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USES OF THE INPUT-OUTPUT MODEL IN DEVELOPMENT PLANNING IN UNDERDEVELOPED COUNTRIES

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The Practicability of Constructing Input-Output Tables in Underdeveloped Countries[2]

THE usefulness of constructing an input-output table for a developed economy has more or less ceased to be a point of argument. However, the practicability of constructing such tables for an underdeveloped economy is still a highly debatable subject and has been under critical examination by many writers. Some of them even went so far as to reject the whole idea of constructing such tables in underdeveloped countries without any reservations. The major objection which most of those writers advanced is that in these countries there is an almost complete lack of statistics of any type and even if there are some basic statistics they are not of the type which would enable the construction of an input-output table.

This is no doubt a very serious reason against the construction of an input-output table in such countries, but we should never forget that an input-output table after all is nothing but a body of comprehensive estimates even in the most developed economies, and that, therefore, it is sufficient to concentrate on certain important entries in the table. These are the strategic inputs to every industry. Strategic inputs would include those which have high coefficients, e.g. the input from the agricultural sector into the sugar cane industry, the input from the mining sector into the petroleum refining, etc., they would also include fertilizers into the agricultural sector, and the input from the energy sector to every industry. Other important figures would be those of production, value added and foreign trade.

These figures, as well as the figures of the strategic inputs, may not be easy to get in most underdeveloped countries, but here we should mention the fact that the construction of such a table may

[1] U.N. Economic Commission for Africa.

[2] A more detailed argument on this subject is given in the following paper: 'The Applicability and Utilization of the Input-Output Model in a Developing Economy. The case of Egypt Examined' by Gamal E. Eleish. A. U.N. publication, ST/STAT/Conf. 10/L. 13.

be of great help in discovering the gaps and inconsistencies in the available data. Postponement in constructing such tables, therefore, may deprive us of this opportunity.

But this statement often raises another type of objection to the input-output model. Even if we overcome or disregard the lack of statistical data, we may exert great efforts in constructing an input-output table for an underdeveloped economy and then obtain only an interflow matrix which is practically empty or has only a few insignificant entries. This, it is argued, is due to the lack of interdependence among the various sectors and the extreme dependence of most of these economies on foreign trade, particularly imports, a typical characteristic of an underdeveloped economy.

This point, however, is a debatable one. It is valid indeed for very underdeveloped economies, but it is not always so when we consider those which are on the road to development. This point was discussed in a more elaborate manner in a previous paper.[1] We were fairly convinced there that lack of interdependence in an underdeveloped economy as an argument against the input-output model is not valid unless one distinguishes between a developing economy and a very underdeveloped one. In the same paper the experiences of the Gold Coast, Tanganyika, Cyprus, on the one hand and some Latin-American countries, Italy and Egypt on the other were cited. A lack of interdependence in the interflow tables was found to exist in the first three countries, but not in the last three of the above countries.

Here it may be pointed out that, although some people tie the existence of interdependence among the various sectors of the economy, judged by the number of entries in the interflow matrix, to the level of the development of the economy, others object that it is not the number of entries which is important but rather the significance of the entries themselves. However, all we would like to emphasize here is that when this objection is considered we have to differentiate between developing economies and very underdeveloped economies.

But there is still another serious objection to the input-output table, not on account of its construction, but rather on account of its applicability in a developing economy (here we are excluding more or less the completely underdeveloped economies). This objection concerns itself with the stability of the technical

[1] Ibid., p. 2.

coefficients in those economies. In a previous paper[1] it was argued that the coefficients were not as stable as they were assumed to be in a developed economy like that of the United States. We took a typical example of a developing economy (Egypt) and showed that the three main factors which affect the technical coefficients, namely technological change, the change in relative prices and the scale of production, will all be at work when such a country takes a development programme seriously. We therefore emphasized the fact that for an input-output table to be effectively utilized, serious consideration has to be given to the shape of the technical coefficients in the year for which one is projecting certain results. In other words the projection of future technical coefficients, to take account of the rapid changes which occur in a developing economy, is of paramount importance. This type of projection, of course, is a difficult one to achieve as it requires foreknowledge of investment decisions and the effects of investment on technical coefficients. But it may always be assumed that one can incorporate an approximation of these changes which would still give better results than if existing coefficients were used for long-term calculations.

These are the most serious objections to the construction and utilization of the input-output model in underdeveloped countries. In view of this, other forms of accounts have been suggested as a substitute for the input-output model, not only because of the abovementioned objections but also because the other forms of accounts better serve the needs of the underdeveloped countries. But looking at the problem as a whole it could be safely stated that the input-output model is a comprehensive statistical model which could be constructed in almost every economy (except for very underdeveloped countries which may not yield results of any significance from such tables) provided high ideals in statistical accuracy are tempered with practicability. For this, we need the type of statistician-economist who may be called a tamed[2] statistician and economist. And after all, it is better to have such a table than none at all. Further, it will help in showing, as we mentioned before, the gaps and inconsistencies in the available data.

[1] Ibid., p. 4.

[2] A tamed statistician or economist in my opinion is that type of economist or statistician who is mature enough to know how to go round the dogmas of the textbook when that is necessary. Some people prefer to use in this context the 'rule of thumb' method.

THE CONSTRUCTION AND GENERAL CHARACTERISTICS OF EGYPTIAN INPUT-OUTPUT TABLES

Before discussing the uses of the input-output model in planning, we thought it would be useful to mention something about the construction and general characteristics of the Egyptian tables since all of the examples given in this paper are based on these tables.[1] To start with, the reader's attention is drawn to the fact that it is difficult to be definite about the accuracy of every individual item and that these figures represent a reasonable approximation of the transactions.

In constructing the Egyptian tables,[2] although aware of this fact, we felt that special attention should be given to certain areas. Thorough investigations in these areas have, therefore, been carried out. These areas include the principal inputs in every sector and the inputs to each sector from the energy sector, value added in every sector (here the extensive work, done in the Planning Committee in the field of national accounting was of great help), gross production in every sector and finally, the elements in the final demand sectors. It was felt that by giving these elements the careful attention they deserved we would not be very far off the track.

To find, verify and process these data presented great difficulties. The required data were dispersed and great efforts had to be made for their collection. But this is a familiar difficulty in many of the developing countries. In constructing the Egyptian tables, we followed the traditional method, that is, we attempted to construct the tables row by row, and then, as an independent exercise, column by column.

The first approach, i.e. the construction of the tables row by row, seeks to discover the distribution of the output of a sector among the different productive sectors and the sectors of final demand. For this purpose, commodity balances were constructed. These included balances not only for material commodities but for services and transportation as well. These balances were constructed for the years 1952 to 1956, but the first input-output table was constructed for 1954. The year 1954 was considered to be a reasonably stable year from the economic point of view,

[1] Two tables have so far been constructed for the Egyptian economy, the first is for 1954 and the second for 1959.

