UNITED ARAB REPUBLIC

THE INSTITUTE OF
NATIONAL PLANNING

Memo. No. 215

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

by

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24th August, 1962.

CAIRO
3, MOHAMED MAZHAR - ZAMALEK

International Association For
Research in Income and Wealth

Middle East Regional Conference
Istanbul 24th-29th August 1962.

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PRINTED IN

INSTITUTE OF NATIONAL PLANNING
3 MOHAMED MAZHAR STREET
ZAMALEK, CAIRO
U.A.R.

Preface

The use of input-output analysis in economic planning in under-developed countries is still in its infancy. In this paper, we have tried to avoid highly theoretical arguments and chose a practical path by providing a variety of uses for the input-output table in planning in underdeveloped countries. In doing that, an attempt was made to choose examples which rested on empirical work. As an introductory part we examined briefly the practicability of utilizing the input-output tables in such countries. We aslo described briefly the construction and charactoristics of the Egyptian input-output tables. It is not claimed, however, that the uses of the table described here are by any means novel but the majority reflect empirical experience and are discussed with the intention of clarifying some facts about the practicability of constructing input-output tables in under-developed countries. Moreover, we thought that a number of such examples grouped in a single paper may serve as a modest guide to people who have the responsibility of constructing and utilizing input-ouput tables in such countries.

Gamal E. Eleish

Contents

I. The Practicability of Constructing Input-Output Tables in Underdeveloped Countries.*

The usefulness of constructing an input-output table for 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 as far as rejecting the whole idea of constructing such tables in underdeveloped countries without any reservations. The major objection which most of those writers forwarded 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 the type which would enable the construction of an input-output table. This is no doubt a very serious charge against the construction of an input-ouptut 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. Therefore, it is enough to be particular about certain entries in the table. These are the strategic inputs to every industry. By strategic, it is meant the inputs which have high coefficients, e.g. the input from the agricultural sector into the sugar cane industry, the input form the mining sector into the pertroleum refining etc. Also a strategic input would be that of fertilizers into the agricultural sector, also the input

*A more detailed argument on this subject is given in the following paper: "The Applicability and Utilization of the 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.

from the energy sector to every industry. Other important figures would be those of production, value added, and foreign trade. These gigures, as well as the figures of the strategic input 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 be of great help in discovering the gaps and inconsistencies in the available data. The postponement of constructing similar tables, therefore, may deprive us of this opportunity. But this statement often raises another type of objection to the input-output model. This lies in the fact that 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 land with an interflow matrix which is practically empty or with only a few insignificant entries. This, it is argued, is due to the lack of interdependence among the various sectors and the 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 when it comes to those highly underdeveloped economies, but it is not always so when we consider others which are on the road to development. This point was discussed in a more elaborate manner in previous paper.[♀] We were fairly convinced that when one considers the interdependence in an underdeveloped economy as a decisive factor against the input-output model, one should not make sweeping judgments but one should rather differentiate between an

[♀] Ibid. P. 2.

underdeveloped economy or as some may call it "developing" and a highly underdeveloped one. In the same paper, the experiences of the Gold Coast. Tanganyika, Cyprus. some Latin American countries. Italy and Egypt were quoted and the lack of interdependence in the interflow tables of the first three countries was found to be true wherease the existence of a substantial interdependence judged by the number of entries in the interflow tables of the last contries was shown. Here it is important to attract attention to the fact that some people tie the existence of interdependence among the various sectors of the economy. Judged by the number of entries in the interflow matrix, with the level of the development of the economy. To this however, some people object on the account that it is not the number of entries which are important but the significance of the entries themselves. However, all what we would like to emphasize here is that when this objection is considered we have to differentiate between developing economies and highly under-developed economies.

But there is still another serious objection to the input-output table, not on the account of its construction, but rather on the accont of its applicability in a developing economy (here we are excluding more or less the highly underdeveloped economies). This objection concerns itself with the stability of the technical coefficients in those economies. In a previous paper[♀] it is agrued that the coefficients are not as stable as they are assumed to be in a developed economy like that of the United States.

♀ Ibid. P. 42

We took a typical example of a developing economy (Egypt) and showed that the three main factors which affect the technical coefficients, namely the technological change, the change in relative prices and production of scale, will all be at work when such a country takes a development programme seriously. We therefore emphasized the fact that to be effectively utilized, serious considerations have to be given to the shape of the technical coefficient in the year for which one is projecting certain result 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 task to achieve as it requires beforehand a deep knowledge of the investment decisions decisions and the affects of these investments on the technical coefficients. But it may always be assumed that one can incorporate an appoximation of these changes which would still give better results than if the supposedly stable coefficients were utilized for long term calculations.

