UNITED NATIONS
AFRICAN INSTITUTE FOR ECONOMIC
DEVELOPMENT AND PLANNING

D A K A R

SIMULATION OF PLANNING

ECONOMIC DEVELOPMENT PLAN OF THE "COCOALAND"

(CENTER FOR UNDER-DEVELOPED ECONOMIES, WARSAW)

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1. Introduction

Assumptions underlying the present study are twofold :

1. It is an exercice in the planning methodology as outlined during several
discussions held at the seminars on planning under the guidance of Profes-
sor M. Kalecki.

The task consisted in working out a set of tables comprising basic aggregate
magnitudes which show the state and trends of development of a " model "
underdeveloped economy displaying some specific natural characteristics.
Within this exercice the following conditions had to be met :

a/ to minimise the number of necessary " data " ;

b/ to introduce into the plan only these " data" that are generally accee-
ible in the current statistics of the developing countries, or to use
such " data" which can be estimated with a fair proximity, on the basis
of the above mentioned official statistics;

c/ the plan under elaboration should be internally consistent. Therefore,
both supply and demand of specific magnitudes has to be worked out not
only in aggregates but also in the breakdown into basic groups and cate-
gories.

2. It was further assumed that during the period of plan implementation no
radical institutional changes are foreseen, and moreover, that no inflation-
ary pressures are permissible. Within this framework, a second aim of this
study was to show what rate of growth is likely to be achieved under condi-
tions of comprehensive planning for a country without any particular facil-
itating factors at the beginning of the plan, and without any particularly
favourable external conditions for growth.

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Having in mind these unfavourable conditions at the starting point, the authors have introduced into this exercice several " difficulties", mainly with regard to the availability of foreign exchange, both in the form of inflow of private and public capital, as well as with respect to trends in prices for most important export item in the given country under considerations, i.e., cocoa. These constrains, had, of course their bearing upon the volume of planned investment and its structure. Final results of this exercice are, moreover, largely influenced by rigorous assumptions for maintaining the market equilibrium and achieving relatively quick rate of growth of consumption.

It will be noticed that despite rather pessimistic assumptions as far as so called " external conditions for growth " are concerned the final result, i.e. the rate of growth of the national income is relatively high. From this we can infer an important conclusion not only for a ficticious country " Cocoaland " but for other countries of similar conditions, namely that within the framework of the planned, comprehensive and consistent economic policy, the growth potential is significant.

Now, let us turn to a few comments with regard to the method of the plan elaboration. The point of departure consisted in calculating the volume of investment necessary for achieving the given rate of growth of the national income, assuming certain, overall capital - output ratio. To simplify the calculus, rates of growth for income, investment and consumption were taken as uniform/ although different for individual magnitudes. Consequently, in the course of the exercice it was possible to confine the analysis to working out the data only for the first $/t_1/$ and the final $/t_7/$ year of the plan.

From the data setting the volume of investment and the national income in the first year of the plan, and from the rates of growth of these items, it was possible to calculate the volume of income in the final year of the plan, as well as the shares of investment and consumption in this income

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Next, and most important step in this study consisted in detailed, dis-
aggregated analysis of these basic, macro- economic data: on the one hand
it was necessary, therefore, to work out the structure of final demand for
both investment and consumer goods as well as to analyse the means to satis-
fy this demand; on the other, we had to elaborate the structure of income
from the point of view of financing respective projects.

At the more detailed stage of analysis, we have dealt with the problems
of foreign trade, branch- structure of output and its capital intensity.
These factors determine the structure of investment, hence it was necessary
to check whether this structure is feasible from the point of view of sour-
ces of its financing.

Other then, after having passed through this stage of disaggregation, it
was possible to evaluate the feasibility of initial macro- economic data/
i.e., to assess, whether an a priori assumed, average capital- intensity of
investment corresponds to the average, weighted capital- intensity for in-
dividual sectors of the economy determined in a way as close to the reality
as possible; whether the assumed rate of growth of income is feasible from
the point of view of the dynamics of its components; whether the assumed
rate of growth would not clash against insurmountable obstacles arising
from a difficult balance of payments position, etc.

Needless to say, this task could not be fullfilled immediately, in one
approach; the authors had to undertake, therefore several attempts, once
any assumption had proved unrealistic. The reader should also bear in mind
a purely academic nature of this exercice, undertaken for a ficticious coun-
try.