[2] The 1954 table was utilized in most cases.

and a great deal of statistical data were collected by the National Income Unit of the Planning Committee for that year.

At the same time, we sought information which would enable us to construct the tables column by column. This meant that an investigation of the structure of the different sectors had to be carried out. For this purpose a survey was conducted which involved the examination of the accounts of some 600 concerns covering a fair representation of the different sectors. Other technical information was also collected.

The 1954 table is of the order of 83 × 83. Other versions of it are of the order of 33 × 33 and 7 × 7. The 1959 table is only of the order 33 × 33. Final demand is divided in both tables into six sectors, distinguishing separately Government and household consumption, Government and private investment, exports and changes in stocks. Producer's prices were used, except for imports which were evaluated at c.i.f. prices and exports which were evaluated at f.o.b. prices. One important characteristic of the Egyptian tables is that flows of domestic production are separated from imports.[1] Thus we actually have two interflow matrices, one from domestic production and the other from imports, or what we will refer to later as the import matrix. The latter has great significance in the calculation of the foreign currency requirements of an investment programme and the net effect of an import substitution policy, as well as other uses which will be discussed later.

Uses of the Input-output Model in Planning

Below we will attempt to cite a variety of uses of the input-output model in planning, starting first with general uses and ending with specific uses.

GENERAL USES OF THE INPUT-OUTPUT MODEL

1. *Calculation of Production Targets*

The calculation of production targets for the various productive sectors is the most straightforward use of the input-output model. Having projected our final demand or any specific part of it, we can calculate the production required from each sector to satisfy this final demand. This can be achieved in two ways. The first involves inverting the matrix of direct coefficients (the aij's), to obtain other types of coefficients (let us call them

[1] For more details on this point see ibid.

rij's). These latter coefficients give the direct and indirect requirements from sector i per unit of final demand from sector j. Alternatively we can reach the same results by adopting an iterative process using the matrix of direct coefficients (the aij's).

The second method is laborious, but it may be advisable to use it for various reasons. Inversion of the matrix freezes the coefficients, and with frequent changes in the input coefficients in a developing economy it may be considered futile to invert the matrix. Furthermore, with the iterative method, we can always see the results step by step and we are able to introduce any changes which may be necessary. For instance, we found that the production required from a certain sector is above the available or anticipated capacity, we can always assume that the requirements from that sector after that point will all come from imports, and stop the indirect effects on the other sectors which would have been created had we assumed that this sector will be able to expand its production without any limits. This will also yield a better estimate of imports. On the other hand the inversion of the interflow matrix may be useful since as its coefficients will be of great help deriving other coefficients, when we wish to know the direct and indirect requirements from imports, labour and income per unit of final demand.

In either case, the significance of the calculation of production targets is clear and this is, no doubt, the principal usefulness of the input-output model. By this means it is possible to discover the bottlenecks or excess capacities which may result from a certain development policy.

2. *Structural Analysis*

The input-output model also provides us with a valuable tool for structural analysis. Interdependence among the different sectors becomes more obvious and clear, and the extent of the dependence of the economy on a certain industry as well as the dependence of that industry on the prospects of others can be easily traced. To illustrate the common method used to carry out such structural analysis we have arranged the data of the 1954 and 1959 tables in a way which shows:

(*a*) the degree of dependence of individual industries on others;

(*b*) the weight of the different sectors in the rest of the economy.

(a) The Degree of Dependence of Individual Industries on Others

The degree of dependence of individual industries on other industries and on the final demand sectors can be examined in terms of the rows of the input-output table. Table I in the Appendix shows the deliveries from each of the thirty-three sectors included in the aggregated interflow matrix for 1954, to intermediate demand, domestic final demand and exports. Industries are ranked in this table according to their direct dependence on other industries, that is, the proportion of their output going to intermediate users. This type of ranking is only interesting as far as it tells us which industries depend largely on the prospect of other industries.

Basic metallurgical, mining and quarrying, basic chemicals, cement and fertilizers all have high percentages of deliveries to intermediate demand. It is for these types of industry that the input-output table provides a unique analytical tool. The fact that these industries do not directly depend on the final demand sectors makes other tools of economic analysis less useful. To discover the influence of such industries, it is necessary to discover the interdependence among the different sectors of the economy as is done by the input-output model.

The industries at the bottom of the table, which depend largely on sales to final demand, include consumer industries, construction and some services. The fact that the products of these industries make their way to the final demand sectors make them fall within the competence of the familiar tools of economic analysis. Unlike the industries at the top of the table, the prospects of these industries depend on the development in consumption, investment and exports to the rest of the world.

As mentioned before, the Egyptian tables show domestic production and imports separately. Table I shows deliveries from domestic production only. But as imports play an important role in the Egyptian economy it is interesting to examine in Table II the deliveries from both domestic production and imports. To facilitate comparison between the two tables and in order to trace easily the changes in ranking which followed the addition of imports, Table III is presented. This table shows the industries divided into three categories: those which did not show any change in the distribution of their output when imports were added, those which delivered more to intermediate consumption and those which delivered less. The first group is large.

Three factors may be responsible for keeping the same pattern of distribution among the sectors. The first is that in some of these sectors a very high proportion, if not all, of the needs of the economy are satisfied by domestic production. This group includes such sectors as electricity, education and other services, and the Suez Canal sector. The second factor is that the amount of imports in some sectors is negligible. These sectors include, for instance, cement, oils and fats, bakery products, wood furniture and others of similar nature. The third factor is that in some sectors the distribution of imports between intermediate and final use is more or less proportionate to the distribution of domestic production among these uses. This is apparent in the case of mining and quarrying, petroleum refining, other basic industries, spinning and weaving, other industries, tobacco and cigarettes and ready-made clothes.

The second group, that is, the group which delivered more to the intermediate sectors after adding imports, includes mainly industries which deliver a large proportion of output to intermediate demand. Among these sectors, fertilizers showed a significant upward change, as might be expected. However, the changes in other sectors are not really very substantial. This is also true of the third group which delivered proportionately less to intermediate demand after adding imports. We feel, therefore, that with few exceptions imports are distributed fairly proportionately to deliveries from domestic production.

Tables were also prepared for 1959. Table IV shows the ranking of the industries when deliveries from domestic production alone are considered. Table V shows the ranking of industries when deliveries from both domestic production and imports are taken into consideration. Table VI shows the changes in the distribution of deliveries between 1954 and 1959. This table shows the industries which increased their deliveries to intermediate demand over the period, those which decreased them and those which have not changed. The table shows also the industries which showed increases or decreases in the percentage of their deliveries to exports.