These are more or less the most serious objections to the construction and utilization of the input-output model in underdeveloped countries. This being the case, other forms of accounts are continuously suggested as a substitute for the input-ouput model not only on the basis of the above-mentioned objections but also on the basis that the other forms of accounts serve better the needs of the underdeveloped countries which are sometimes incorrectly stated. But reviewing the whole situation

it could be safely stated that the input-output model is a comprehensive statistical model which could be constructed in almost every economy (here we are excluding the highly underdeveloped countries where there may not be any significance for constructing such tables) if and when high ideals in statistical accuracy are not a must. For this, we need the type of statistician economist who may be called tamed[♀] statistician and economist. And after all, the existence of such a table may be better than if it were not existing at all. Further, it will help in showing, as we mentioned before, the gaps and inconsistencies in the available data.

II. The Construction and General Characteristics of the 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.[♀♀] To start with, the reader's attention is attracted to a fact in the light of which the data presented in this paper and the work involved in its processing would be appreciated. Although it may be hard to be definite about the accuracy of every individual

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

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

figure, yet it could always be safe to argue that these figures represent a roasonable approximation of what the transactions are in practice.

However, in constructing the Egyptian tables[♀], although aware of this fact, we felt that special attention should be given to certain areas and thorough investigations in these areas have, therefore, been carried out. To start with, it was felt that grea attention should be attached to the basic inputs in every sector which importance we emphasized earlier in this paper. Furthermor we attached particular importance to inputs from the energy sector Similarly value added created in every sector was carefully exami and the extensive work done in the planning committee in the field of national accounting was of great help in the verification of the magnitude of the value added. Great attention was also given to the examination of the figures of gross production in every sector. As regards the elements in the final demand sector they were equally examined and reasonable assessment of their magnitude was arrived at. These in general were the corner stones in the construction of the Egyptian tables and it was always felt that by giving these elements the careful attention they deserve we will not be very far off the track.

Our greatest difficulty, as it may be assumed, was the finding, verification and processing of these data in the proper form. These taske, of course, were made even more difficult by the

[♀] The 1954 table which was utilized in most cases.

fact that the required type of data, if it were not available at all, was dispersed that great efforts had to be exerted for its collection. But this is a familiar difficulty with many of the developing countries. However, in constructing the Egyptian tables, we followed a traditional method which was adopted by many of the countries which passed through this experience before us, and that is we attempted to construct the tables row-wise. Meanwhile, efforts were made to collect all the information necessary for the construction of the tables column-wise.

As for the first approach, i.e. the construction of the tables row wise, it is the attempt to reach at the distribution of the output of a sector to the different productive sectors as well as the sectors of the final demand. To reach this goal, we resorted to the familiar method of constructing commodity balances. These comprised balances for material commodities as well as other balances for services and transportation. These balances were constructed for the years 1952 to 1956, but the first input-output table was constructed for 1954. This was due to the fact that 1954 was considered as a reasonably stable year from the economic point of view. Also a great deal of statistical data was collected by the national income unit of the planning committee for that year. This consideration, in fact, was a decisive factor in the choice of the year 1954.

The preliminary work for the construction of the input-output tables however, did not stop at this level as efforts were

exerted to have answers to the type of information which would enable us to construct the tables columnwise. 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 production accounts and other accounts of some 600 concerns which presented a fair representation of the different sectors. Other technical information was also collected and having completed this work we were in a position to proceed with the construction of the input-output tables. We possessed adequate information to construct the tables both row-wise as well as column-wise. In fact, the tables were the outcome of all the data collected in those two stages.

The 1954 table is of the order of 83 X 83. Other version of it are of the order of 33 X 33 and 7 X 7. The 1959 table is only of the order of 33 X 33. The final demand is divided in both tables into six sectors distinguishing the government and household consumption separately. The same is done with investment. The remaining two sectors are, of course, exports and stocks. As regards prices, the flows in the two tables are evaluated at producer's prices. However, imports were evaluated at "CIF" prices and exports were evaluated at FOB prices. One important characteristic[♀] of the Egyptian tables is that flows domestic production are separated from those from imports. Thus we actually have two interflow matrixes, one from domestic production and the other from imports, or what we will refer to

[♀] For more details on this point see Ibid.

lator as the import matrix. The lattor has great significance in the calculation of the foreign currency requirements of an investment programme as well as the net effect of an import substitution policy as well as other uses which be discussed later.

III. Uses of the Input-Output Model in Planning.

Writing about the uses of the input-output model in Planning, one could choose an abstract way, but this is not the path we have chosen since it is more valuable to present, whenever possible, some figures which are the outcome of practical experience. 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.