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2. The analysis of the plan

Table 1 presents the assumptions for total volume of investment out-
lays over seven years covered by the plan, as well as main sources of
their financing. According to general idea of this exercise, these assump -
tions reflect specific difficulties, introduced into the plan, as mention-
ed in the introduction :

a/ The volume of the budget surplus is determined by the assuptions
for cocoa prices. Explanation of sources of this surplus can be
found in the table concerning the budget;

b/ The inflow of foreign capital is estimated rather cautiously keep-
ing in mind that the country should utilise only these credits; that
are efficient and profitable from the point of view of plan imple-
mentation;

c/ Investment outlays financed from private sources, both domestic and
foreign, have been assessed only hypothetically.

Investment outlays from domestic private sources had to be divided into
monetary investment and investment in kind/i.e., the latter meaning direct
investment by agricultural producers/. The item " domestic monetary in-
vestment " includes reinvested profits of foreign owned firms.

Table 2 deals with distribution of investment on different sectors
of the economy. Although it presents a direct elaboration of data derived
from table 1, it nevertheless has been worked out on the basis of data
contained in tables 4 and 5, i.e., on the basis of the growth of produc-
tion foreseen for individual sectors and of capital intensity of this
production. The analysis of sources of financing specific types of in-
vestment aims at checking whether accumulation projected in table 1 has
been channeled to appropriate sectors of production as provided for in
the plan./ For example, it would be quite unrealistic to assume that ex-
pansion of agriculture is financed by foreign capital flows, or that the
mining sector is financed through " investment in kind "/.

..../...

Data in table 3 present the structure and the rate of growth of the GNP in the ficticious country Cocoaland.

The rate of growth of GNP is taken as given which follows from the very nature of this study. The structure of GNP and rates of growth of this components have also been assumed in such a way, as :

a/ To exclude/for the sake of simplicity/ a non -linear growth of specific components during the plan period;

b/ To ensure a realistic rate of growth of consumption;

c/ To keep a constant share of balance of payments in the financing of investment/ according to the structure of sources of investment financing, as presented in Table 1/.

Thus, the rate of growth of investment/ as well as its volume in t_1/and t_7/ is a result of adjusting the foregoing assumptions to the total amount of investment as given in Table 1.

Table 4 contains data for branch structure of productive sectors, infrastructure and non- productive sectors of the economy. The latter are of hypothecal character while in the case of the former, the branch wise division has been based on actual data on developing economies.

Data for the period t_7 in this table follow from other magnitudes calculated and presented in other tables and listed in the balance- sheet of natural resources/ Table 20/.

A basis for calculating Table 5 are date for increase in production in individual sectors of the economy in the period t_1 - t_7. Formally speaking, these data are calculated basing on Table 4, but in actual fact the results for structure of investment and its capital intensity have influenced the solutions in Table 4; therefore, both tables have had to be elaborated simultaneously. The most important problem has consisted in calculating - in a realistic way - the efficiency of investment. Capital- output ratios for specific sectors of production have been calculated with reference to experiences of a number of developing economies, with due respect, however, to the specific conditions existing in Cocoaland.

..../...

Capital intensity of non- productive sectors was arrived at through a comparison of investment outlays and targets set for increase in "output" of these sectors; it is, therefore, precisely a resultant and, at the same time, a feasible magnitude.

The second column of this table showing data for the branch-structure of investment follows, of course, from the next two columns.

The state budget is analysed in Table 6. Justification for the planned rates of growth of receipts in specific items can be found in tables showing the structure of taxation of population and enterprises./ see table 7 and 8/. It will be noticed that net profits of the state from the public sector can be assessed only in the course of plan implementation, while at the beginning of the plan one could rather assume that this sector would not show any profits.

Although general rate of taxation has not been foreseen to increase, nevertheless, a relatively high rate of increase in direct taxes is projected, based on the following assumptions :

1. Incease in the amount of taxes/ including, from subsistence sector/;
2. Numerical increase of higher income groups;
3. Improvement in tax collection.

At the same time, taxation of luxury consumption is foreseen which may be noticed from the column " other"; where the taxation of luxury housing is included along with other multifarious duties/e.g. for licences/.