Among those industries which showed increases in the percentage of deliveries to intermediate demand over the period are petroleum refining, other basic industries, fertilizers and other industries. These same industries showed decreases in the percentages of their deliveries to exports. These are industries

which deliver a larger proportion of their output to the intermediate sectors.

The sectors which showed decreases in the percentages of their delivery to intermediate demand over the period included mining and quarrying, basic metallurgical, cement, other food industries and spinning and weaving. Those sectors without any exception showed substantial increases in the percentages of their deliveries to exports.

(*b*) *The Weight of the Different Sectors in the rest of the Economy*

To show the weight which each of the sectors have on the rest of the economy we followed a familiar procedure. This procedure rests upon deriving for each industry (*a*) the percentage of total deliveries of the industry's products which arose from domestic production,[1] and (*b*) the percentage of the inputs to the industry derived from domestic production. These two percentages were then multiplied together and the industries ranked accordingly, the highest, i.e. the industry which exerts the most influence, being at the top of the table.

The results for 1954 are shown in Table VII. The table shows clearly that in some basic industries there is a heavy reliance on imports. Industries in this group are of the capital intensive type which develop generally at a later stage of economic development. These include manufacture and repair of machinery, other basic industries, other industries, metal products, mining and quarrying, basic metallurgical and fertilizers. At the other end of the table, the sectors in which a high percentage of the needs are satisfied from the domestic production include services, transportation and communications, and also the types of industry which have already been developed mainly in light industries.

The direct influence of an industry on the rest of the economy as shown by this table represents the combined effect of the percentage of the availability from a sector which is supplied by domestic production and the material inputs from domestic production to that sector. However, this index should be taken

[1] Total deliveries include the deliveries from the industry to itself but changes in stocks were excluded. It would have been, of course, more appropriate to include the effects of the changes in stocks. However this was not done simply because of our desire not to introduce too many sets of figures which will only lead to the confusion of the reader.

only in relative terms, as circular and indirect effects play an important role and here they are neglected.

A similar table for 1959 has also been prepared (Table VIII). Although some industries have changed their ranking, the table shows that the general pattern is the same as in 1954. However, some significant substitution of domestic production for imports has taken place. This is particularly true of the capital intensive industries. By 1959, the mining and quarrying sector supplied 79 per cent of the total availabilities[1] as compared with 74 per cent in 1954. Similarly fertilizers supplied 43 per cent in 1959 as compared with 33 per cent in 1954, and paper and paper products increased its share from 38 per cent in 1954 to 73 per cent in 1959. Other basic industries increased from 47 per cent in 1954 to 78 per cent in 1959. The sector 'other industries' went up from 59 to 71 per cent.

These are only examples of how the input-output model can be put to use for structural analysis purposes. The methods utilized are not unfamiliar but we thought it useful to present them here with actual data derived from the two tables for Egypt. Other general uses of the input-output model are numerous but it may be useful to go on with the discussion of the more specific utilization of the model in planning.

SOME SPECIFIC USES OF THE INPUT-OUTPUT MODEL IN PLANNING

1. *Sectoral Analysis*

The input-output model provides us with a unique tool for sectoral analysis. In fact we can have as many partial input-output tables as we may desire. We may have a table for agriculture if that sector is of particular importance. Also we may have a separate table for industry if we are particularly interested in doing so. What we actually do in such cases is that we put a magnifying glass over the rows and columns presented by the sector or sectors which interest us. As every sector is represented by a row and a column, our analysis may be concentrated on the row only if we are interested in the detail of the commodities produced within the sector or on the column if we are interested in the effects of technological change or the substitution of one industry for another (from gas fuel to electricity or from cotton

[1] Total availabilities here means production and imports. Changes in stocks are neglected.

textiles to synthetics, etc.). Or, we can conduct our study through concentrating our magnifying glass on both the row and the column at the same time.

So if we are interested in the specific commodities produced by a particular sector then all we do is to disaggregate the row representing this sector and include in a separate row every commodity we want to study. In doing that, we are merely rectangularizing the table. Once we are able to disaggregate the row of the sector into the various commodities we want to study we can then calculate the requirements of the various sectors of the economy for each of these commodities. This method is extremely important in planning, particularly if some of the commodities which are aggregated in a sector have strategic importance and detailed information is therefore required for a better planning of such commodities.

On the other hand if we are interested in the technological structure of the various industries grouped in one sector we can disaggregate the column representing that sector. This will show the variety of inputs which go to the production of one commodity rather than the other. This is particularly interesting in the calculation of the effects of the expansion of the production of a particular commodity as with this disaggregation we will have a better insight into the repercussions caused by this particular commodity on the rest of the economy. This, as we mentioned before, is very useful in studying the effect of substituting one commodity for another, within the sector or outside it, on imports, employment, income and a variety of other things.[1] In this connection the reader is referred to a very interesting study of the industrial sectors in Egypt which was carried out by the National Institute of Planning, Cairo. This experimental study showed the great value of the input-output model in sectoral analysis.

2. *Regional Analysis*

For the purposes of regional analysis the input-output model is very helpful indeed. Through the utilization of a regional input-output model, we can study the effect of a certain development programme on the various regions. In some countries there may be separate regions with distinct geographical characteristics as well as definite levels of economic development. These

[1] An example of this type of calculation will be given later.

differences may be the outcome of historical developments, variation in income, natural resources and a variety of other reasons. In such a case an economic model which incorporates such differences may be best suited for economic analysis.

Regional input-output analysis takes into consideration the fact that the demand for and the supply of commodities differ from one region to the other, and that a particular commodity which is produced in abundance in one region may not be a substitute for another commodity produced in another region. It brings to light the differences in the technological structure of the various regions, in consumer's behaviour, in sources of supply of commodities, and the composition and size of final demand.

Keeping these points in mind a regional model[1] was suggested for the U.A.R. which would have embraced two input-output tables for the two regions, Egypt and Syria. A version of the model is reproduced in Table IX.

In the top left-hand side corner, we have the interflow matrix for Egypt where entries from both domestic production and imports are shown separately in every cell. A similar matrix for Syria is located at the bottom right corner. The imports shown in these two matrices are from outside both regions. Below the Egyptian matrix there is another matrix showing the Syrian exports to Egypt, and in the top right-hand corner, one which shows exports from Egypt to Syria. On the extreme right the final demand of both regions and the gross production of every sector in the two regions is shown separately. At the bottom of the table is the value added in the two regions.

The model is simple, distinguishing three sources of supply, from the region itself, from the other region and from the rest of the world. This differentiation is not unlike Leontief's regional and national commodities and Chenery's differentiation between those of Leontief and his additions, i.e. the intermediate commodities. However, the model is simplified in that it assumes that consumption can be considered autonomous in the two regions rather than induced or partly induced. The stage of the union between the two countries at that time necessitated the treatment of the two economies as more or less separate entities.