A. General Uses of the Input-Output Model

1. Calculation of Production Targets

The calculation of the production targets for the various productive sectors is, as it is known, the most straightforward utilization 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. The most obvious use of this utilization is that we will be able to take into account the direct and indirect requirements from all the sectors at the same time to satisfy the final demand we projected. The calculation of such production requirements could be achieved in, more or less, two ways. The first by inverting the matrix of the direct coefficients (the aij's), a

process which will give us other types of coefficients (let us call them ri j). The latter coefficients give the direct and indirect requirements from sector i per unit of final demand from sector j. Having derived these coefficients, we can calculate the production required from each sector to satisfy the direct and indirect requirements from every sector created by the projected final demand. As for the other way, we can reach the same rosults by using the matrix of direct coefficiehts (the ai j's) and adopt the method famous as the iterative method. Comparing between the two, one may come to the conclusion that the second method may be laborious, but it may be advisable to utilize it for various reasons. The first is that the inversion of the matrix freezes the coefficients and with the anticipated frequent changes in the input coefficients in a developing economy it may be considered a waste to invert the matrix. Although the cost of inverting such a matrix is not as high as one may assume from this type of argument, however, the other points in favour of the second method makes us come to the above conclusion. The second reason is that when we solve by steps we can always see the results step by step and in such case we are able to introduce any such changes which may be necessary. This could be illustrated, for instance, by the fact that if while solving we found that a production required from a certain sector is above the available capacity or the anticipated one. In such a case we can always assume that the requirements from that sector after that will all come from imports and in doing that we are able to 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. Also we must not forget that in this case, a better estimate of imports will be reached at. On the other hand it may be mentioned that the inversion of the interflow matrix may not, after all, be a waste as the coefficients contained in it, as we will see later, will be of great help in deriving other coefficients, particularly when we desire to know the direct and indirect requirements from imports, labour and income per unit of final demand. However, the significance of the calculation of the production targets in either way in planning is by no means unclear and it is, no doubt, the corner stone in the utilization of the input-output model. Through such utilization it is possible to discover the bottlenecks or excess capacities which may be the outcome of a certain development policy.

2. Structural Analysis.

For purposes of structural analysis the input-output model provides us with a valuable tool. A deeper insight of the economy could be traced through the transactions recorded in such a table. Interdependence among the different sectors becomes more vivid 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 could 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 dependency of the individual industries on other;

(b) the weight of the different sectors on the rest of the economy.

(a) The Degree of Dependency of the Individual Industries on Others.

To test the degree of dependency of the individual industries on other industries and on the final demand sectors, the straight-forward way is to move along the rows of the input-output table. This is exactly what we have done with only minor alterations. Table I in Appendix I shows the deliveries from every one of the 33 sectors included in the aggregated interflow matrix for 1954, to intermediate demand, domestic final demand and to exports. Industries were later ranked according to their direct dependence on other industries, in the sense that the industries which delivered most of its output to intermediate demand were ranked higher than the others which delivered less of their outputs to intermediate demand and delivered a larger proportion of their output to final demand, domestic as well as exports. This type of ranking is only interesting as far as it tells us which indstries depend largely on the prospect of other industries. If we examine table I we see that the indistries which are at the top are those which traditionally depend on other industries rather than on final demand

Basic metallurgical, mining and quarrying, basic chemicals, cement and fertilizers, all have high percentages of deliveries to intermediate demand. In fact it is for these types of industries that the input-output table provides a unique analytical tool. The fact that these industries do not directly depend in their prospects on the final demand sectors makes other tools of economic analysis less meaningful. As it could be seen, the discovery of the influence of such industries depends on the discovery of the interdependence among the different sectors of the economy in a manner as that revealed by the input-output model.

As for the industries at the bottom of the table, they are the ones which depend largely on sales to final demand. Consumer industries, construction and some services are among these industries. The fact that these industries make their way to the final demand sectors make them fall within the vicinity of the familiar tools in economic analysis. Unlike the industries at the top of the table, these industries depend in their prospects on the development in consumption, investment as well as on exportation to the rest of the world.

As we mentioned before, the entries in the Egyptian tables are from domestic production with entries from imports shown separately. Similarly table I shows deliveries from domestic production only. But as imports play an important role in the Egyptian economy it is interesting to include in another table the deliveries from both domestic production and imports.

A similar procedure of ranking the industries was followed and the results are presented in table II. 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. The table shows the industries divided in three categories. Those which did not show any change in the distribution of their output, others which delivered more to intermediate consumption, and those which delivered less. The first group constitute a substantial number of sectors, and the reason for keeping the same pattern of distribution among the sectors may be due to three factors. The first is that a very high proportion, if not all the needs of the economy, are satisfied by domestic production from some of these sectors. This group comprises such sectors as electricity, services like education and other services as well as the Suez Canal sector. The second reason is that the amount of imports from some sectors is very negligible. These sectors include for instance, cement, oils and fats, bakery, wood furniture and others of similar nature in that most of the needs of the economy are satisfied by domestic production. The third reason is that 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 sector, petroleum refining, other basic industries, spinning and weaving, other industries, tobacco and cigarettes and the sector manufacturing of ready made clothes.