All the items on the side of " expenditures" follow from assumptions made in other tables of the plan. Specifically :

1. The volume and the rate of growth of current expenditure follows from Table 3;
2. Targets set for the volume of foreign loans and credits are specified in Table 1
3. Amount of investment outlays follows also from Table 1

4. Amount and the rate of growth of budget surplus is, of course, connected with former items, but, at the same time, it is also the residual item balancing the financial side of the plan, with given amount of foreign loans and credits.

Table 7 shows the structure and the dynamics of growth of incomes and expenditures by individual groups of the population. It gives some ideas about possible scope for taxation of different social and economic groups for the purpose of economic development. The initial structure of incomes of these groups may be partly inferred from the data presented in this table, bearing in mind however, that they are rather scanty and incomplete, which, of course, reflects upon other magnitudes analysed in this table.

Estimates for growth- rates of incomes of specific groups are to a large extent based on general assumptions underlying this plan, e.g., on changes in the structure of the whole national economy, allocation of investment, etc. The rate of growth of consumption is, in principle, a function of growth- rates of personal incomes of various groups, allowance made for such factors as autonomous propensity of a given group to save and accumulate, evaluation of income elasticities of consumption expenditure of a given group, or, finally socio- economic purposefullness and feasibility of income taxation of each of the groups concerned. One of the most difficult problems in this calculus consisted in taking into account the necessity of striking a balance between interests of private accumulation, accumulation for public sectors and interests of personal consumption/ the latter being approached from the point of view of economic, political and social implications.

Personal incomes follow from distributing the value of GNP at factor cost, therefore indirect taxes/ including import duties/ could be neglected, focusing only upon direct taxes/ including export duties/. A more detailed analysis of these taxes is given in Table 8, while Table 7 is simply an extension and continuation of Table 6.

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Table 8 explains and develops the parts of the former two tables dealing with taxation of the population and enterprises. Specifying different types of taxes, this table enables to check the consistency of all the three tables/6,7 and 8/ in their respective parts, showing at the same time the direction and pattern of economic policy with regard to different groups of the population in the course of plan implementation. Basic aims of this fiscal policy are more clearly seen when the scope of taxation with respect to individual groups of the population is considered, indicating at the same the type of taxes to be applied for each special group. Detailed criteria are explained in comments to table 7.

The structure and dynamics of total consumption as well as its components are given in Table 9. The data on private consumption in the initial year of the plan are based primarily on certain official statistics of family households and budgets, with some modifications/ due to the incomplete character of these data/. The data on government expenditure on goods and services are taken from Table 3, both for the initial period and the rate of growth.

Targets for the structure and dynamics of private consumption during the plan period are based on postulated decline in the share of food in total private consumption, from 56 per cent at the beginning of the plan, to 52 per cent at its end. It approximately corresponds to the assumption that about a half of per capita increase in income is earmarked for increase in food consumption. Structure and dynamics of food consumption are analysed in Table 11. The rate of increase in consumption of manufactured goods is clearly higher than that of food consumption/ due to significant increase in consumption of textiles, and some increase in durable consumer goods resulting from differentiated growth in personal incomes/. While the former difference in growth- rates is a matter of course, explanation is needed with regard to substantial increase in consumption of services, as projected in the plan.

It was necessary to take into account a considerable rural- urban migration, resulting in strong increase in demand for services, especially in bigger towns.

Table 10 is of a " re-count " character, making it possible to pass from the analysis of output in terms of factor cost and import prices cif, to the volume of supply for domestic market / domestic production plus imports/, calculated at market prices. All the data are taken from other tables, except retail margin, postulated in this tentatively, largely to arrive at a balanced calculus. The same is true for Table 11. It will be noticed that the total amount of taxes and duties/ according to Table 7/ has had to be distributed between food and manufactured goods in accordance with Table 10 and 11. This calculus has been done largely in a hypothetical way, taking however into account the projected changes in the structure of imports and in fiscal policy.

The significance of the last two tables of " re- count" character, for comparability of two sets of magnitudes should be emphasised, namely, for comparing the supply calculated at factor cost, with the supply, calculated, by its very nature, in market prices.

Demand for food and the sources of food supply are analysed in Table I2. Data for calculating total demand for food are derived from Table 9. Together with information regarding import of food in t_1 these data made it possible to calculate the volume of domestic production of food, including the share of so called traditional food/i.e., staple food produced and consumed mainly within the framework of subsistence economy/. Such an analysis enabled the calculation of the output of these food-stuffs, demand for which will be especially pronounced in connection with rapid urbanization and increase in the standard of living of population. The next step consisted in estimating the technical potential of growth of " non- traditional " food-stuff.