[1] The frame of this model is not unfamiliar but its adaptation to the U.A.R. was suggested by me in consultation with Professor Vera Cao Pinna of Italy who visited the Planning Committee, Cairo, in 1960.

The model shows clearly the magnitude of foreign trade between the two countries, and it would lead to the discovery of any contradictory policy in foreign trade. It could, therefore, be a good guide for a policy of import substitution, that is, substitution of a foreign import by an import which comes from the other region. It is also useful in discovering the bottlenecks or excess capacities which could result from an investment programme in either region. Such a model may avoid duplication of investment, and help in the choice of investment to suit the factor proportions in each region. However, there is a major defect in this model, and that is that the import coefficients will always be changing. Therefore to be effectively used, anticipated changes in these coefficients should be incorporated in the model before its utilization.

3. *Calculation of Foreign Currency Requirements for Development Projects*

One of the most difficult problems which faces most, if not all the underdeveloped economies is the serious shortage of foreign currencies. This shortage becomes more acute when the country starts an economic development programme. In this phase of development the country increases its importation of capital goods and, as the figures for Egypt indicate, the import requirements (direct and indirect) per unit of investment are much higher than those per unit of consumption or of exports. The need for foreign currency becomes extremely vital for the execution of the development plan, and its allocation to the various uses becomes a matter to be given careful consideration. Here we are concerned with the use of an input-output table in calculating the foreign currency requirements of the development projects; the allocation problem will be touched on briefly in due course.

In calculating the requirements for foreign currencies for development projects we should, of course, take into consideration both the direct and indirect requirements. The calculation should distinguish two phases for each project, the construction phase and the utilization or production phase, as during each of these phases the requirements are different in their size and nature.

For the first phase, we proceed by breaking the investment down into its input components. Doing that, the figures we have

will be nothing but another column of final demand. Of course, we have to distinguish between the various stages of completion of the project. Having done this, we can calculate the direct and indirect requirements for imports for that set of final demands which represents the investment project under consideration. The method of calculation is simple. Having the import factor which could be denoted by M we can multiply it by the inverse of the interflow matrix $(I - A)^{-1}$ which will give us a new vector M u. The elements in this show the direct and indirect requirements for imports in terms of final demand.

$$M^* = M(I - A)^{-1}$$

The significance of this type of calculation is illustrated by the figures given in Table X which show the direct and indirect requirements for imports per unit of final demand from each of the productive sectors included in the Egyptian input-output table.

For the second (production) phase, we can follow a similar procedure and calculate the total import requirements needed for the new production; the latter will create a demand for the products of other sectors, and those in turn have import requirements. Our experience in Egypt showed that these types of calculations are most useful in estimating the real need for foreign funds and their proper allocation.

4. *The Use of the Input-Output Model in Testing the Effects of an Import Substitution Policy*

Import substitution plays an important role in the early phases of development. In an earlier paper[1] it was argued that industrial development in Egypt is largely characterized by efforts to substitute local production for imports. Therefore it is extremely important to calculate the effects of such policy on the economy.

One particular effect in which we are interested is the net effect on foreign currencies. The question to be posed is this: are we going to have a net saving in foreign currencies if we substitute a domestic product for a particular import and if so, how much is this saving? This can be easily done by utilizing the coefficients of the vector M u. The amount of imports to be replaced by domestic production should be shown as part of final demand.

[1] Ibid.

It is then possible to calculate, by utilizing the above coefficients, the direct and indirect requirements for imports necessitated by this final demand. By subtracting these requirements from the value of imports to be replaced by domestic production, we get the net effect of the process of substitution.

This type of calculation can also be done by using the iterative method. In Table XI we give an example utilizing the input coefficients of the 1954 table, assuming that £E100 worth of agricultural imports and £E400 worth of industrial products will be replaced by domestic production. The example shows that taking the direct requirement only into account the savings of foreign currency would be £E463, but taking both direct and indirect requirements into consideration the net saving would be £E436·75. This type of calculation is extremely important in a country where there is a scarcity of foreign currencies. By neglecting these indirect effects, we exaggerate the benefits derived from an import substitution policy as well as underestimating the requirement for foreign currencies. This in turn can lead to a bottleneck in this vital area which eventually will affect not only new investments but also the flow of imported input, as has happened in some countries. These types of calculations are being carried out by the Planning Committee, Cairo, and the results show that better estimates of the net savings in foreign exchange could be arrived at through such calculations.

5. *Choice of Investments*

The use of input-output analysis in policy decisions is developing from merely testing the consistency of investment programmes and economic policies which have already been established into more elaborate usage, namely the exploration of the range of development possibilities by assuming certain exportation possibilities, growth rates, changes in technology and other constraints of similar nature.[1] More elaborate models of the Frisch type are also in the course of development. His Cairo and Oslo channel models are examples to be quoted. The first is a linear type of model whereas the second is a non-linear one. But in the underdeveloped economy, the simpler the model the better. In this connection, the simple open input-output model may prove to be of great help in guiding the policy-

[1] H. B. Chenery, 'Inter-industry Research in Economic Development', *American Economic Review*, Vol. I, No. 2, May 1960.

makers in underdeveloped countries. By following a procedure such as that referred to above, a variety of development paths could be tested and the most suitable choice could be made. Here, however, we would like to emphasize the usefulness of the input-output model in investment choices. Our scheme is simple, and some calculations on the lines we are suggesting were carried out in the Planning Committee in Cairo.

In underdeveloped economies, foreign currency requirements, as we mentioned before, play an important role in development. Therefore it is important to calculate beforehand the commitments which would result from carrying a certain investment programme. The employment to be created by such a programme is also of paramount importance, particularly if a country is aiming at increasing employment opportunities without jeopardizing levels of technology. Income generated by an investment programme is also a factor to be considered seriously. There are, of course, a variety of other effects which should be considered but let us be contented with the three we have mentioned. What we are suggesting then is to calculate coefficients which show the direct and indirect requirements of labour and also others showing the total income generated by a unit of final demand. These coefficients could be calculated in a similar way to those of imports. Having calculated these coefficients and having distinguished the investments suggested into distinct categories, we would be able to calculate the total requirements from imports, labour and incomes created from the various categories of investments.[1] This type of calculation has proved to be valuable in Egypt as it put before the analyst as well as the policy-maker a valuable set of information which would not have been available otherwise. But the problem of choice and timing still, of course, would have to be considered and the general method of linear programming would have to be thought of seriously.

