in connection with the first year. It is the apparent inability or unwillingness of the model to use all available resources. In particular, foreign aid is not used up. This appears to go against the intuitive notion that, surely, all foreign aid can always be channeled into consumption. Although irrational at first sight, this behavior is in fact quite optimal in terms of the model. In brief, the whole trouble arises from requiring a minimum growth of consumption in each and every year (constraint 11). If consumption in year 1 is allowed to rise above a certain level (in this case: 8133), the increase in productive capacity in that year will not make it possible to produce a p (= 2.5) per cent increase in year 2's consumption.

Since the resources available for consumption are already not fully utilized, it is evident that making one more unit of, say, foreign aid available would not change the optimum. The shadow price here is zero. In fact it is possible that in some cases the shadow price be negative. Such results have actually been achieved in earlier versions of the model. Under those situations, making one more unit of resources available is positively harmful. To give a specific example, "forcing" the economy to consume one more unit of food aid under such circumstances makes it so hard to satisfy the requirement for a minimum growth of consumption that the economy is willing to pay somebody a positive amount to throw away that extra unit!

In more general terms, there may be cases where food aid is so counterproductive (in terms of the social welfare function) that the intended recipient country would be willing to pay the donor country in order to reduce

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[1]The errors in X for those three years average to only 8.4 per cent, as opposed to 30.5 per cent for the entire period 1961-1969. Thus g is indeed the crucial element here.

the food aid, or at least not to force any more of it into the recipient country. This payment would be in the form of a reduction in the total volume of aid. This phenomenon must account in a large part for the fact that each unit of commodity aid is valued by the recipient country at only a fraction of the nominal value.

3. Pattern of investment. The requirement for a minimum growth of consumption also explains the pattern of investment. In the first three years, investment grows at the maximum possible rate. This is in order to build up enough productive capacity so that consumption can grow at the rate p. In the later years, the need is no longer so pressing. The accumulated productive capacity is enough to satisfy the requirement. Consequently, investment grows only at the minimum acceptable rate.

The pattern of investment is quite sensitive to the discount rate, at least in the range from 10 to 20 per cent. At 10 per cent, investment in year 2 is at its maximum (750) and therefore consumption at a minimum (8337). Since investment and consumption represent the only uses of resources, and since they are alternatives to each other, in any given year the only way to increase one is to reduce the other. On an intuitive basis it is obvious that, given the formulation of the social welfare function, the higher the discount rate the more the model will value consumption in earlier years. Consequently, the higher d the more it will try to increase early year consumption. This is confirmed by trying different values of d. At d = .15, investment in year 2 is reduced to 692 and consumption rises correspondingly to 8395 (which is reflected in a higher value for year 1 also: 8190). For d = .20, the respective figures are 673, 8414 (and 8209). Given the requirement for a minimum growth in investment, 673 is the lowest possible value. Thus d = .10 yields the lowest possible value of consumption (or highest value of investment) for year 2, and hence for year 1 as well; and d = .20 yields the highest. Since the constraints on absorptive capacity and on minimum growth of investment cannot be violated it is evident, first, that any discount rate below 10 per cent will not change the optimal variable values obtained from d = .10. And, secondly, any discount rate above 20 per cent will not change the optimal variable values obtained from d = .20. In general terms, compared with d = .10 or less, d = .15 or .20 or higher are associated with consumption values that are higher in the first four years and lower in the last five years for the period 1961-1969.

In considering the pattern of investment and consumption, the main conclusion is that the only way to increase consumption in a given year is to reduce investment in that year--with the limits imposed by the constraints on absorptive capacity and minimum growth of investment. Whether it is optimal to reduce investment in this fashion depends on the social rate of discount: the higher this rate, the more profitable (in terms of the social welfare function) such reductions become. It is in fact conceivable that for high enough discount rates it would become optimal to reduce investment to very low levels, possibly to zero. This is precisely the reason why the model contains a requirement for a minimum growth of investment.

4. Value of foreign aid and national income equality. After year 1, the shadow price associated with the national income equality (column 1, Table 5.3) is simply $1/(1 + d)^t$. Each unit of resource available for consumption is valued at its contribution to welfare, which is equal to the coefficient associated with it in the objective function. The only exception arises in year 2 where the shadow price is

$$1.71283 = 1/(1 + d)^2 + 0.88683.$$

This is because each additional unit made available in that year not only increases the welfare function by 0.826 in year 2 but also raises consumption in future years by an amount valued at 0.88683 (the shadow price of constraint 11). In terms of the model, the value of the shadow price associated with the national income equality is

$$\frac{dW}{dC(t)} = \frac{dW}{dRHS(t)} = \frac{1}{(1 + d)^t},$$

where RHS is the right hand side of equation (1).

The contribution of food aid and non-food aid to the social welfare function can be determined. Each additional unit of non-food aid contributes that unit--properly discounted--to consumption, directly through the national income equality; and indirectly, through the government budget, it adds $g \cdot qu$ --properly discounted. Except for year 1 when foreign aid is in surplus, the total contribution of cash aid in year t is therefore

$$\frac{1}{(1 + d)^t} (1 + g \cdot qu)$$

which is simply $dW/dA(t)$. It can be checked that this expression corresponds to column (3) in Table 5.3, where 0.88693 must be added in year 2 for reasons already discussed. Thus column (3) represents the value or shadow price of

non-food aid to the economy.

Each additional unit of food aid also contributes directly to consumption an amount equal to $1/(1 + d)^t$. However, given that available total foreign aid is fixed in any year, one more unit of food aid used means one less unit of non-food aid (by relations 2 and 3). Consequently a unit increase in food aid actually used beyond the amount of food aid available has two effects. On the one hand it raises consumption by $1/(1 + d)^t$. But, on the other, it occasions a reduction in cash aid which, through the government budget (constraint 8), implies a reduction of g·qu in the social welfare function. The net effect of substituting a unit of food aid for cash aid is thus a reduction in the social welfare function in the amount of

$$\frac{1}{(1 + d)^t} \ (g \cdot qu)$$

which is equal to $-dW/dF(t)$. Column 2 of Table 5.3 is this discounted value of g·qu. It can be interpreted in two different ways. First, it shows the loss in social welfare resulting from using one unit of cash aid to purchase foodstuffs above the amount of food aid available. Secondly, it represents the gain that could be derived if, given the total amount of foreign aid, one unit of food aid could be exchanged for a unit of non-food aid.

This aspect of the model supports a notion that one would hold on the basis of a priori reasoning, namely that food aid is less productive or useful than non-food aid. This is because commodity aid represents the extreme form of aid tying, and aid tying always reduces the true value (as opposed to the nominal value) of aid to the recipient country--except in the unlikely case where the recipient country would have imported, at the same cost and in the same amount, precisely the commodity to which aid is tied.

In considering constraints 1 (national income equality), 2 (food aid utilization constraint), 8 (budget constraint on works program), and 9 (supply constraint on investable X) some relationships emerge which throw additional light on the nature of the difference between food and non-food aid. Let s.p.(c) stand for the shadow prices corresponding to constraint c. Since the food aid constraint on the works program and the absorption constraint on investable X are not effective in the present solution, the following equalities can be observed. First,

$$s.p.(1) = s.p.(9).$$

This is because according to the national income equality, each additional unit of $I_x(t)$ increases $C(t)$ by one unit--other things the same. Secondly,

$$s.p.(2) = g \cdot [s.p.(8)] .$$

In words the difference in the value of food aid and non-food aid is equal to the value of X as represented by s.p.(8), multiplied by g--the ratio of X over government expenditures, which provides an indication of government resources used in the works program. Thirdly, however, X itself is only valued because it contributes to I_x, which is associated with column (9). This explains why

$$s.p.(8) = q(t)u(t) \cdot [s.p.(9)] ,$$

and ultimately

$$s.p.(2) = g \cdot q(t)u(t) \cdot [s.p.(9)] .$$

5. <u>Productive capacity and works program</u>. Constraint (4)--the productive capacity constraint--represents the crucial element for determining the true role of a works program in the process of capital formation. The first noteworthy characteristic is that the economy works at full capacity every year. The productive capacity constraint is always effective; or, alternatively, all available productive capacity is fully used. The shadow prices associated with the productive capacity constraint (column 4, Table 5.3) reveal a very interesting relationship with various parameters of the model, except for year 1 which presents certain problems already discussed. For each year $y = 2$ to 9, the shadow price is

$$s.p.(4) = \sum_{t=y}^{9} \frac{1}{(1 + d)^t} \cdot (1 + r \cdot g \cdot q(t)u(t)).$$

(For year 2, when the requirement for a minimum growth in consumption is effective, the shadow value of 0.88683 must be added to the term $1/(1 + d)^t$.)