Through the comparison of the volume and structure of demand for food in t_7 with the size of domestic supply likely to be produced, we have arrived at the assessment of the necessary volume of food imports. The latter, in turn, has been taken into account in the relevant part of Table 19.

Substantial differences in growth- rates of staple and "non - traditional " food, stem, obviously, from changes in the structure of demand. Differences in the rates of growth of specific items of non- traditional food can be explained, in turn, by existence of easily accessible reserves/ e.g. fishing, tobacco or beverages/.

Table 13 presents the share of domestic and foreign sources in satisfying total domestic demand for manufactured goods. The data for period t_1 come from general assumptions of the plan, concerning imports and structure of total demand, while data for t_7 follow from changes in the structure of total demand and changes in the structure of domestic output and imports, as projected in the plan. In other words, these data permit to arrive at the structural balance of demand and supply; this table has been therefore worked out, for coordinating :

a/ the plan of aggregated dynamics of consumption of manufactured goods/Table 9/ and demand for investment goods/ Table 3/;

b/ the plan of domestic production of industrial goods/ Table 14/, allowing for exp rts, and

c/ the plan of structure and dynamics of imports/ Table 19/.

Data in Table 14 are highly hypothetical, as based in principle on authors' own estimates/ especially with regard to a breakdown of total industrial output into handicraft and modern industry/. Not withstanding its accuracy, the elaboration of such a table seemed necessary; for, only on its basis was it possible to ascertain whether the structure of supply of industrial goods will correspond to the structure of demand for them, or not. On the other hand, even very rough estimation of modern and handicraft industry seems necessary for evaluation of the feasibility of the rates of growth of different branches, and for constructing Table 16.

Table I5 helps to control the distribution of initial and planned net output among individual branches of industry. The necessety of elaborating this table stems from the need of disaggregating the distribution of net output. This dissagregation, rough as it is, makes it possible to check the balance/e.g., to find out whether demand for durable consumer goods is not met by production of textiles, etc./

Table I6 serves the same purpose, with regard to industrial production, as Tables 2 and 5 with regard to total national economy. For, it gives the disâggregation of data for total industrial output, shows sources of financing its expansion, and presents average capital- output ratios.

Undoubtedly, at such a level of disaggregation, the margin for mistake is much more greater than in the cases of more aggregate magnitudes. It is true especially for the capital- output ratio, for which is very difficult to apply data from actual experience of developing countries, since differences in conditions for production in " Cocoaland" are much greater in individual industries, than for manufacturing as a whole as compared with other developing countries.
However, certain mistakes may offset each other.

The reader should bear in mind, therefore, that capital- output ratios and structure and sources of investment outlays in various branches of industry/ especially in handicraft/ have both been estimated with a considerable degree of arbitrariness. But the calculus done in this table is entirely made for the purpose of "re- count", i.e. to check whether no inconsistencies would appear due to the disaggregation of average magnitudes.

Table I7 provides data for the balance of payments.
The assumption of a limited inflow of foreign capital/ Table 1/ has been of decisive importance for projecting the balance of payments position over the plan period.

This projection, in turn, sets the degree of freedom of running the economy below " the barrier of foreign trade "; at the same time it automatically sets a limit for a permissible deficit of the current trade. The volume and dynamics of receipts from current trade were calculated basing on the projections concerning :

1. The size and growth - rate of merchandise export and non- monetary gold/ Table 18, and

2. The volume of net expanditure for invisibles

In the latter case it was postulated that the share of these expanditures in total balance of payments should decrease over the plan peri as a result of curtailing foreign expenditure of the state for representation.

The balance of these autonomous/ from the point of view of the plan elaboration/ items of foreign trade sets the upper limit for merchandise imports capacity, which, in turn, implies essential constraints for rate and structure of growth of the whole economy.

In subsequent stages of the plan elaboration it was necessary to make several corrections, adjusting the whole planned process of growth to the total, possible volume of imports.

The main item of the next Table 18, dealing with exports, is cocoa, with arbitrarily calculated prices and the built- in assumptions of stability of these prices. Certain components of total exports need some clarification. The whole plan for growth of exports is considerably influenced by the postulated rate of volume of cocoa exports equal to 4 per cent per year. Taking into account the decisive share of cocoa in total exports, this rather modest rate significantly reduces the rate of growth of total exports; it cannot be substantially raised even if other items could grow very quickly.