6. *Input-Output and National Budgeting*

The input-output model can be of great help in the preparation of a national budget. This was done in Egypt; the 1954 table was utilized in the preparation of a national budget for Egypt for

[1] Similar calculations were made in the Planning Committee, Cairo, for twenty-five different categories of investments, see G. Eleish, *The Applicability of the Input-Output Model.*

the year 1960–1.[1] The starting-point in the preparation of such a budget was a projection of the changes in the final demand elements which would take place during the period 1959–60 and 1960–1. Having done that and having calculated sets of coefficients which show the direct and indirect requirements of imports, value added and household income created as percentages of a variety of final demands for the year 1960–1, we were able to prepare a national budget showing the repercussions on imports and incomes which will result from the projected final demand.

7. *The Calculation of the Requirements of a certain Investment Programme*

One simple utilization, and a very useful one, of the input-output model is the calculation of the requirements of a certain investment programme. This we have done repeatedly in Egypt. One particular example which could be quoted here is the attempt to calculate the repercussions of an investment programme in agriculture. The total sum of the investment was £E418 million. This was divided in two components, £E183 million for vertical expansion and £E235 million for horizontal expansion. This distinction between the two components is extremely important, as each type of investment has its own structure.

The first step was to break down the two types of investment into their input components or what may be considered the direct requirements. The second step was to calculate the production required from each sector to meet this investment programme. Having calculated these production targets, the available capacities in every sector which could be directed to this production were reviewed. In some sectors it appeared that to avoid bottlenecks new capacities should be installed, which would, of course, require investment in these sectors. Another round of calculation should be made in such cases in order to calculate the requirements of those new investments.

Other repercussions, on consumption for instance, could also be incorporated in the solution. As a result of the initial investment programme and the other additional investments, employment and consequently new incomes will be generated. Having

[1] The steps followed in the preparation of the abovementioned budget are discussed in more detail in ibid.

coefficients similar to those which we discussed in Section 5, we can calculate the incomes which will be created from the investment programme and, assuming certain propensities to consume, the additional consumption, which in its turn could be included as a new final demand. This method is laborious and requires many rounds of calculations. It is also approximate, but nevertheless it is a simple and useful exercise.

8. *Input/Output Analysis and Public Organizations in Egypt*[1]

Since July 1961 the drive for nationalization has greatly increased in the U.A.R. As a result, the public sector has increased in all economic activities. Some sectors were completely nationalized; others were left to the private sector. In the remaining sectors, the public sector operates side by side with the private sector. For better management of the public sector, the Government has created thirty-nine public organizations, each to be responsible for one or more sectors. Each organization was made responsible for planning of the activities of the production units in the sector, and also for following up the execution of the plans. The production unit is autonomous in the majority of its actions, yet general policy measures are designed in close consultation with the public organizations. These organizations were in turn made responsible to the proper ministry, which may in turn be responsible for more than one organization.

From this very brief description of the organizational set-up of the public executive machinery in the U.A.R. it may be suggested that an inter-industry model designed to incorporate these organizations would be of some empirical value. To start with, if we can assume that there are now some sectors which may be described as purely public (railroads for instance, banks and insurance services, etc.) and others which may be described as purely private, and the remainder which may be described as mixed sectors, an input-output model could be constructed to distinguish such sectors. As for the first two types of sectors, we have no problem. The major problem will be the mixed sectors. Each of these could be divided into two components, one public and the other private. The deliveries from each could be calculated by means of delivery coefficients[2] which are merely the

[1] This is a tentative suggestion which could be elaborated.

[2] Complete substitutability is assumed between similar input from the two sectors (private and public).

ratio of the production of each component to the total production of the sector. These coefficients could not, of course, be assumed to be stable, but any changes in the capacities installed in the public sector or the private sector could be incorporated. The columns of the mixed sectors would also be divided into public and private, each showing its own distinct technological structure. This in itself may reveal the shortcomings of one sector if compared with the other.

Having constructed a table on these lines, the public sectors will be distinguished from the private sectors and production targets for each could be set. All the other familiar types of calculations could easily be performed. This will give the planners and the policy-makers a better tool for the organization and management of the public sector viewed through its relationship with the private sector and the outside world.

TABLE I

Ranking of the Productive Sectors According to their Deliveries to Intermediate and Final Demand

£E.'000 (Without imports) Year: 1954

Sector	Total Output 1	Deliveries to intermediate demand 2	% 2 : 1 3	Deliveries to domestic final demand 4	% 4 : 1 5	Deliveries to exports 6	% 6 : 7 7
1. Basic metallurgical	9,847	9,091	92	414	4	342	4
2. Mining and quarrying	13,051	11,525	88	624	5	902	7
3. Basic chemical	2,857	2,447	86	410	14	—	—
4. Cement	5,545	4,700	85	44	1	801	14
5. Fertilizers	5,747	4,566	79	0	—	1,181	21
6. Electricity	12,383	9,082	73	3,301	27	—	—
7. Paper and paper products	3,621	2,557	71	796	22	268	7
8. Petroleum refining	25,783	17,416	68	7,520	29	847	3
9. Banking and insurance	15,316	10,413	68	3,776	25	1,127	7
10. Agriculture	400,814	253,363	63	144,282	36	3,169	1
11. Grinding and processing of grains	81,660	47,380	58	32,530	39·8	1,750	2·2
12. Other services	276,093	159,757	58	116,336	42	—	—
13. Manufacturing and repair of machinery	30,828	17,770	57	11,922	39	1,136	4
14. Other basic industries	12,744	7,137	56	4,698	37	909	7
15. Transportation and communication	86,165	42,511	49	37,274	43	6,380	8
16. Metal products	11,870	5,302	45	6,346	53	222	2
17. Spinning and weaving	86,812	38,542	44	40,966	47	7,304	9
18. Other industries	36,955	16,111	44	16,975	46	3,869	10
19. Tobacco and cigarettes	49,125	20,558	42	28,496	58	71	—
20. Trade and financial services	249,495	105,246	42	104,373	42	39,876	16
21. Dairy products	44,611	17,136	38·4	27,450	61·5	25	0·1
22. Oils and fats	13,548	3,927	29	9,111	67	510	4
23. Sugar industry	21,104	6,005	28	15,083	71	16	1
24. Other food products	26,843	7,287	27	16,432	61	3,124	12
25. Ginning and processing of cotton	87,061	20,340	23·3	—	—	66,721	76.7
26. Education	5,725	1,335	23	43,901	77	—	—
27. Wood and furniture	10,063	1,008	10	8,747	87	308	3
28. Manufacture of ready-made clothes	14,332	697	5	12,589	88	1,046	7
29. Construction	71,311	3,257	4	68,054	96	—	—
30. Slaughtering and meat products	46,420	483	1·4	45,758	98·3	179	0·3
31. Bread and bakery products	57,050	220	0·4	56,780	99·5	50	0·1
32. Suez Canal	31,429	18	0·01	0	—	31,411	99·9
33. Medical services	7,932	—	—	7,932	100	—	—