This pattern has the following--very logical--explanation. An additional unit of productive capacity in year t is represented by a unit increase in the magnitude $[Y(t - 1) + k \cdot I(t - 1)]$. Each unit increase in the productive capacity in year t has the following effects. First, it contributes one unit to $C(t)$, which enters into the welfare function with the proper discount rate, i.e. $1/(1 + d)^t$. Secondly, since the model does not have any physical deterioration or obsolescence working on the productive capacity, this same unit also contributes to consumption in subsequent years. The sum of these two direct effects is

$$\sum_{t=y}^{9} \frac{1}{(1 + d)^t} .$$

Thirdly, indirect effects of this increase in productive capacity are felt through the investable output of the works program. A unit increase in

productive capacity raises government resources by r--the average rate of raising domestic resources. This allows the works program output to increase by r·g since the budget represents the effective constraint on X. In turn, since the supply constraint on investable X prevails, this occasions a rise of r·g·q(t)u(t) units in I_x. Fourthly, a similar increase in investable X is felt in every succeeding year. The sum of these two indirect effects, when properly discounted, is

$$\sum_{t=y}^{9} \frac{1}{(1 + d)^t} (r \cdot g \cdot q(t)u(t)) .$$

These four direct and indirect effects of the increase in productive capacity--which represents dW/dY(t)--produce the shadow prices associated with constraint (4).

It is evident from the foregoing analysis that the works program performs a very specific function, namely that of introducing a feedback from the productive capacity to itself. The extent of this feedback can be quantified in the present case by separating the direct and indirect effects, as is done in Table 5.4. Although the relative share of the indirect effects remains very small, it is definitely growing from year 2 to year 9, because of increases in the coefficient of investable X. This latter aspect is most intriguing.

Table 5.4 - Direct and Indirect Effects of Changes
in Productive Capacity: Morocco, 1961-1969

Year	Marginal Value of Productive Capacity (1)	Value of Direct Variation (2)	Value of Indirect Variation (3)	Relative Share of Indirect Variation (4)
1961	5.75679	5.75800	-	-
1962	5.75679	5.73583[a/]	0.02096	0.00364
1963	4.03844	4.02300	0.01544	0.00382
1964	3.28489	3.27200	0.01289	0.00392
1965	2.59946	2.58900	0.01046	0.00402
1966	1.97614	1.96800	0.00814	0.00412
1967	1.40994	1.40400	0.00594	0.00421
1968	0.89485	0.89100	0.00385	0.00430
1969	0.42585	0.42400	0.00185	0.00434

Sources: (1) = shadow prices of the productive capacity constraint.
(2) and (3): see text.
(4) = (3)/(1).

Note: [a/] 4.84900 + 0.86683 = 5.73583.

Thus the works program contributes to capital formation in two ways. The first one--the one that is usually discussed, and analyzed briefly below--is through I_x adding directly to I. There exists, however, a second way which has been neglected so far in the literature: it may be called the feedback effect. Through the intermediary of the government budget the works program permits an additional unit of investment--whether originating from the works program or from other sources--to add more to productive capacity than that unit alone. In a manner of speaking, the works program acts as a savings bank which rewards the economy for each unit of investment by paying interest or dividend on it. This feedback effect, though small, constitutes an important aspect of works programs.

As for the direct contribution of the works program to capital formation through I_x, it can also be estimated. In the period 1962-1969, the average yearly contribution amounted to 4.00 per cent if one compares I_x with the model values of I; and 4.62 per cent if one compares it with the actually observed I (see Table 5.2).

III. The Model and Beyond

A. Some Implications of the Model

1. The optimal works program. Trying to judge reality on the basis of any kind of model is an exercise subject to a high probability of error. For one thing, a model cannot include all the constraints that are operative in the real world. For another, the actual welfare function--if there is one, implicit or explicit--is rarely the same as the model's maximand. Thus in comparing actual performance in the period 1961-1969 with the model results for, say, the works program (columns 8 and 9, Table 5.2) it would be foolhardy to state, without adequate qualifications, that the actual X was below the optimal.

Under the present model, the best works program would be one which produced as much investable output as the economy can absorb, i.e. such that both the supply and absorption constraints on investable X (relations 8 and 9)[1] are simultaneously effective. Clearly, producing more than the economy

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[1]The model's capabilities are very limited at this stage precisely because relations 8 and 9 represent the crucial elements in determining the works program's contribution to capital formation. The reason is that the coefficient of investability $q(t)u(t)$ and the proportion b of investment which can originate from the works program have been chosen more or less arbitrarily. Only a very detailed study of a large sample of P.N. projects would allow a satisfactorily accurate estimation of $q(t)u(t)$ and b.

can absorb will add nothing to social welfare. And producing less than that amount means that allocating more resources to the works program would not be a bad idea.

In the foregoing application to Morocco only the supply constraint (8) is effective. If the estimate of $b = 0.05$ is fairly close to the actual value of the absorption coefficient for investable X, then it can be concluded that the investable X actually realized in 1961-1969 have been below the optimal levels. Assuming that the government is not willing to increase the proportion of its resources devoted to the works program, there exist two ways of increasing I_x: they are not mutually exclusive. On the one hand the proportion of the output of the works program that is investable can be raised by increasing the share of useful projects in the program, or by improving the quality of work accomplished, or both. On the other, the government resources can be boosted by raising the "rate of taxation," or by somehow obtaining more non-food aid, or both. Of these two methods, the former--striving to have a more productive program--seems to be the easiest to attain. In addition, any improvements that are achieved under the first scheme are likely to be longer-lasting than the results of an exogenous increase in, say, cash aid which cannot be expected to be more than a one-time injection.

2. <u>Foreign aid</u>. The model reveals an interesting aspect of foreign aid. Although both food aid and cash aid contribute equally to consumption in their direct effects, cash aid also has an indirect effect on the social welfare function through the government budget. The additional productivity of cash aid is indicated by g·qu, i.e. the product of the index of the government's willingness to devote resources to the works program and the proportion of the works program output that is investable. These findings have implications for the desirable size and composition of foreign aid.

First, cash aid and food aid represent scarce resources. They both have positive values or shadow prices. More of one or of both is desirable.

Secondly, since cash aid is more productive (has a higher shadow price) than food aid, the more foreign aid comes in as cash the better. In the ideal, if the recipient country had a choice it should elect to receive all of its foreign aid in cash--as opposed to part in kind. Usually, however, the choice is not between more food aid or more cash aid but between more food aid or less food aid. In such a case, more food aid is obviously to be preferred to less food aid.

B. Alternative Forms of the Model

    1. Degree of realism. The model used here, and summarized in Table 5.1, has been reduced to its simplest form. This is done partially for convenience of exposition. The main reason, however, is that this makes it easier to grasp the basic relationships in the model. In fact, as the previous application largely illustrates, the inner workings of the system are brought out quite clearly in this simplified version.

    It is possible to make the model depict reality in a more accurate fashion: the cost is increased complexity. First, the foreign trade sector could be brought in. To do so one needs an import function, an export function and the requirement that the trade gap be filled by an inflow of external resources (foreign aid). This means the addition of two new variables and three new constraints. Secondly, the government budget could be introduced specifically by defining a government resource function. The cost is two more variables and one more constraint. Thirdly, the goods and services sector could be divided into n (two or more) sub-sectors. This would immediately require the addition of (n - 1) more productive capacity constraints, (n - 1) more minimum growth of investment constraints, and (n - 1) more absorptive capacity constraints. Depending on how much detail (or realism) is desired, it would then be possible to have either one or n "resources equal uses" constraint(s), and one or n minimum growth of consumption constraint(s). Breaking up the goods and services sector in this fashion would constitute an interesting exercise in the case where, for instance, the works program contributes to capital formation in one of the sub-sectors exclusively. The cost in terms of additional constraints, variables and parameters--as well as computer time--can be quite substantial in this process, however.