As for the second group, that is the group which delivered more to the productive sectors after adding imports, it comprises mainly industries which deliver a large proportion of its output to intermediate demand. Among these sectors one, i.e. fertilizers showed a significant upward change, a thing which is expected. However, the changes in other sectors are not roally very substantial. This is also true of the third group which delivered proportionally less to intermediate demand. This makes us feel, therefore, that with the exception of few sectors and if we disregard the minor changes in deliveries, imports are distributed fairly proportionately to deliveries from domestic production.

Similarly, tables were also prepared for 1959. Table IV shows the ranking of the industries when deliveries form domestic production alone are considered. Table V shows the ranking of industries when deliveries from both domestic production and imports are taken into consideration. As it is the case in 1954 the type of industry which depends largely on the prospects of others appeared at the top of the table and those whose output finds its way to final demand are grouped at the bottom of the table. In order to show the changes which happened in the distribution of deliveries between 1954 and 1959 we prepared table VI. This table shows the industries which increased its deliveries to intermediate demand, those which decreased this delivery and those which have kept the same percentage of distribution between intermediate and final demand. The table shows also the

industries which showed increases as well as those which showed decreases in the percentage of their deliveries to exports.

Among those industries which showed increases in the percentages of their deliveries to intermediate demand are petroleum refining, other basic industries, fertilizers and other industries. These indsutries showed on the other hand decreases in the percentages of their deliveries to exports. These industries together with electricity which also showed a substantial increase in its delivery to intermediate demand are the type of industries which are ranked at the top of the tables and which deliver a larger proportion of their output to the productive sectors.

On the other hand, the table shows the sectors which showed decreases in the percentage of their delivery to intermediate demand. Among these are mining and quarrying, basic metallurgical coment, other food industries and spinning and weaving. Those sectors without any exception showed substantial increases in the percentages of their deliveries to exports.

(b) <u>The Weight of the Different Sectors on the Rest of the Economy.</u>

To show the weight which each of the sectors have on the rest of the economy we followed a familiar proceducre. This procedure rests upon deriving the percentage of the total

deliveries which were made out of domestic production♀ as well as the percentage of the input from domestic production to the total cost. Later the two percentages are multiplied and the industries are ranked accordingly, the highest, i.e., the industry which exerts more 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 included in this group are 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. On the other hand, the table shows that in the case of a number of sectors a high percentage of the needs are satisfied from the domestic production. Besides services, transportation and communications, this group includes the types of industries which have already been developed and composed mainly of light industries. The direct influence as it is shown by this table is a 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. It is assumed therefore that industries at the top of the table exert more influence on the economy than others in the sense that they do not only produce a high percentage of the needs of the economy but also

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♀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 exclude the effects of the changes in stocks. However this was done simply because of our desire not to introduce too many sets of figures which will only lead to the confusion of the reader.

have a high percentage of input and these are secured from domestic production. However, this index should be taken 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 ranks, yet the table shows that the general pattern is the same as it was in 1954. Food industries, light industries and others which satisfy a high percentage of the demand and have a high ratio of inputs from domestic production come at the top of the tables and vice versa. The table however, shows that some significant substitution of imports by domestic production has taken place. This is particularly true of the capital intensive industries. By 1959, the mining and quarrying sector supplied 79% of the total availabilities[♀] as compared with 74% in 1954. Similarly fertilizers supplied 43% in 1959 as compared with 33% in 1954, and paper and paper products increased its share from 38% in 1954 to 73% in 1959. Other basic industries showed a significant upward trend from 47% in 1954 to 78% in 1959. This was also the case with the sector "other industries" which went up from 59% to 71%.

The above are only examples of how the input-output model could be put to use for structural analysis purposes. The methods utilized are not unfamiliar but we found it useful to present them here, utilizing actual data derived from the two tables for Egypt. Other general uses of the input-output model are numerous but it

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♀Total availabilities here means production and imports. Changes in stocks are neglected.

may be useful to go on with the discussion of the more specific utilization of the model in planning.