TABLE II

Ranking of the Productive Sectors According to their Deliveries to Intermediate and Final Demand

£E'000 (With imports) Year: 1954

Ranking of sectors Table 1	Ranking of sectors after adding imports	Sectors	Gross production and imports 1	Intermediate demand (domestic production and imports) 2	% 2 : 1 3	Domestic final demand (domestic production and imports) 4	% 4 : 1 5	Exports 6	% 6 : 1 7
1	1	Basic metallurgical	20,491	19,382	94	767	4	342	2
5	2	Fertilizers	17,359	16,178	93	0	—	1,181	7
2	3	Mining and quarrying	17,669	15,502	88	1,265	7	902	5
4	4	Cement	5,665	4,820	85	44	1	801	14
7	5	Paper and paper products	9,609	7,239	75	2,102	22	268	3
6	6	Electricity	12,383	9,082	73	3,301	27	—	—

9	7	Banking and insurance	17,007	12,104	71	3,776	22	1,127	7
8	8	Petroleum refining	40,989	27,828	68	12,314	30	847	2
10	9	Agriculture	416,391	258,643	62	154,579	37	3,169	1
11	10	Grinding and processing of grains	84,815	50,535	60	32,530	38	1,750	2
12	11	Other services	276,098	159,762	58	116,336	42	—	—
14	12	Other basic industries	26,838	15,107	56	10,822	40	909	4
15	13	Transportation and communication	92,969	46,084	50	40,505	44	6,380	6
17	14	Spinning and weaving	95,023	41,776	44	45,943	48	7,304	8
18	15	Other industries	62,292	27,493	44	30,930	50	3,869	6
16	16	Metal products	19,650	8,389	43	11,039	56	222	1
19	17	Tobacco and cigarettes	54,117	22,652	42	41,394	58	71	—
20	18	Trade and financial services	249,854	105,579	42	104,399	42	39,876	16
13	19	Manufacture and repair of machinery	61,023	23,257	38	36,630	60	1,136	2
21	20	Dairy products	45,743	17,570	38	28,148	61·5	25	0·5
24	21	Other food products	28,487	8,669	30	16,694	59	3,124	11
22	22	Oils and fats	14,130	4,094	29	9,526	67	510	4
26	23	Education	5,725	1,335	23	4,390	77	—	—
25	24	Ginning and processing of cotton	87,061	20,340	23	—	—	66,721	77
27	25	Wood and furniture	10,328	1,012	10	9,008	87	308	3
29	26	Construction	71,311	3,257	5	68,054	95	—	—
28	27	Manufacture of ready-made clothes	17,065	899	5	15,120	89	1,046	6
31	28	Slaughtering and meat products	46,420	483	1	45,758	98·5	179	0·5
30	29	Bread and bakery products	57,121	220	0·4	56,851	99·5	50	0·1
32	30	Suez Canal	31,429	18	0·01	0	—	31,411	99·9
33	31	Medical services	7,932	—	—	7,932	100	—	—

TABLE III

Changes in Ranking of Sectors After Adding Imports 1954

Industries with higher percentage of delivery to intermediate demand	% Without imports	% With imports	Industries with smaller percentage of delivery to intermediate demand	% Without imports	% With imports	Industries which did not change	%
Basic metallurgical	92	94	Agriculture	63	62	Mining and quarrying	88
Fertilizers	79	93	Manufacture and repair of machinery	57	38	Cement	85
Paper and paper products	71	75	*Metal products*	45	43	Electricity	73
Banking and insurance	68	71	Dairy products	38·4	38	Petroleum refining	68
Grinding and processing of grains	58	60	Ginning and pressing of cotton	23·3	23	Other services	58
Transportation and communications	49	50	Slaughtering and meat products	1·4	1	Other basic industries	56
Construction	4	5				Spinning and weaving	44
						Other industries	44
						Tobacco and cigarettes	42
						Trade and financial services	42
						Oils and fats	29
						Education	23
						Wood and furniture	10
						Manufacture of ready-made clothes	5
						Bread and bakery products	0·4
						Suez Canal	0·01
						Medical services	—

TABLE IV

Ranking of the Productive Sectors According to their Deliveries to Intermediate and Final Demand

£.E.'000 (Without imports) Year: 1959

Sector	Total output 1	Deliveries to intermediate demand 2	% 2 : 1 3	Deliveries to domestic final demand 4	% 4 : 1 5	Deliveries to exports 6	% 6 : 1 7
1. Banking and insurance	11,991	10,827	90	664	6	500	4
2. Fertilizers	8,833	7,767	88	0	—	1,066	12
3. Electricity	19,830	15,843	80	3,987	20	—	—
4. Other basic industries	14,358	11,368	79	2,495	17	495	4
5. Mining and quarrying	22,864	17,324	76	1,269	5	4,271	19
6. Basic metallurgical	15,985	12,202	76	108	1	3,675	23
7. Cement	7,355	5,620	76	303	4	1,432	20
8. Agriculture	439,806	323,884	73·6	113,181	25·7	2,741	0·7
9. Paper and paper products	15,988	11,650	73	3,213	20	1,125	7
10. Petroleum refining	36,729	25,607	70	10,144	28	978	2
11. Other industries	39,307	23,261	59	13,381	34	2,665	7
12. Manufacture and repair of machinery	27,564	14,875	54	12,401	45	298	1
13. Grinding and processing of grains	98,373	52,894	54	41,945	43	3,534	3
14. Transportation and communication	92,752	45,897	49	38,055	41	8,800	10
15. Dairy products	81,899	34,196	42	47,469	57·8	234	0·2
16. Tobacco and cigarettes	52,545	20,817	40	31,674	60	540	—
17. Metal products	13,626	5,170	38	8,201	60	255	2
18. Spinning and weaving	142,561	53,999	38	72,864	51	15,698	11
19. Trade and financial services	175,722	65,701	37	81,884	47	28,137	16
20. Sugar industry	32,670	11,741	36	18,263	56	2,666	8
21. Oils and fats	15,490	5,072	33	9,666	62	752	5
22. Ginning and processing of cotton	149,612	32,356	21	1,633	2	115,623	77
23. Other services	185,784	24,368	13	161,416	87	—	—
24. Basic chemical	10,920	733	7	9,874	90	313	3
25. Construction	88,232	6,209	7	82,023	93	—	—
26. Other food products	28,626	1,641	6	12,305	43	14,680	51
27. Manufacture of ready-made clothes	19,044	277	3	17,826	92	941	5
28. Slaughtering and meat products	56,342	515	0·9	55,568	98·6	259	0·5
29. Wood and furniture	8,501	4	0·7	8,240	97	197	2·3
30. Medical services	10,695		0·1	10,686	99·9	—	—
31. Bread and bakery products	68,376	39	—	68,316	99·9	21	—
32. Suez Canal	44,500	—	—	0	—	44,500	100
33. Education	5,868	—	—	5,868	100	—	—