    It is evident that the appropriate degree of complexity varies with the intended use of the model. It also depends on the amount of information that is available for feeding into the model on the one hand; and, on the other, on the amount of information and degree of realism that one wants to extract from it. Our purpose here is merely to gain an insight into the inner workings of the system, and thereby trace the effects of a works program on a given economy. This aim is duly achieved with a very simple version of the model.[1]

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[1]An earlier version of this model had two goods and services sectors, with foreign trade and the government budget explicited. There were 18 constraints and 14 variables--as opposed to 11 and 9 under the present form. The

2. <u>General applicability</u>. The present model has been developed with the Moroccan experience in the 1960's in mind. That case is characterized by several features. The works program workers are (generally) paid, and they are paid in cash and in kind. The output of the works program can therefore be defined as the sum of expenditures in cash (wages and non-wage costs) and in kind. The "production function" is specified by an upper limit imposed by the availability of cash, and a lower limit determined by the availability of food aid (used for the payment in kind). Though developed in this specific context, however, the model could be used to analyze almost any conceivable type of labor-mobilization works program. To do so in a given case, it is only necessary to devise an appropriate convention for measuring the output of the works program, and to define the relevant "production function."

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gain in realism--if any--was small indeed. But the increase in complexity was then such that some of the relationships and patterns uncovered with the simpler model could not even be perceived.

CHAPTER 6

CONCLUSION

Over its ten-year existence Promotion Nationale has been and remains
the object of a heated controversy. Its achievements[1] have been celebrated
almost as many times and with as much conviction as its failures[2] have been
publicized. The present study does not claim to resolve this controversy.
But it sheds some light on the points of contention and on other aspects
as well.

The importance of schemes for capital formation through labor mobili-
zation stems from several sources. Foremost among them are the contribu-
tion to capital formation and agricultural development, the creation of
present and future employment, and the role in spreading the benefits of
growth more widely--or, more generally, of imparting to the masses a sense
of participation in the national development effort. In the case of
Morocco's Promotion Nationale program, the analysis carried out in the pre-
vious chapters permits the evaluation of its performance in each of these
aspects over its ten-year existence.

Section I reviews the achievements of Promotion Nationale. Section
II considers its shortcomings, and some facets of foreign aid. The general
conclusions emerging from the study of the Moroccan experience in labor
mobilization are briefly restated in Section III.

I. The Achievements of Promotion Nationale

The achievements of Promotion Nationale lie in three different areas.
It has helped to spread the benefits of economic growth and to alleviate
the immediate employment problem. It has also made a limited contribution
to capital formation and agricultural development.

A. Spreading the Benefits of Economic Growth

Promotion Nationale's role in spreading the benefits of economic
growth has taken two different forms. First, it has been an effective

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[1]See (Ardant, 1963) and (Arlès, 1966).

[2]See (Belal, 1968), pp. 324-330; (Oualalou, 1969), p. 59, pp. 75-77; and
(Tiano, 1963), Part I.

vehicle of income transfer from the richer provinces to the poorer ones. For the period from 1961 to 1969, on the average it has provided annually 6 days of work to each rural active male inhabitant in the former region, as opposed to 16 days of work in the latter.

Second, within the poorer provinces Promotion Nationale plays an important role for the more destitute segments of the population. The survey of P.N. workers conducted in the region of Goulmima, Province of Ksar Es Souk shows that P.N. workers have families larger than average (5.4 vs. 4.3 persons), and are poorer than average: their average landholdings amount to less than one-fifth of the regional mean holding. P.N. wages constitute a very sizable part of their incomes, perhaps as much as one-half. In addition, over three-fourths of the workers felt that they or their relatives benefited directly--in terms of improved irrigation of land--from the P.N. projects on which they were employed.

This part of our findings contradicts an oft-made criticism of Promotion Nationale. According to some observers[1] the existing system of remuneration is a very bad one. On the one hand, they say, it represents a very low upper limit to any extension of Promotion Nationale as an instrument for solving the employment problem. At the existing wage rate, for instance, it would take more than the government's entire investment budget to employ the available or surplus 300 million man-days. (Let us grant for a moment that this figure is in some sense meaningful.) On the other hand, the DH 4.00 a day is not sufficient to attract workers. The solution offered for these two problems is very simple: Promotion Nationale should be tied to land reform. Workers would not be paid wages; instead they would receive land for the work. As a result, they would have higher productivity since they would be working on their land. And the government would no longer have to spend on P.N. wages: it could limit its contribution to the provision of supplies and small equipment for the various improvements.

The reasoning is not entirely convincing. To begin with, even if the figure on underemployment had been correctly measured, it is inappropriate because it includes both men and women. The more relevant figure for Promotion Nationale would be 140 million man-days.[2] If voluntary

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[1](Belal, 1968), pp. 324-330; (Oualalou, 1969), p. 77; (Tiano, 1963), Part I.

[2](P.N. au Maroc, 1964), p. 19.

and/or short seasonal underemployment is taken out, the final figure may be as little as half that amount. It has by now become clear that the first part of the argument lies on very shaky foundations indeed. As for the second aspect, the Goulmima survey findings do not support the contention that P.N. wages are unattractive to the peasants. Thus while land reform may be desirable from many points of view, it is an entirely futile exercise to try to make it into a necessary and sufficient condition for a labor mobilizing works program. And in any case, those who try to relate these two problems do not offer any realistic answer to the question: What shall be done about employment while waiting for land reform? (We realize that the easy, but unrealistic, answer is: Let us have land reform now!)

B. Employment

For those peasants who do work on P.N. projects, Promotion Nationale represents the only alternative to doing nothing or working in the fields at very low productivity. The Goulmima survey revealed that, on the average, the workers interviewed spend three months of full time work on P.N. worksites every year. These results indicate that Promotion Nationale has a favorable effect on the immediate employment problem.

At the national level, it has provided 20 million man-days annually in the period 1966-1969.[1] This is certainly a minute proportion of the underemployed[2] if compared to 300 million. As previously mentioned, however, this figure is rather high for P.N. discussion. If the lower and more relevant figure of 140 million or even less is used--with a lot of reservation-- the P.N. performance in this area begins to look respectable. In any case it cannot be termed negligible.

As for the effects of Promotion Nationale in providing future employment, no direct evidence is available. This depends mainly on how much of the work undertaken is of a productive nature.

C. Capital Formation and Agricultural Development

The share of purely "make-work" or equipment projects in the P.N. program has fallen from 17 per cent in 1961 to 7.2 per cent in 1969, that of infrastructure from 52.2 per cent to 35.9 per cent, while mise en valeur

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[1]See Appendix 4, Table A4.7.

[2](Oualalou, 1969), p. 76.

projects rose from 30.7 per cent to 56.9 per cent over the same period.[1] Clearly the proportion of useful or productive projects--whether defined to include the last two as we have done here, or only the last one--has been increasing, and with it the contribution of Promotion Nationale to capital formation.

At the micro level, an analysis of ten P.N. mise en valeur projects located in the Provinces of Al Hoceima, Ksar Es Souk, and Marrakech yields a mean internal rate of return of 14.0 per cent. This shows that Promotion Nationale does undertake projects which compare favorably with similar projects realized in other parts of the economy. It does not, however, mean that all P.N. projects are equally profitable. Through these projects, Promotion Nationale makes some important contribution to agricultural development. The present finding weakens somewhat the criticism that, due to the passivity and laziness of workers,[2] Promotion Nationale is characterized by extremely low productivity.

At the aggregate level, a linear programming model permits the estimation of the P.N. contribution to capital formation, and hence to agricultural development since the bulk of P.N. projects lie in the agricultural sector. Directly, as much as 4.6 per cent of total net investment in Morocco could have originated from the investable part of P.N. output in the period 1962-1969--if Promotion Nationale had been at the optimal levels prescribed by the model. This estimate is based on reasonable assumptions concerning the quality of work accomplished on Promotion Nationale. More conservative assumptions would lead to figures ranging from a minimum of 2.0 to 4.6 per cent.