B. 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 presented by a row and a column, therefore our analysis may be concentrated on the row only if we are interested in a detail of the commodities produced within the sector or on the column if we are interested in the effects of the technological change or the substitution of one industry by another (from gas fuel to electricity or from cotton textile tosynthetics, etc.). In the meantime, 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 as to 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 from each of these commodities. This method is extremely important in planning, particularly if some of the commodities which are aggrgated 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 then we can disggregate the column representing the sector we are interested in. 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 of the repercussion 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[♀]. 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 Institue of Planning Cairo. This experimental study showed vividly how the input-output

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

model is of great value in sectoral analysis.

(2) Regional Analysis.

For purposes of regional analysis the input-outpput model is very helpful indeed. Through the utilization of a regional input-output model, we can detect the effect of a certain development programme on the various regions. This is , no doubt, of great importance in planning as regional development programmes form an integral part of any general economic development plan. In some countries there may be separate regions with distinct geographical characteristics as well as definite levels of economic development. These 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 found economic analysis .

In regional input-output analysis an important fact is always taken into consideration; that is, the demand for and the supply of commoditties differ from one region to the other. Furthermore a particular commodity which is produced in abundancy in one region may not be a substitute for another commodity produced in another region. However, in order to cope with regional differences, the model we adopt should naturally bring to light the differences in the technological structure of the various regions. Variations in the consumer's behaviour as well as the sources of supply of commodities should also be made vivid.

Another important factor which should be brought to light is the variation in the composition and size of the final demand.

Keeping these points in mind a regional model[♀] was suggested for the UAR which would have embraced two input-output tables for the two regions, Egypt and Syria. This model may seem out of data but its discussion may be of some use. A version of the model is reproduced in Appendix 2.

The model is based on two input-output tables, one for Egypt and the second for Syria. On the top left hand side corner, we have the interflow matrix for Egypt where entries from both domestic and imports are shown separately in every cell. Similarly an interflow matrix showing the entries from both domestic and imports separately for Styia is located at the bottom right corner. The imports shown in these two matrices are from outside the two regions. Below the Egyptian matrix there is another matrix showing the Syrian exports to Egypt which are to be considered as imports in Egypt. Similarly on the top right hand corner there is to be found a matrix which shows the exports from Egypt to Syria, which are imports as far as the Syrian table is concerned. On the extreme right we find the final demand of both regions and also the gross production of every sector in the two regions shown separately. At the bottom of the table we find the value added croated in the two regions.

[♀]The frame of this model is not unfamiliar but its adaptation to the UAR was suggested by myself in consultation with professor Veva Cao pinna of Italy who visited the Planning Committee, Cairo in 1960.

As it could be seen the model is simple and distinguishes between three sources of supply, from the region itself or what we have called domestic production, from the other region and from the rest of the world. This differentiation may not be unsimilar to Leontief's regional and national commodities and Chenery's differentiation between those of Leontief and his additional, i.e. the intermediate commodities. However the model is simplifiod in a way that it assumed that consumption could be considered autonomous in the two regions rather than induced or partly induced. But 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. However, the model has morits in that it shows clearly the magnitude of foreign trade between the two countries. But more important, it would lead to the discovery of any contradictory policy in foreign trade. It could therefore be a goood guide for a policy of import substitution. Here we mean substitution of a foreign import by an import which comes from the other region. This is besides the very important use of the model in discovering the bottlenecks or excess capacities which could happen if an investment programme is adopted in either region. Through the analysis provided by such a model a duplication of investment may be avoided. Also the choice of investment to suit the factor proportions in each region could be successfully made. In the meantime, the method of solutions would not be very different from those adopted in an ordinary input-output model.

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 is due mainly to the inability of these countries to develop their exports besides, of course, the fact that these economies depend a great deal on imports to satisfy the need for industrial commodities which they do not generally produce or not produce in enough quantities. This characteristic becomes more clear and certainly more complicated when the country starts an economic development plan. 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 indrect) per unit of investment are much higher than those per unit of consumption or of exports. In such case the foreign currency requirement become extremely vital for the execution of the development plan and its allocation on the various uses becomes a matter to be given careful [illegible] considerations. Here we are concerned with the use of an input-output table in calculating the foreign currency requirements of the development projects; as regards the

allocation however, we will touch on it briefly in due course.

In calculating the requirements of foreign currencies for development projects we should, of course, take into consideration the direct and indirect requriements and not only the first. But again we have to conduct our calculation for two phases, the construction phase and the utilization or production phase as during each of these phases the requirements are different in their size and nature. As for the calculation for the first phase, we proceed by breaking down the investment into its input component. 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 that, we can calculate the direct and indirect requirements of imports for that set of final demand represent the investment project under consideration. The method of calculation is simple. Having the import vector which could be denoted by M we can multiply it by the inverse of the interflow matrix $(I - A)^{-1}$ this will give us a new vector M^*, the elements in it show the direct and indirect requrements of 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 I appendix III which show the direct and indirect requirements of imports per unit of final demand from each of the productive sectors included in the Egyptian

input-output table.