TABLE V

Ranking of the Productive Sectors According to their Deliveries to Intermediate and Final Demand

£E'000 (With imports) Year: 1959

Ranking of industries Table IV	Ranking of industries after adding imports	Sectors	Total output 1	Deliveries to intermediate demand (domestic productions and imports) 2	% 2 : 1 3	Deliveries to domestic final demand (domestic productions and imports) 4	% 4 : 1 5	Deliveries to exports 6	% 6 : 1 7
2	1	Fertilizers	20,358	19,292	95	—	—	1,066	5
1	2	Banking and insurance	12,791	11,627	91	664	5	500	4
5	3	Mining and quarrying	29,012	23,220	80	1,521	5	4,271	15
3	4	Electricity	19,830	15,843	80	3,987	20	—	—
4	5	Other basic industries	18,463	14,733	80	3,235	18	495	2
7	6	Cement	7,821	6,063	78	326	4	1,423	18

9	7	Paper and paper products	22,003	16,361	75	4,517	20	1,125	5
8	8	Agriculture	475,289	353,967	74	118,581	25	2,741	6
6	9	Basic metallurgical	38,092	27,436	72	6,981	18	3,675	10
10	10	Petroleum refining	50,702	35,395	70	14,329	28	978	2
11	11	Other industries	55,599	33,357	60	19,577	35	2,665	5
13	12	Grinding and processing of grains	100,596	54,134	54	42,928	43	3,534	3
14	13	Transportation and communications	102,822	51,305	50	42,717	42	8,800	8
15	14	Dairy products	83,784	34,984	42	48,566	57·9	234	0·1
16	15	Tobacco and cigarettes	58,613	23,220	40	35,339	60	54	—
19	16	Trade and financial	183,049	73,028	40	81,884	45	28,137	1·5
17	17	Metal products	2,267	8,660	38	13,752	60	255	2
18	18	Spinning and weaving	144,804	54,835	38	74,271	51	15,698	11
20	19	Sugar industry	33,834	12,197	26	18,971	56	2,666	8
21	20	Oils and fats	16,451	5,405	33	10,294	63	752	4
12	21	Manufacture and repair of machinery	82,361	21,172	26	60,891	74	298	0·3
22	22	Ginning and processing of cotton	149,932	32,676	22	1,633	1	115,623	77
24	24	Basic chemical	16,520	1,124	7	15,083	91	313	2
25	25	Construction	88,232	6,209	7	82,023	93	—	—
26	26	Other food products	40,413	2,993	7	22,740	56	14,680	37
27	27	Manufacture of ready-made clothes	20,579	313	1·5	19,325	94	941	4·5
28	28	Slaughtering and meat products	56,847	521	0·9	56,067	98·6	259	0·5
29	29	Wood and furniture	9,098	70	0·9	8,831	97	197	2·1
23	23	Other services	185,784	24,368	13	161,416	87	—	—
30	30	Medical services	10,695	9	0·1	10,686	99·1	—	—
31	31	Bread and bakery products	68,381	39	—	68,321	99·9	21	—
33	32	Education	5,868	—	—	5,868	100	—	—
32	33	Suez Canal	44,500	—	—	—	—	44,500	100

TABLE VI

Comparison of the Years 1954 and 1959

Industries which increased deliveries to intermediate consumption	% in 1954	% in 1959
Agriculture	63	73·6
Electricity	73	80
Petroleum refining	68	70
Other basic industries	56	79
Construction	4	7
Dairy products	38·4	42
Sugar industry	28	36
Oils and fats	29	33
Paper and paper products	71	73
Fertilizers	79	88
Other industries	44	59

Industries which decreased deliveries to intermediate consumption	% in 1954	% in 1959
Mining and quarrying	88	76
Basic metallurgical	92	76
Metal products	45	38
Cement	85	76
Basic chemical	86	54
Slaughtering and meat processing	1·4	0·9
Grinding and processing of grain	58	54
Other food products	27	6
Spinning and weaving	44	38
Ginning and pressing of cotton	23·3	21
Manufacture of ready-made clothes	5	3
Tobacco and cigarettes	42	40

Industries which remained at the same level	% in 1954	% in 1959
Bread and bakery	—	—
Transportation and communication	49	49
Suez Canal	—	—

Industries which increased exports	% in 1954	% in 1959
Mining and quarrying	7	19
Basic metallurgical	4	23
Cement	14	20
Sugar industry	1	8
Oils and fats	4	5
Other food products	12	51
Spinning and weaving	9	11
Transportation and communication	8	10

Industries which decreased exports	% in 1954	% in 1959
Petroleum refining	3	2
Manufacturing and repair of machinery	4	1
Other basic industry	7	4
Manufacture of ready-made clothes	7	5
Fertilizers	21	12
Other industries	10	7
Banking and insurance	7	4

TABLE VII

Ranking of the Productive Sectors According to their Weight in the Rest of the Economy

£E'000

Year: 1954

Sectors	Gross production 1	Gross production and imports 2	% 1 : 2 3	Inputs from domestic production 4	% 4 : 1 5	Index of weight 3 × 5 6
Ginning and processing of cotton	87,061	87,061	100	84,358	97	97
Grinding and processing of grains	81,660	84,815	96	75,202	92	91
Slaughtering and meat products	46,420	46,420	100	40,351	87	87
Other food products	26,843	28,487	94	22,600	84	79
Bread and bakery products	57,050	57,121	99·8	43,935	77	76
Tobacco and cigarettes	49,125	54,117	91	40,356	82	75
Spinning and weaving	86,812	95,023	91	67,739	78	71
Dairy products	44,611	54,743	98	31,720	71	70
Manufacture of ready-made clothes	14,332	17,065	84	9,740	68	57
Agriculture	400,814	416,391	96	211,385	53	51
Sugar industry	21,104	21,906	96	10,900	52	50
Other services	276,093	276,093	100	13,112	47	47
Medical services	7,932	7,932	100	3,662	46	46
Cement	5,545	5,665	98	2,493	45	44
Construction	71,311	71,311	100	29,263	41	41
Wood and furniture	10,063	10,328	97	3,524	35	34
Electricity	12,383	12,383	100	3,932	32	32
Banking	15,316	17,007	90	3,995	26	32
Other industries	36,955	62,292	95	16,451	45	27
Education	5,725	5,725	100	1,543	27	27
Manufacture and repair of machinery	30,828	61,023	51	15,317	50	26
Other basic industries	12,744	26,838	47	6,163	48	23
Metal products	11,870	19,650	60	4,311	36	22
Paper and paper products	3,621	9,609	38	2,125	59	22
Trade and financial services	249,495	249,854	99·8	54,727	22	22
Mining and quarrying	13,051	17,669	74	3,552	27	20
Transportation and communication	86,165	92,969	93	18,159	21	20
Basic metallurgical	9,847	20,491	48	3,361	34	16
Oils and fats	13,548	14,130	96	2,567	19	16
Suez Canal	31,429	31,429	100	3,341	11	11
Fertilizers	5,747	17,359	33	1,693	29	10