Promotion Nationale also contributes to capital formation in a second way, through the government budget. More P.N. output means more investable P.N. output, which means more investment and more output of goods and services. This in turn implies increased government resources, making possible a rise in P.N. output, and so on. This indirect contribution is probably fairly small, but it cannot be ignored.

The proportion of productive projects in the total P.N. program and the quality of work accomplished on P.N. worksites constitute the two crucial elements in determining the magnitude of P.N.'s contribution to

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[1]See Appendix 4, Table 4.7.

[2](Oualalou, 1969), p. 76.

capital formation. They are the instruments with which P.N. performance in this area can be further improved.

II. Other Aspects of Promotion Nationale

A. The Shortcomings of Promotion Nationale

While Promotion Nationale's performance on the material side has been far from disastrous, it has not been devoid of shortcomings, especially in the human aspects of the undertaking.

The first one arises on the institutional side. Except at the very bottom, the administration of Promotion Nationale occurs mostly as an appendix to the normal activities of all departments involved, or at least as one among many responsibilities of the persons dealing with it. This gives rise to endless confusion and unnecessary duplication of functions which greatly reduce the efficiency of the system and result in some waste. However, its contribution to increasing adoption and acceptance of the "P.N. way" (i.e. labor-intensive methods) by the technical services militates against any radical remodeling of the existing P.N. institutional framework.

Secondly, Promotion Nationale seems to have accomplished very little in the direction of imparting to the masses a sense of active participation in the national development effort. The whole exercise remains a highly centralized program, with very little room for local initiative. This situation may or may not have given rise to corruption in hiring, as some critics contend.[1] The evidence on that aspect is unclear. Although it is rather extreme to hold that Promotion Nationale has become the undertaking par excellence which kills the democratic spirit in the management of the Nation's affairs,[2] it is a fact that the effective (as opposed to formal) participation of the peasants in the decision-making process remains low. This is probably the case in most things and not just with Promotion Nationale, however, so that considering it a failure of Promotion Nationale may not be justified.

Finally, Promotion Nationale has not performed adequately in "promoting" the worker to an improved status--as its name indicates that it should have. Very few workers acquire skills of any kind on P.N. worksites. Out of the 251 P.N. workers interviewed in Goulmima, only 20 reported that they had learned a trade while working on P.N. projects. Thus Promotion

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[1] (Oualalou, 1969), p. 76.

[2] (Oualalou, 1969), pp. 76-77.

Nationale has very little effect on the worker's access to another more remunerative occupation.

B. Some Facets of Foreign Aid

Some characteristics of foreign aid and general features of works programs emerged during this study of Morocco's Promotion Nationale program. They relate to food aid and the role of a works program in expanding the domestic market.

In an economy with a works program, where foreign aid is received as food aid and cash aid, and where a portion of the food aid is used as part of the payments to the works program laborers--in such an economy, foreign aid has the following characteristics. First, in terms of contribution to the social welfare function, food aid is less productive than cash aid. This is because commodity aid represents the extreme form of aid tying, and aid tying always reduces the effective (as opposed to nominal) value of aid to the recipient. Secondly, the difference in productivity of cash aid and food aid stems from the fact that the former, through the government budget, contributes to the output of the works program--as well as directly to consumption. More precisely, food aid has a lower value to the extent that using or purchasing one additional unit of foodstuffs above the available food aid reduces cash aid correspondingly, which in turn occasions a decline in the output of the works program and the investable part of that output. Thirdly, in terms of the linear programming model there may be cases when food aid is counter-productive: it has a negative shadow price. Under such circumstances, the intended recipient country would be willing to pay the donor country--in the form of a reduction in the total volume of aid--in order to reduce food aid, or at least not to force any more of it into the recipient country.

Finally, some of the findings of this study suggest that the works program cannot be expected to provide, indirectly, a stimulus to the development of domestic industries. The laborers are among the poorest of the inhabitants. They spend the overwhelming proportion of their works program wages on agricultural products, mostly foodstuffs. Therefore, the expenditures on the works program will contribute very little to the expansion of the market for domestically manufactured goods.

III. Some Facts on Labor Mobilization

From the economic standpoint, Morocco's Promotion Nationale represents

a moderate success. Although trying to transplant any type of experience into different settings is always an exercise fraught with danger, the general conclusions from the Moroccan experience should prove of great interest to those underdeveloped countries which, like Morocco, are trying to find at least a partial solution to the employment problem.

A labor mobilization works program is an effective vehicle for income transfer. Its impact on immediate employment is favorable--though the longer run effects remain uncertain. It contributes in a limited way to capital formation and agricultural development: this contribution increases with the proportion of productive projects included in the program and the quality of work on those projects.

The effectiveness and usefulness of the entire undertaking may, however, be severely circumscribed unless great care is taken to avoid unnecessary duplication and confusion in establishing the institutional apparatus, and to generate popular participation at all stages.

APPENDIX 1

PROJECT DATA FOR THE BENEFIT-COST ANALYSIS

The material contained in this appendix, together with the various assumptions and data provided in the text itself (Chapter 3), should enable the interested reader to reproduce all the necessary computations and/or alter some or all of the assumptions as he likes. The appendix is arranged according to the three-way classification adopted in the text.

Group I: Small-Scale Irrigation

Table A1.1 shows the areas and yields of various crops without and with the improvements. The benefits from the projects can be derived with the following assumptions:

(1) The savings on repairs start in the year after the project is completed.

(2) The increase in value added on existing crops begins in year 2 and reaches the full amount in five years' time, with a straight-line progression.

(3) Newly planted fruit trees start producing in their seventh year and reach their maturity output in five years' time.

With these elements and the costs appearing in Table 3.1 it is possible to derive total benefits and total costs for each project: see Table A1.2.

Group II: Medium-Scale Irrigation

Table A1.3 shows the costs of the three elements of the projects, from which Table 3.4 of initial costs is derived, with the assumptions stated in the text.

The increases in agricultural output appear on Table A1.4. The assumptions to derive the benefit streams therefrom are:

(1) The increase in yields on the existing palm grove begins after the canal is completed and reaches its full extent in three years.

(2) The extension of the palm grove starts producing after the perimeter equipment is completed and reaches full production in eight years.

(3) The flood water irrigated area starts producing after completion

Table A1.1 - Agricultural Production Without and With Improvements
in the Three Small-Scale Irrigation Projects

	Unit	Without the Improvement		With the Improvement	
		Area or Number	Yield (DH/unit)	Area or Number	Yield (DH/unit)
01. Ain M'Kelkem					
Barley	ha	20	120	0	-
Wheat	ha	12	162.5	0	-
Tomato	ha	3.5	1550	0	-
Zucchini	ha	1.5	550	0	-
Apricot	ha	25	320	30	500
Fig	ha	2	Personal	2	-
Grape	ha	30	1500	30	2000
Olive	ha	5	450	5	650
Orange	ha	0.5	4800	2	4800
Reed	ha	2	450	15	450
Fessa and Bersim	ha	0	-	66	-
Cows	head	100	547.5	104	730
Bulls:					
1 year-old	head	49	100	25	200
2 year-old	head	1	750	25	750
02. El Kouhliyne					
Barley	ha	9	90	8	210
Corn	ha	4	200	4	360
Wheat	ha	10	248	12	500
Carrot	ha	4	600	5	880
Turnip	ha	2	550	2	840
Tomato	ha	4	600	6	800
Zucchini	ha	2	400	3	500
Apricot	ha	4	600	5	750
Grape	ha	4	1200	6	1500
Fig	ha	1	Personal	1	-
Olive	ha	8	9000	10	9500
Orange	ha	4	8000	5	8500
Reed	ha	3	450	6	750
Cows	head	90	250	60	500
Sheep	head	200	50	100	75
03. Taddarte					
Barley	ha	450	175	450	187.50
Corn	ha	180	280	180	288
Wheat	ha	300	252	300	294
Zucchini	ha	180	300	180	375
Apple	tree	1650	75	1650	75
Apricot	tree	1000	21	2000	21
Grape	tree	500	240	1000	240
Olive	tree	500	10	1000	10
Orange	tree	0	30	300	30
Pomegranate	tree	1000	20	1000	20

Sources: Bureau P.N. of the O.R.M.V.A.H.; local Centres de Mise en Valeur (C.M.V.); interviews with the local shioukh and the farmers.