As regards the second phase, i.e., the production phase, we can follow more or less a similar procedure and calculate the total import requirments needed for the new production since the latter will create a demand on the products of the other sectors and those in turn have import requirements. This will be made more vivid when we consider the usefulness of the input-output model in testing the effect of an import substitution policy. However, our experience in Egypt showed that these types of calculations are most useful in estimating the real need for foreign funds and also their proper allocation.

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

Inport substitution, as we mentioned earlier, plays an important role in the early phases of development . In an earlier paper[♀] it was argued that the 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 particula 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 domesti production for a particular import and if so, how much is this saving. This could be easily done by utilizing the coefficients of the vector M^+. To proceed with our calculation we should

[♀] Ibid.

treat the amount of imports to be substituted by domestic production as part of the final demand. After doing that we can calculate, by utilizing the above coefficients, the direct and indirect requirements from imports necessitated by this final demand. By subtracting these requirments from the value of imports to be substituted by domestic production, we get the net effect which could be effected by such process of substitution. This type of calculation could also be achieved by using the iterative method. In Appendix IV we give an example utilizing the input coefficients of the 1954 table and assuming that a £^{E}100 worth of agricultural imports and a £^{E}400 worth of industrial products will be substituted by domestic production. The example shows clearly that taking the direct requirement only into account the savings of foreign currency would be £^{E}463 but taking both direct and indirect requirements into consideration the net saving would be £^{E}436.75. This type of calculation, as it is clear, is extremely important in a country where there is a scarcity of foreign currencies as by neglecting these indirect effects, we are merely exaggerating the benefits derived from an import substitution policy as well as underestimating the requirement for foreign currencies, a thing which would lead to a bottleneck in this vital area which eventually not only affect new investments but also the flow of imported input, as it did happen 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 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[♀]. 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 wherease the second is a non-linear one. But what we are proposing here is that in the absence of the "institutional set-up or what may be called the "communication system" in the underdeveloped economy, the simpler the model the better. Arguments have been raised about growth models versus discitional models but in the light of what we have stated it makes little difference. In this connection, the simple open input-output model may after all prove to be of great help in guiding the policy makers in underdeveloped countries. By following a procedure 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

[♀] H.B. Chenery, "Intor-industry Research in Economic Development" American Economic Review, Vol.L. No. 2, May 1960.

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 the employment opportunities without jeopardizing the 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 certented 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 simialr 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 to and incomes created from the various categories of investments.♀ This type of calculation has proved to be valuable in Egypt as it put before the

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♀Similar calculations were made in the Planning Committee, Cairo for 25 different categories of investments, see G. Eleish, The Applicability of the Input-Output Model.

analyst as well as the policy maker a valuable set of information whcih would have not 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 could be of great help in the preparation of a national budget. This was done in Egypt as the 1954 table was utilized in the preparation of a national budget for Egypt for the year 1960-61[♀]. 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 1960-61. Having done that and having calculated sets of coefficients which show the direct and indirect requirements of imports, value added, household income created as percentages of a variety of final demands for the year 1960-61 we were able to prepare a national budget which shows 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

[♀]The steps followed in the preparation of the above-mentioned budget are discussed in more detail in Ibid.

certain investment programme. This we have done repeatedly in Egypt. One particular incidence 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 £^{E}418 m. and this was divided in two components £^{E}183m. for vertical expansion and £^{E}235m. for horizontal expansion. This distinction between the two components, as it is known, is extremely important as each type of investment has its own structure. The first step of course, 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 figures from each sector to meet the requirements of 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 insalled which require, of course, investment in these sectors. Another round of calculation in such case should be made 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 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 could be calculated which in its turn could be included as a new final demand. This method may be 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.♀

Since July 1961 the drive for nationalization has greatly increased in the U.A.R. As a result, the public sector has increased its dimension in all the economic activities. Some sectors were totally nationalized, others were left to the private sector. In the remaining sectors, however, the public sector operates side by side with the private sector. For better management of the public sector, the Government has created 39 public organizations, each to be responsible for one or more sectors and in doing that each organization was made responsible for the planning of the activities of the production units in the sector and also the follow up of the execution of the prescribed plans. The production unit, though an autonomous unti in the majority of its actions, yet general policy measures are designed in close consulation 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

♀This is a very tentative suggestion which could be largely elaborated.

these set-ups 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 however, will be the mixed sectors and each of these could be divided into two components, one public and the other private. The deliveries from each could be made by means of delivery coefficients♀ which are merely the 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 private sector could be incorporated. As for the columns of the mixed sector, they will also be divided in 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 be easily 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 each other and with its relationship with the private sector and the outside world.