TABLE VIII

Ranking of the Productive Sectors According to their Weight in the Rest of the Economy

£.E'000 Year: 1959

Sectors	Gross production 1	Gross production and imports 2	% 1 : 2 3	Inputs from domestic production 4	% 4 : 1 5	Index of weight in other industries 3 × 5 6
Ginning and processing of cotton	149,612	149,932	99·7	138,609	93	92
Slaughtering and meat products	56,342	56,847	99	41,237	73	72
Bread and bakery products	68,376	68,381	99	50,110	73	72
Spinning and weaving	142,561	144,804	98	99,375	70	69
Grinding and processing of grains	98,373	100,596	98	68,089	69	68
Other food products	28,626	40,413	71	22,602	79	56
Manufacture of ready-made clothes	19,044	20,579	93	11,289	59	55
Sugar industry	32,670	33,834	97	18,037	55	53
Cement	7,355	7,821	94	3,904	53	50
Tobacco and cigarettes	52,545	58,613	90	26,424	50	45
Dairy products	81,899	83,784	98	36,435	44	43
Oils and fats	15,490	16,451	94	6,947	45	42
Other basic industries	14,358	18,463	78	7,033	49	38
Banking and insurance	11,991	12,791	94	4,782	40	38
Construction	88,232	88,232	100	30,841	35	35
Wood and furniture	8,501	9,098	93	3,177	37	34
Electricity	19,830	19,830	100	6,266	32	32
Other industries	39,307	55,599	71	17,045	43	31
Petroleum refining	36,729	50,702	72	14,003	38	27
Trade and financial services	175,722	183,049	96	46,363	26	25
Agriculture	439,806	475,289	93	110,296	25	23
Transportation and communication	92,752	102,822	90	22,434	24	21
Mining and quarrying	22,864	29,012	79	5,296	23	18
Metal products	13,626	22,667	60	3,922	29	17
Manufacturing and repair of machinery	27,564	82,361	33	12,858	47	16
Basic metallurgical	15,985	38,092	42	5,554	35	15
Fertilizers	8,833	20,358	43	2,393	27	12
Education	5,868	5,868	100	619	11	11
Other services	185,784	185,784	100	19,448	10	10
Medical services	10,695	10,695	100	988	9	9
Paper and paper products	15,988	22,003	73	2,688	11	8
Basic chemical	10,920	16,520	66	1,193	11	7
Suez Canal	44,500	44,500	100	1,659	4	4

TABLE IX

A Suggested Regional Model for the U.A.R.

Purchasing sector / Producing sector	Agriculture	Industry	Services	Agriculture	Industry	Services	Final demand	
Agriculture	Interflow matrix for Egypt			Exports to Syria and imports of Syria from Egypt			Final demand (Egypt) excluding exports to Syria	Gross production (Egypt)
Industry	Showing flows from domestic production and imports from countries other than Syria separately							
Services								
Agriculture				Interflow matrix for Syria			Final demand (Syria) excluding exports to Egypt	Gross production (Syria)
Industry	Imports from Syria and exports of Syria to Egypt			Showing flows from domestic production and imports from countries other than Egypt separately				
Services								
Total imports							(Egypt and Syria)	
Total inputs								
Value added								
Gross production								

TABLE X

Direct and Indirect Requirements of Imports per unit of Final Demand from Each of the Productive Sectors

Year: 1954

Sectors	Direct imports per unit of production	Indirect import requirements per unit of final demand	Direct and indirect requirements per unit of final demand
Agriculture	0·041	0·018	0·059
Mining and quarrying	0·068	0·029	0·097
Electricity	0·158	0·043	0·201
Basic metallurgical industry	0·225	0·062	0·287
Metal products	0·221	0·071	0·292
Cement industry	0·131	0·063	0·194
Petroleum refining	0·132	0·051	0·183
Manufacture and repair of machinery	0·166	0·097	0·263
Basic chemical	0·076	0·048	0·124
Other basic industries	0·146	0·047	0·193
Construction	0·143	0·067	0·210
Slaughtering and meat production	0·026	0·050	0·076
Dairy products	0·028	0·054	0·082
Grinding and processing of grains	0·027	0·057	0·084
Bread and bakery products	0·064	0·065	0·129
Sugar industry	0·032	0·034	0·066
Oils and fats	0·052	0·019	0·071
Other food products	0·080	0·063	0·143
Spinning and weaving	0·055	0·072	0·127
Ginning and pressing of cotton	0·006	0·060	0·066
Manufacture of ready-made clothes	0·049	0·095	0·144
Paper and paper products	0·236	0·090	0·326
Tobacco and cigarettes	0·059	0·078	0·137
Wood and furniture	0·186	0·064	0·250
Fertilizers	0·075	0·026	0·101
Other industries	0·162	0·068	0·230
Transportation and communication	0·085	0·027	0·112
Suez Canal	0·015	0·007	0·022
Education	0·034	0·027	0·061
Medical services	0·143	0·052	0·195
Trade and financial services	0·017	0·020	0·037
Banking and insurance	0·012	0·026	0·038
Other services	0·006	0·106	0·112

TABLE XI

Example of Calculation of Net Saving in Foreign Currency Utilizing the Iterative Method (Coefficients of 1954)

	Agriculture	Industry	Services		Final demand
				100	Agricultural imports to be replaced by domestic production
Agriculture	11	92	—		103
	11·33	26·68	—		38·01
	4·18	10·09	—		14·27
	1·56	4·31	—		5·87
	0·64	1·78	—		2·42
				400	Industrial imports to be replaced by domestic production
Industry	4	112	—		116
	4·12	32·48	7·29		43·89
	1·52	12·28	4·94		18·74
	0·57	0·24	1·94		7·75
	0·23	2·17	0·75		3·15
Services	37	44	—		81
	38·11	12·76	4·05		54·92
	14·06	4·82	2·74		21·62
	5·27	2·06	1·08		8·41
	2·17	0·85	0·42		3·44
Imports	5	32	—		37
	5·15	9·28	1·62		16·05
	1·90	3·51	1·09		6·50
	0·71	1·49	0·43		2·63
	0·29	0·62	0·16		1·07

Imports to be replaced by domestic production 100 + 400 = 500.
Direct and indirect imports required for the new production = 37 (direct imports) + 26·25 (indirect imports) = 63·25.
Net saving in foreign currency 500 − 63·25 = 436·75.