Table A1.2 - Total Benefits and Total Costs for the
Small-Scale Irrigation Projects (dirhams)

Year	Project 01 Ain M'Kelkem		Project 02 El Kouhliyne		Project 03 Taddarte	
	Benefit	Cost	Benefit	Cost	Benefit	Cost
1968	0	25 118	0	53 626	0	74 160
1969	9 503	97 013	4 304	11 154	5 882	38 526
1970	21 526	12 739	7 408	11 154	15 765	2 189
1971	31 030	12 739	10 512	11 154	22 007	2 189
1972	40 533	12 739	13 616	11 154	27 530	2 189
1973	50 036	12 739	16 720	11 154	33 412	2 189
1974	51 588	12 739	21 720	11 154	57 092	2 189
1975	53 140	12 739	26 720	11 154	80 772	2 189
1976	54 692	12 739	31 720	11 154	104 452	2 189
1977	56 244	12 739	36 720	11 154	128 132	2 189
1978	57 796	12 739	41 720	11 154	151 812	2 189
1979	57 796	12 739	41 720	11 154	151 812	2 189
1980	57 796	12 739	41 720	11 154	151 812	2 189
1981	57 796	12 739	41 720	11 154	151 812	2 189
1982	57 796	12 739	41 720	11 154	151 812	2 189

of the canal and reaches its full output in ten years.

The streams of total benefits and costs appear on Table A1.5.

Group III: Defense and Restoration of Soils (D.R.S.)

Table A1.6 shows the areas treated and the number of trees planted for each of the three D.R.S. projects. For Projects 08 and 10, the benefit streams are derived essentially from the number of trees, with the following assumptions:

(1) The mortality rates for almond trees is one-third[1] during the first four years, and the mortality victims are replaced up to the fifth year. Thus of an original stand of x trees the survivors in year 6 are:

5 year old survivors: $(12/27)x$
4 year old survivors: $(5/27)x$
3 year old survivors: $(5/27)x$
2 year old survivors: $(3/27)x$
1 year old survivors: $(2/27)x$

Thereafter the mortality rate is 3 per cent and the mortality victims are not replaced. When the trees all reach 16 years of age, the mortality is assumed to be zero (since, presumably, the trees will by then be strong enough to withstand the elements).

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[1]These are based in part on the assumptions of (I.V.S., June 1969).

Table A1.3 - Costs of the Three Elements of the
Medium-Scale Irrigation Projects (dirhams)

	Begin- ning Year (1)	Total Costs (2)	Total Labor Costs (3)	Labor Costs in Kind (4)	Cash Initial Cost (5)
04. Tadiroust					
Dam	1966	816 000	190 144	95 072	720 928
Dead head canal[a/]	1969	267 650	171 296	85 648	182 002
Perimeter equipment[b/]	1970	247 950	184 464	92 232	155 718
TOTAL		1 331 600	545 902	272 952	1 058 648
05. Tazmout					
Dam	1967	405 605	243 345	121 672	283 933
Dead head canal	1968	255 040	153 560	76 780	178 260
Perimeter equipment	1969	614 715	459 780	229 890	384 825
TOTAL		1 275 360	856 685	428 342	847 018
06. Tazourmit					
Dam	1967	465 500	231 300	115 650	349 850
Dead head canal	1968	1 051 475	548 825	274 412	777 063
Perimeter equipment	1969	614 715	459 780	229 890	384 825
TOTAL		2 131 690	1 239 905	619 952	1 511 738
07. Yfegh					
Dam	1966	222 527	91 584	45 792	176 735
Dead head canal	1967	175 000	140 000	70 000	105 000
Perimeter equipment[b/]	1968	113 400	85 050	42 524	70 876
TOTAL		510 927	316 634	158 317	352 611

Sources: Columns 1-3: (S.C.E.T., 1966b).
Column 4 = (Column 3)/2.
Column 5 = (Column 2)-(Column 4).

Notes: [a/]Calculated on the basis of the cost of Tazourmit's 11 kilometre
canal; Tadiroust's canal is 2.8 kilometre long.

[b/]Calculated on the basis of the cost of perimeter equipment for
Tazmout and Tazourmit (see perimeter areas below).

(2) The output per almond tree in Al Hoceima is

6 - 10 years old:	DH 1.00
11 - 15 years old:	DH 2.50
16 years old and over:	DH 5.00;

for Sahrij, the corresponding figures are 2, 5, and 10 dirhams. (It must

be noted that basing the benefit stream on the number of trees assumes that

Table A1.4 - Increases in Agricultural Output for the
Four Medium-Scale Irrigation Projects

	Without the Improvement		With the Improvement		Total Increase in Value Added[a]	Begin-ning Year	Full Output Year
	Area (ha)	Yield (DH/ha)	Area (ha)	Yield (DH/ha)			
04. Tadiroust							
Existing	240	-	240	-	297 200	1971	1973
Extension	-	-	50	-	105 280	1973	1980
Flood water	-	-	310	-	106 100	1971	1980
05. Tazmout							
Existing	200	120	200	480	57 600	1970	1972
Extension	-	-	-	-	-	-	-
Flood water	-	-	1 300	480	499 200	1972	1981
06. Tazourmit							
Existing	200	120	200	480	57 600	1970	1972
Extension	-	-	-	-	-	-	-
Flood water	-	-	1 300	2 086	1 169 440	1972	1981
07. Yfegh							
Existing	125	3 980	125	5 240	126 000	1969	1971
Extension	-	-	-	-	-	-	-
Flood water	150	2 000	150	3 000	120 000	1971	1980

Sources: Project 04: (S.C.E.T., 1969).
Projects 05-07: (S.C.E.T., 1966b).

Note: [a] In calculating the total increase in value added, the areas have been adjusted by a factor of .8 (except for Tadiroust) to take account of the fact that 20 per cent of the land area in palm groves is taken up by paths and the irrigation network.

the trees will be adequately cared for by their owners. This may not always be the case, and this fact must be kept in mind.)

(3) For Al Hoceima, the forest trees (pine trees) also provide some benefit. The mortality rate is 3 per cent up to their fifteenth year. They are cut in lots of one-tenth of the total stand starting in their fifteenth year, during ten years. They are valued at their gross price of DH 5.00 per round beam each.

For Project 09 (Imintanoute), the value of almond output is based on the actual income received from the trees. This project was started in 1961; the trees begin producing in year 5, so that there have already been four or five years of sale. The output is sold by the Water and Forestry Service "on the trees." On the basis of sales figures for 1965-1969 the

Table A1.5 - Total Benefits and Total Costs for the
Medium-Scale Irrigation Projects (dirhams)

Year	Project 04 Tadiroust		Project 05 Tazmout		Project 06 Tazourmit		Project 07 Yfegh	
	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost
1966	0	816 000	-	-	-	-	0	222 527
1967	0	61 812	0	405 604	0	465 500	0	111 662
1968	0	61 812	0	186 229	0	624 458	0	149 463
1969	0	195 637	0	391 134	0	829 361	33 600	61 963
1970	0	278 287	15 360	263 614	15 360	303 624	67 200	61 963
1971	87 741	144 462	30 720	263 614	30 720	303 624	110 400	24 162
1972	175 482	144 462	86 016	58 709	219 635	98 719	120 000	24 162
1973	273 752	61 812	125 952	58 709	393 190	98 719	129 600	24 162
1974	292 768	61 812	165 888	58 709	566 746	98 719	139 200	24 162
1975	311 784	61 812	205 824	58 709	740 301	98 719	148 800	24 162
1976	330 800	61 812	245 760	58 709	913 856	98 719	158 400	24 162
1977	349 816	61 812	285 696	58 709	1 087 411	98 719	168 000	24 162
1978	368 832	61 812	325 632	58 709	1 260 966	98 719	177 600	24 162
1979	387 848	61 812	365 568	58 709	1 434 521	98 719	187 200	24 162
1980	406 864	61 812	405 504	58 709	1 608 076	98 719	196 800	24 162
1981	406 864	61 812	445 440	58 709	1 781 631	98 719	196 800	24 162
1982	406 864	61 812	445 440	58 709	1 781 631	98 719	196 800	24 162
1983	406 864	61 812	445 440	58 709	1 781 631	98 719	196 800	24 162
1984	406 864	61 812	445 440	58 709	1 781 631	98 719	196 800	24 162
1985	406 864	61 812	445 440	58 709	1 781 631	98 719	196 800	24 162
1986	-	-	445 440	58 709	1 781 631	98 719	-	-

output per hectare of young trees is around DH 20.00. The following fig-
ures are retained here:

5 - 10 year old trees:	DH 20.00/hectare
11 - 15 year old trees:	DH 40.00/hectare
16 year old trees and over:	DH 60.00/hectare.