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

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APPENDIX I

TABLE I

Ranking of the Productive Sectors According to their deliveries to Intermediates and Final Demand

In L. E. 1000 (Without imports) Year: 1954

Sector	Total Output	Deliveries to Intermediate Demand	% 2:1	Deliveries to Domestic Final Demand	% 4:1	Deliveries to Exports	% 6:7
	1	2	3	4	5	6	7
1)Basic Metallurgical	9847	9091	92	414	4	342	4
2)Mining and Quarrying	13051	11525	88	624	5	902	7
3)Basic Chemical	2857	2447	86	410	14		
4)Cement	5545	4700	85	44	1	801	14
5)Fertilizers	5747	4566	79	0		1181	21
6)Electricity	12383	9082	73	3301	27		
7)Paper & Paper Products	3621	2557	71	796	22	268	7
8)Petroleum Refining	25783	17416	68	7520	29	847	3
9)Banking & Insurance	15316	10413	68	3776	25	1127	7
10)Agriculture	400814	253363	63	144282	36	3169	1
11)Grinding & Processing of Grains	81660	47380	58	32530	32.8	1750	2.2
12)Other Services	276093	159757	58	116336	42		
13)Manufacturing & Repair of Machinery	30828	17770	57	11922	39	1136	4
14)Other Basic Industries	12744	7137	56	4698	37	909	7
15)Transportation & Communication	86165	42511	49	37274	43	6380	8
16)Metal Products	11870	5302	45	6346	53	222	2
17) Spinning & Weaving	86812	38542	44	40966	47	7304	9
18)Other Industries	36955	16111	44	16975	46	3869	10
19)Tobacco & Cigarettes	49125	20558	42	28496	58	71	-
20)Trade & Financial Serv.	249495	105246	42	104373	42	39876	16
21)Dairy Products	44611	17136	38.4	27450	61.5	25	0.1
22)Oils & Fats	13548	3927	29	9111	67	510	4
23)Sugar Industry	21104	6005	28	15083	71	16	1
24)Other Food Products	26843	7287	27	16432	61	3124	12
25)Ginning & Pressing of Cotton	87061	20340	23.3			82747	
26)Education	5725	1335	23	43901	77		
27)Wood & Furniture	10063	1008	10	8747	87	308	3
28)Manufacture of ready made clothes	14332	697	5	12589	88	1046	7
29)Construction	71311	3257	4	68054	96		
30)Slaughtering & Meat Products	46420	483	1.4	45758	98.3	179	0.3
31)Bread & Bakery Products	57050	220	0.4	56780	99.5	50	0.1
32)Suez Canal	31429	18	0.01	0	-	31411	99.9
33)Medical Services	7932			7932	100		

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

In L. E. 1000 (With imports) Year: 1954

Ranking of Sectors Table 1	Ranking of Sectors After Adding imports	Sectors	Gross Production & imports 1	Intermediate Demand Domestic & imports 2	%2:1 3	Domestic Final Demand Domestic Production & imports 4	%4:1 5	Exports 6	%6:1 7
1	1	Basic Metallurgical	20491	19382	94	767	4	342	2
5	2	Fertilizers	17359	16178	93	0	-	1181	7
2	3	Mining & Quarrying	17669	15502	88	1265	7	902	5
4	4	Cement	5665	4820	85	44	1	801	14
7	5	Paper & Paper Products	9609	7239	75	2102	22	268	3
6	6	Electricity	12383	9082	73	3301	27		
9	7	Banking & Insurance	17007	12104	71	3776	22	1127	7
8	8	Petroleum Refining	40989	27828	68	12314	30	847	2
10	9	Agriculture	416391	258643	62	154579	37	3169	1
11	10	Grinding & Processing of Grains	84815	50535	60	32530	38	1750	2
12	11	Other Services	276098	159762	58	116336	42		
14	12	Other Basic Industries	26838	15107	56	10822	40	909	4
15	13	Transportation & Communication	92969	46084	50	40505	44	6380	6
17	14	Spinning & Weaving	95023	41776	44	45943	48	7304	8
18	15	Other Industries	62292	27493	44	30930	50	3869	6
16	16	Metal Products	19650	8389	43	11039	56	222	1
19	17	Tobacco & Cigarettes	54117	22652	42	41394	58	71	-
20	18	Trade & Financial Services	249854	105579	42	104399	42	39876	16
13	19	Manuf.& Repair of Machinery	61023	23257	38	36630	60	1136	2
21	20	Dairy Products	45743	17570	38	28148	61.5	25	0.5
24	21	Other Food Products	28487	8669	30	16694	59	3124	11
22	22	Oils & Fats	14130	4094	29	9526	67	510	4
26	23	Education	5725	1335	23	4390	77		
25	24	Ginning & Pressing of Cotton	87061	20340	23			82747	9
27	25	Wood & Furniture	10328	1012	10	9008	87	308	3
29	26	Construction	71311	3257	5	68054	95		
28	27	Manuf. of ready made clothes	17065	899	5	15120	89	1046	6
31	28	Slaughtering & Meat Products	46420	483	1	45758	98.5	179	0.5
30	29	Bread & Bakery Products	57121	220	0.4	56851	99.5	50	0.1
32	30	Suez Canal	31429	18	0.01	0		31411	99.9
33	31	Medical Services	7932	-	-	7932	100	-	-