One of the main results of the planned transformations of the internal structure of the economy towards industrialization is reflected in high targets set for exports of manufactured goods/to be doubled over the plan period/ which express the process of diversification of exports. It will be noticed, however, that the rate of increase in export of manufactured cocoa is relatively modest, which follows from difficulties in placing this export in foreign markets, as anticipated in the plan./ Relatively high index of this increase is a result of a low initial basis and of the rounding of value figures/. It is worth stressing that the plan postulates the export of " final " industrial goods.

Structure of imports/ Table I9/ in the initial year follows from general assumptions of the plan, while absolute volume of imports for t_1 and for t_7 is a result of adjusting the data according to the import capacity, as indicated in Table I7. The elaboration of dynamics of imports has been undertaken under the following assumptions :

1. Total capacity to import over the whole period of the plan;

2. The deficit of the balance of trade should be distributed over time, according to balancing internal demand and supply in subsequent years.

Three basic components of total import/ consumer goods, capital goods and raw materials/ have different rates of growth, which reflects the the postulated changes in the structure of imports at the end of the plan as compared with the initial situation.

Thus, the lowest rate of growth has been projected for consumer goods, without postulating any changes in proportions between food and industrial goods. Only in the latter case a substantial decline in the relative share of import of non- durable consumer goods/ textiles and footwear/ apart/ is foreseen, which has important bearing both upon the expansion of import- substituting production and upon limiting the luxury imports. All in all, as far as imports of consumer goods are concerned, the substitution of imports by domestic production in agriculture handicraft and light industry is relatively sizable.

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The imports of capital goods/ especially machinery and equipment/
expand much more quickly than those of consumer goods. A drastic simp-
lifying assumption has been made in this context, that no increase in
imports of construction materials is foreseen in the plan, forcing,
therefore, a maximum utilisation of respective domestic reserves.

The imports of raw materials, expecially for light industries, are
assumed to have the highest rate; it is the result of the fact, that
it was impossible for Cocoaland to develop silumtaneously during this
plan both industry and the raw material basis for it. The import of
fuels / in value terms/ follows from postulate of construction of own
oil refinery plant, making it possible to pass from " more expensive "
refined oil, to the import of " cheaper ", crude oil.
Table 20 shows the full balance of the national economy, within the
confines of simplifying assumptions made in this study. This table is
of great importance as a means of control and synthesis of all the cal-
culus done throughout the construction of the plan.   This final
checking is done through recalculating data for all the sectors of
domestic production and import/ in aggregate form/ according to parti-
cular items of the final demand. Without constructing this table it
could not be said for sure whether the plan is internally consistent,
since not all the calculus has been undertaken for disaggregated sec-
tors/ e.g. trade/.

It should be emphasized that to arrive at such a final balance
it was necessary to pass from the approach in terms of factor cost to
that in terms of market prices/ through indirect taxes./

One symplifying assumption has been made here, namely that the
balance of invisibles in the balance of payments is fully exhausted by
expenditure of the state on wages and salaries/ i.e., expenditure on
financing government officies, abroad, official visits, etc./

Table 2I deals with the manpower balance. The authors did not see much need for a detailed analysis of the manpower problem, simply making the assumption that employment will not constitute any bottleneck of the present plan. On the other hand, it was also assumed/ in the view of realities of the developing countries/ that the plan cannot aim at providing jobs for all the people who seek it. On the contrary, as will be seen from the table, the rate of growth of unemployment is rather high/i.e. only the unemployment in towns/. The term " social unemployment" used in the table indicates the fact that this is the unemployment of a special nature, resulting not from the lack of employment opportunities in the villages but from the strong migrations to towns, induced by extra-economic factors. An attempt to adjust investment programmes to employment needs could not result in positive solutions, for, any increase in demand for labour in urban centers would induce more than proportional increase in supply of labour in these centers. In conditions assumed for Cocoaland, the only factor limiting rural migration to towns is the unemployment already existing in urban centres.

Although manpower balance has not had, as indicated, any implications for setting productive targets in the plan, nevertheless projections for the rates of growth of specific professional groups constituted one of the factors influencing the rates of growth of incomes of individual groups of population / see Table 7/.

List of Tables :