There is no mortality factor for the almond trees in this case. For carob
trees (whose nuts or seeds are sold in this area for medicinal and other
uses), however, the mortality rate is 3 per cent and it drops to zero when
all trees reach 16 years of age. The output is

6 - 10 years old:	DH 2.00/tree
11 - 15 years old:	DH 10.00/tree
15 years old and over:	DH 20.00/tree.

The third source of benefit in the Imintanoute project arises from the fact
that the areas between the fruit tree banquettes (estimated at 50 per cent
of the total area on the average) can now be grown in barley the year after
the area has been treated. The yield is DH 120.00 per hectare.

Table A1.6 - Areas Treated and Trees Planted in
the Three D.R.S. Projects

	Areas (ha)	TREES				
		Almond	Carob	Pine	Eucalyptus	Other[a]
08. Al Hoceima						
1965	672	39 209	-	135 007	-	-
1966	245	27 500	1 860	25 970	-	-
1967	284	33 937	-	-	-	-
1968	313	26 733	-	-	-	2 000
09. Imintanoute						
1961	56	6 000	-	5 400	-	-
1962	399	37 600	1 760	-	800	-
1963	100	8 400	940	-	1 200	-
1964	200	19 325	3 825	-	500	-
1965	300	23 475	3 110	-	1 500	-
1966	408	26 000	4 565	-	6 000	1 200
1967	149	11 100	1 670	-	2 800	-
1968	209	14 000	5 830	1 000	5 500	2 000
1969	14	1 350	-	-	-	-
10. Sahrij						
1968	500	8 000	-	-	-	-
1969	1 000	50 000	-	-	-	-

Sources: 08: Water and Forestry Service, Al Hoceima.
          09: Water and Forestry Service, Imintanoute.
          10: Bureau Promotion Nationale, Office Regionale de Mise en
               Valeur du Haouz (O.R.M.V.A.H.).

Note: [a] Fig in Al Hoceima, cypress in Imintanoute.

To summarize the sources of benefit are almond and forest trees for Project 08 (Al Hoceima), almond, carob and barley for Project 09 (Imintanoute), and almond for Project 10 (Sahrij).

The costs are as specified in the text. Opportunity costs arise for Projects 08 and 10, from the loss of 20 per cent of areas cultivated in wheat and barley, respectively. The yields are, respectively, DH 53.00 and DH 210.00 per hectare.

From these data and the information supplied in the text, especially the initial costs appearing as Table 3.8, the streams of total benefits and costs can be established. They are presented in Table A1.7.

Table A1.7 - Total Benefits and Total Costs for the
D.R.S. Projects (dirhams)

Year	Project 08: Al Hoceima		Project 09: Imintanoute		Project 10: Sahrij	
	Benefit	Cost	Benefit	Cost	Benefit	Cost
1961	-	-	0	49 050	-	-
1962	-	-	2 688	277 851	-	-
1963	-	-	21 840	204 154	-	-
1964	-	-	26 640	199 970	-	-
1965	0	474 175	37 136	250 164	-	-
1966	0	227 970	57 709	394 246	-	-
1967	0	250 747	78 598	190 788	-	-
1968	0	258 197	92 046	150 816	0	521 000
1969	0	111 527	106 592	82 663	0	383 225
1970	0	90 065	113 599	26 424	0	175 345
1971	13 941	73 349	120 499	26 424	0	166 455
1972	23 054	58 652	136 551	26 424	0	131 395
1973	35 296	42 333	149 239	26 424	5 690	117 735
1974	47 822	39 590	163 950	26 424	41 890	83 125
1975	66 452	39 590	171 422	26 424	53 647	83 125
1976	87 699	39 590	194 180	26 424	64 343	83 125
1977	100 818	39 590	223 335	26 424	80 338	83 125
1978	116 308	39 590	246 942	26 424	135 932	83 125
1979	130 430	39 590	280 137	26 424	149 098	83 125
1980	187 229	39 590	286 905	26 424	161 202	83 125
1981	210 719	39 590	309 632	26 424	181 413	83 125
1982	230 655	39 590	329 556	26 424	260 326	83 125
1983	252 262	39 590	336 015	26 424	278 422	83 125
1984	271 621	39 590	358 108	26 424	294 431	83 125
1985	301 958	39 590	358 108	26 424	306 225	83 125
1986	313 666	39 590	358 108	26 424	315 984	83 125
1987	313 666	39 590	358 108	26 424	315 984	83 125
1988	313 666	39 590	358 108	26 424	315 984	83 125
1989	313 666	39 590	358 108	26 424	315 984	83 125
1990	278 998	39 590	358 108	26 424	315 984	83 125
1991	278 998	39 590	-	-	315 984	83 125
1992	278 998	39 590	-	-	315 984	83 125
1993	278 998	39 590	-	-	315 984	83 125
1994	278 998	39 590	-	-	315 984	83 125
1995	-	-	-	-	315 984	83 125
1996	-	-	-	-	315 984	83 125
1997	-	-	-	-	315 984	83 125

APPENDIX 2

THE GOULMIMA SURVEY OF P.N. WORKERS

From June 5 to June 8, 1970 a survey of P.N. workers was conducted
in the Cercle of Goulmima, Province of Ksar-Es-Souk. A total of 251 work-
ers on five different worksites were interviewed. The worksite names, the
types of project, the date of the survey and the number of workers inter-
viewed are as follows:

1. Ouakka: <u>seguia</u> or irrigation canal;

      June 5, 1970; 39 workers.

2. Ait Yahia: <u>seguia</u> or irrigation canal;

      June 5, 1970: 28 workers.

3. Touroug: <u>seguia</u> or irrigation canal:

      June 6, 1970; 78 workers.

4. Mazlaghate: medium-scale dam:

      June 8, 1970; 77 workers.

5. Tiliouine: <u>khettara</u> or underground irrigation canal;

      June 8, 1970; 30 workers.

The workers for the first two projects came to the <u>cercle</u>'s adminis-
trative building at the end of their workday for the interview. The re-
mainder were interviewed on the worksites themselves.

The interviewing was done through interpreters: five during the first
day, and two for the other days. All interpreters spoke both Arabic and
Berber, as well as French. Some of the workers spoke (and were interviewed
in) Arabic; some spoke (and were interviewed in) Berber. Very few--usually
the supervisory workers--knew French: none was interviewed in that language.

The survey questionnaire was discussed with the <u>supercaïd</u> who made
helpful suggestions with regard to its content as well as in the phrasing
of some questions. The interpreters were also provided through his office.
We are grateful for his help and cooperation, without which the survey
would not have been possible.

The original questionnaire was formulated in French. An English
translation is attached.

QUESTIONNAIRE: PROMOTION NATIONALE LABOR FORCE

Name of the worksite:
Location of the worksite:
Number of workers on the worksite:
Date of the interview:

1) Are you   a) a worksite leader:
                   b) a timekeeper:
                   c) a foreman:
                   d) a skilled worker:
                   e) an unskilled worker?

2) How old are you?

3) Are you married?

4) How many children do you have?

5) A. In which village or ksar do you live?
    B. How far from the worksite is your village? (km)

6) How do you come to the worksite:

                   a) on foot:
                   b) on bicycle:
                   c) other (specify)?

7) How long ago did you work on a Promotion Nationale worksite for the
    first time? (number of years)

8) How much time per year do you work on Promotion Nationale worksites?
    (number of two-week periods)

9) Have you looked for work somewhere else before coming to the present
    worksite?
                   a) Yes
                   b) No?

10) What would you be doing now if the worksite did not exist?

                   a) nothing:
                   b) work in the fields:
                   c) work at home:
                   d) trade:
                   e) seasonal emigration:
                   f) long-term emigration?

11) Do you have any land: a) Yes
                              b) No?

12) If yes, how many mouds?

13) How far from the present worksite is your land? (km)

14) Does your land benefit directly from the work on this worksite:
                   a) Yes
                   b) No?

15) Do you have any relatives who own land:
                   a) Yes
                   b) No?

16) If yes, how many mouds?

17) How far from the present worksite is the land of your relatives? (km)

18) Does the land of your relatives benefit directly from the work on this worksite: a) Yes
                                     b) No?

19) How much money per year do you receive on the worksites of Promotion Nationale? (dirhams)

20) What do you buy with the money that you receive from Promotion Nationale?

21) Do you have any other sources of income: a) Yes
                                            b) No?

22) Would you like the payment in wheat to be replaced by cash: a) Yes
                                                               b) No?

23) If yes [to 22], instead of the 60 kg sack of wheat, would you accept to receive DH 12.00: a) Yes
                                     b) No?

24) If yes [to 22], instead of the 60 kg sack of wheat, would you accept to receive DH 15.00: a) Yes
                                     b) No?

25) If yes [to 22], instead of the 60 kg sack of wheat, would you accept to receive DH 18.00: a) Yes
                                     b) No?

26) If yes [to 22], instead of the 60 kg sack of wheat, would you accept to receive DH 21.00: a) Yes
                                     b) No?

27) Have you learned a trade on the worksites of Promotion Nationale:
                                     a) Yes
                                     b) No?

28) If yes, what is that trade?

APPENDIX 3

DATA FOR "PROMOTION NATIONALE AND THE PEOPLE"

This appendix contains the data used in the analysis of the regional distribution of Promotion Nationale activity (Chapter 4, Section II.A), and a summary of data on four palm groves situated in the region of Goulmima, Province of Ksar Es Souk.

Table A3.1 - The Regional Distribution of P.N. Mandays

Province or Prefecture	1961[a/]	1962[a/]	1963[a/]	1964	1965	1966	1967	1968	1969
Agadir	406 175	690 302	475 522	621 877	593 551	582 985	692 091	379 069	552 031
Al Hoceima	246 810	531 737	523 452	376 325	520 440	1 067 355	1 054 890	541 642	1 079 728
Beni Mellal	327 068	694 784	484 147	711 320	546 320	833 016	671 705	813 753	467 040
Casablanca[b/]	251 388	528 569	670 042	546 343	432 273	780 795	829 518	596 138	644 860
Fes	765 038	1 495 912	1 185 050	1 355 932	1 390 122	2 203 518	1 625 422	2 039 059	1 343 472
Kenitra	496 108	993 014	721 876	721 435	665 026	1 041 916	1 102 602	1 152 310	1 138 572
Ksar-Es-Souk	503 173	847 813	477 012	758 424	1 442 772	3 759 448	2 822 753	3 198 785	2 937 819
Marrakech-Safi[c/]	670 988	1 413 234	1 296 776	1 560 321	1 275 929	1 801 795	1 568 963	1 095 858	841 657
Meknes	276 044	739 379	942 577	1 141 524	1 052 377	859 440	1 439 779	1 382 917	1 039 368
Nador	198 047	408 758	457 194	439 147	244 645	567 626	863 629	852 227	1 137 576
Ouarzazate	517 186	850 274	426 538	2 933 913	1 608 924	1 995 005	1 571 075	2 809 786	3 786 357
Oujda	408 863	950 079	951 058	896 221	714 904	900 409	1 138 682	729 194	374 000
Tanger	267 944	381 531	188 527	172 182	78 861	194 760	134 003	265 434	247 764
Tarfaya	0	39 354	60 646	36 000	111 641	215 931	224 172	227 021	154 383
Taza	290 732	697 124	627 144	950 952	1 029 188	1 566 491	1 235 723	809 959	1 162 268
Tetouan	664 407	1 731 388	1 710 204	1 317 534	1 364 111	1 775 259	1 573 481	1 719 943	2 026 839
Casablanca Pre.	534 306	574 881	255 813	315 000	354 159	877 446	612 621	675 705	143 798
Rabat-Salé Pre.	101 000	123 450	152 549	99 681	287 150	359 650	452 627	457 840	283 000
TOTAL	6 934 278	13 691 591	11 606 131	14 954 132	13 812 393	21 392 845	19 613 736	19 746 640	19 360 532

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Sources: (P.N. Bilan, 1961 through 1969), (P.N. au Maroc, 1964), (P.N.: Trois Années, 1964).

Notes: [a/] Promotion Nationale data for the years 1961 to 1963 are published on an agricultural year basis (July to June). They were adjusted to the calendar year in order to make them comparable to the data for later years. The formula used in the conversion are:

$$1961 = \frac{\text{original } 1961}{2}, \quad 1962 = \frac{\text{original } 1961 + \text{original } 1962}{2}, \quad 1963 = \frac{\text{original } 1962}{2} + \text{original } 1963.$$

[b/] In 1966, the province of Casablanca was divided into three separate provinces: El Jadida, Khouribga, and Settat. For the sake of continuity the data for these three provinces starting in 1967 were added up and entered under the single province of Casablanca (which, officially, no longer exists).

[c/] In 1965 the province of Marrakech was also split between Marrakech and Safi. Similarly data for these two provinces for the later years have been combined into a single entry.

These notes apply to all Promotion Nationale data cited in the text.

Table A3.2 - Rural Population and Agricultural Income,
By Province

Province	Rural Active Men 1960 (1)	Rural Population 1968 (2)	Density on Arable Land (rural inhab./sq. km.)		Per Capita Agricultural Income (DH) 1960 (5)
			1960 (3)	1968 (4)	
Agadir	192 938	890 000	189	212	139
Al Hoceima	40 495	215 000	350	430	114
Beni Mellal	109 354	500 000	105	130	438
Casablanca	292 187	1 415 000	61	87	418
Fes	146 219	690 000	100	123	246
Kenitra	229 528	1 110 000	84	109	448
Ksar Es Souk	90 822	425 000	435	522	165
Marrakech-Safi	426 767	1 970 000	93	114	243
Meknes	87 854	430 000	97	123	307
Nador	67 426	415 000	231	291	91
Ouarzazate	90 324	495 000	526	625	101
Oujda	54 052	320 000	86	110	289
Tanger	6 732	30 000	143	192	159
Tarfaya	5 196	20 000	-	-	-
Taza	110 070	490 000	159	192	184
Tetouan	119 596	555 000	294	366	199

Sources: The following sources are arranged by column:

1. (Recensement 1960, II), Table 31, pp. 447-481.

2. (Plan 1968-1972), Vol. III, p. 8.

3. (Plan 1968-1972), Vol. III, p. 9.

4. (Plan 1968-1972), Vol. III, p. 9.

5. (Plan 1968-1972), Vol. III, p. 20.

Table A3.3 - Land, Labor, and Output in Four Palm Groves
of the Goulmima Region

	Goulmima	Tinejdad	Yfegh	Tadiroust	Mean
1. Land per house-hold (ha)	0.80	0.71	0.98	0.99	0.87
2. Area (ha)	2 000.00	1 310.00	155.00	580.00	-
3. Output (DH)	-	1 310 400.00	171 970.00	534 675.00	-
4. Available Labor Force[a] (man-days)	930 150.00	320 000.00	47 250.00	165 530.00	-
5. Productive Labor Force[b] (man-days)	502 800.00	232 000.00	30 500.00	102 812.00	-
6. Output/Land (DH/ha)	-	1 000.31	1 109.48	921.85	1 010.55
7. Output/Available Labor (DH/md)	-	4.10	3.64	3.23	3.66
8. Output/Productive Labor (DH/md)	-	5.65	5.64	5.20	5.50
9. Rate of Under-employment[c] (%)	27.5	35.5	37.9	36.7	34.4

Sources: Lines 1 to 5 are taken from (S.C.E.T., 1968) and (S.C.E.T., 1969).
Lines 6 to 9 as well as the means are computed from these data.

Notes: [a] The available labor force is computed in the sources by assuming
that on a yearly basis an adult male provides 250 days of work in
agriculture, an adult female 60 days and a child between the age
of 10 and 20 years also 60 days.

[b] The productive labor force is computed--also in the sources--on the
basis of man-days per year required by a unit of the different
activities: cereals, fruit trees, animal raising, etc.

[c] It goes without saying that the rates of underemployment derived
in this table should only be taken to indicate orders of magnitude.

APPENDIX 4

DATA ON THE MOROCCAN ECONOMY (1951-1969)

AND PROMOTION NATIONALE (1961-1969)

This appendix contains all the data used in the application to Morocco of the linear programming model developed in Chapter 5.

Table A4.1 - G.D.P. and Investment in Morocco, 1951-1954

Year	In billions of current francs					Price Index 100=1939 (6)	Price Index 100=1951 (7)
	G.D.P. (1)	Gross Investment (2)	Depreciation (3)	Investment of Bases (4)	Net Investment (5)		
1951	405.0	100.6	21.0	1.9	77.7	2 464	100.0
1952	485.5	131.6	25.0	5.4	101.2	2 767	113.0
1953	530.0	127.0	29.0	10.2	87.8	2 836	115.1
1954	552.4	114.5	33.0	6.9	74.6	2 809	114.0

Sources: (1) to (4): (Zind, 1965), p. 125; p. 125; p. 123; p. 128.
          (5)   = (2)-(3)-(4)
          (6):   (Tableaux Economiques 1915-1959), p. 214. (This is the index of retail prices in Casablanca.)
          (7):   Computed from column (6).

Table A4.2 - G.D.P. and Budget in Morocco, 1957-1960
(in millions of current dirhams)

Year	Gross Domestic Product (1)	Total Government Expenditures (2)	Government's Foreign Borrowings (3)	Domestic Resources (4)
1957	5 849	1 446	70	1 376
1958	6 630	1 767	126	1 641
1959	7 240	1 817	220	1 597
1960	8 200	1 905	202	1 703

Sources: (1) to (3): (Annuaire Statistique, 1957 to 1960).
          (4)   = (2)-(3).

Note: The "rate of taxation" r is the average value of domestic resources over gross domestic product.

Table A4.3 - The Moroccan National Accounts, 1960-1969
(in millions of dirhams at current prices)

Year	Gross Domestic Product	Imports	Consumption	Gross Investment	Changes in Inventories	Exports
1960	8 200	2 200	7 440	920	40	2 010
1961	8 080	2 370	7 620	1 050	-150	1 930
1962	9 540	2 360	8 770	1 150	100	1 880
1963	10 630	2 490	9 610	1 410	60	2 040
1964	11 150	2 510	9 960	1 370	- 20	2 350
1965	11 800	2 330	10 370	1 440	0	2 320
1966	11 410	2 610	10 800	1 530	-150	2 290
1967	12 100	2 890	11 800	1 890	30	2 270
1968	13 660	3 060	11 610	1 970	720	2 420
1969	14 070	3 120	12 550	2 170	-140	2 610

Sources: 1960-1967: (Annuaire Statistique, 1966-1967), p. 281.
          1967-1969: (Plan Exécution 1969), p. 8.

Table A4.4 - Price Index and Depreciation, 1960-1969

Year	Price Index (1960 = 100)	Depreciation[a] (in millions of dirhams at 1960 prices)
1960	100.0	400
1961	101.8	400
1962	106.9	400
1963	113.1	400
1964	117.7	400
1965	121.7	400
1966	120.5	410
1967	119.5	420
1968	120.4	430
1969	123.6	430

Sources: The price index is computed on the basis of the "index of the
          cost of living in Casablanca," 100 = October 1958-September 1959:
          (Situation Economique, 1967 and 1968), (Bulletin de Statistiques,
          July-August 1969), (Note Rapide sur Prix, November 1969 and Jan-
          uary 1970).

          Depreciation: (U.N. Yearbook 1968), p. 460 for 1960 to 1967;
          1968 and 1969 figures are obtained by extrapolation.

Note: [a] In the application of the linear programming model to Morocco
          (1961-1969), depreciation has been netted out of investment and
          included in consumption. Changes in inventories have also been
          included in consumption.

Table A4.5 - Government Budget and Foreign Aid, 1960-1969
(in millions of dirhams at current prices)

Year	Government Budget			Foreign Aid[c]		
	Total Expenditures	Foreign Borrowings	Domestic Resources[a]	Total Aid	Food Aid	Non-Food Aid[b]
1960	1 905	202	1 703	303	24	279
1961	2 142	232	1 910	562	155	407
1962	2 361	247	2 114	401	159	242
1963	2 789	553	2 236	489	148	341
1964	3 175	260	2 915	524	172	352
1965	2 877	456	2 421	575	73	502
1966	2 994	259	2 735	469	147	322
1967	3 103	189	2 914	301	186	115
1968	3 621	310	3 311	550	162	388
1969	3 926	310	3 616	550	179	371

Sources: Budget: (Annuaire Statistique, 1960 to 1966-1967), (Situation Economique, 1968), (Plan Exécution 1969), (Banque du Maroc, 1964 and 1965).
Total aid: (O.E.C.D., 1966), pp. 43-44; (O.E.C.D., 1969), p. 192.
Food aid: (U.S.A.I.D.-Rabat, 1969).

Notes: [a] (domestic resources)=(total expenditures)-(foreign borrowings)

[b] (non-food aid)=(total aid)-(food aid).

[c] The foreign aid figures are on a calendar year basis.

Table A4.6 - Promotion Nationale Expenditures, 1961-1969
(current dirhams, or equivalent)

Year	Expenditures			Number of Man-days
	In Cash	In Kind	Total	
1961	16 086 995	18 795 150	34 882 145	6 934 278
1962	31 764 437	37 111 800	68 876 237	13 691 591
1963	32 853 518	25 759 800	58 613 318	11 606 131
1964	37 162 337	26 254 800	63 417 137	14 954 132
1965	33 747 671	22 979 550	56 727 221	13 812 393
1966	55 593 965	39 000 000	94 593 965	21 402 972
1967	52 045 158	39 227 500	91 272 658	19 613 726
1968	44 687 843	39 493 280	84 181 123	19 746 640
1969	44 709 116	38 721 000	83 430 116	19 360 552

Sources: Same as Table A3.1.

Table A4.7 - Distribution of Promotion Nationale Man-Days
According to Project Types and Categories, 1961-1969

Year	Man-Days					
	"Mise en valeur"	Infra-structure	Equipment	Part I	Part II	Total
1961	2 130 485	3 621 267	1 182 527	-	-	6 934 278
1962	4 705 025	7 208 801	1 777 764	-	-	13 691 591
1963	4 491 733	5 302 608	1 816 090	2 102 854	9 503 275	11 606 131
1964	7 991 654	4 623 455	2 339 023	5 267 993	9 686 139	14 954 132
1965	7 162 031	4 622 491	2 027 871	5 334 399	8 477 994	13 812 393
1966	9 013 473	7 766 846	4 612 525	8 814 821	12 578 024	21 392 845
1967	9 072 865	7 350 440	3 190 431	6 394 642	13 219 094	19 613 736
1968	11 523 794	5 536 708	2 686 138	6 203 093	13 543 547	19 746 640
1969	11 025 373	6 944 721	1 390 438	5 719 767	13 640 765	19 360 532
	Percentage					
1961	30.7	52.2	17.0	-	-	100.0
1962	34.3	52.6	13.0	-	-	100.0
1963	38.7	45.7	15.6	18.1	81.9	100.0
1964	53.4	30.9	15.6	35.2	64.8	100.0
1965	51.9	33.5	14.6	38.6	61.4	100.0
1966	42.1	36.3	21.6	41.2	58.8	100.0
1967	46.2	37.3	16.3	32.6	67.4	100.0
1968	58.4	28.0	13.6	31.4	68.6	100.0
1969	56.9	35.9	7.2	29.5	70.5	100.0

Sources: Same as Table A3.1.

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