TABLE III

Changes in Rabking of Sectors after adding imports

Industries which changed ranks with higher percentage of delivery to Intermediate demand	% Without Imports	% With Imports	Industries which changed ranks with smaller repercentage of delivery to Intermedite demand	% Without Imports	% With Imports	Industries which did not show change in percentage of distribution of output	%
Basic Matallurgical	92	94	Agriculture	63	62	Mining & Quarrying	88
Fertilizers	79	93	Manufacture & Repair of Machinery	57	38	Cement	85
Paper & Paper Peoducts	71	75				Electricity	73
Banking & Insurance	68	71	Metal Products	45	43	Petroleum Refining	68
Grinding & Processing of Grains	58	60	Dairy Products	38.4	38	Other Services	58
Transportation and Communications	49	50	Ginning & Pressing of Cotton	23.3	23	Other Basic Industries	56
Construction	4	5	Slaughtering & Meat Products	1.4	1	Spinning & Weaving	44
						Other Industries	44
						Tobacco & Cigarettes	42
						Trade & Financial Services	42
						Oils & Fats	29
						Education	23
						Wood & Furniture	10
						Manufacture of ready made clothes	5
						Bread & Bakery Products	0.4
						Suez Canal	0.01
						Medical Services	

Table IV

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

(Without imports)

. E. 1000

Year: 19

Sector	Total Output	Deliveries to Intermediate Demand	% 2:1	Deliveries to Domestic Final Demand	% 4:1	Deliveries to Exports	% 6:
	1	2	3	4	5	6	7
king & Insurance	11991	10827	90	664	6	500	4
tilizers	8833	7767	88	0	-	1066	12
ctricity	19830	15843	80	3987	20		
er Basic Industries	14358	11368	79	2495	17	495	4
ing & Quarrying	22864	17324	76	1269	5	4271	19
ic Metallurgical	15985	12202	76	108	1	3675	23
ent	7355	5620	76	103	4	L432	20
iculture	439806	323884	73.6	113181	25.7	2741	0.
er & Paper Products	15988	11650	73	3213	20	1125	7
roleum Refining	36729	25607	70	10144	28	978	2
r Industries	39307	23261	59	13381	34	2665	7
facture & Repair of Machinery	27564	14865	54	12401	45	298	1
ding & Processing of Grains	98373	52894	54	41945	43	3534	3
sportation & Communi-cation	92752	45897	49	38055	41	8800	10
y Products	81899	34196	42	47469	57.8	234	0.
cco & Cigarettes	52545	20817	40	31674	60	540	-
l Products	13626	5170	38	8201	60	255	2
ning & Weaving	142561	53999	38	72864	51	15698	11
e & Financial Servi-ces	175722	65701	37	81884	47	28137	16
r Industry	32670	11741	36	18263	56	2666	8
& Fats	15490	5072	33	9666	62	752	5
ing & Processing of Cotton	149612	32356	21	1633	2	115623	77
r Services	185784	24368	13	161416	87		
c Chemical	10920	733	7	9874	90	313	3
truction	88232	6209	7	82023	93		
r Food Products	28626	1641	6	12305	43	14680	51
facture of ready made clothes	19044	277	3	17826	92	941	5
ghtering & Meat Products	56342	515	0.9	55568	98.6	259	0.
& Firniture	8501	64	0.7	8240	97	197	2.
al Services	10695	9	0.1	10686	99.9		
& Bakery Products	68376	39	-	68316	99.9	21	-
Canal	44500	-	-	0	-	44500	100
tion	5868	-	-	5868	100		

TABLE V

Ranking of the Productive Sectors According to their Deliveris to Intermediate and Final Demand
(With Imports)

L. E. 1000 — Year: 1959

Ranking of Industries Table IV	Ranking of industries after adding Imports	Sectors	Total Output	Deliveries to Intermediate Demand Domestic & Imports	%2:1	Deliveries to Domestic Final Demand Domestic & Imports	%4:1	Deliveries to Exports	%6:1
			1	2	3	4	5	6	7
2	1	Fertilizers	20358	19292	95	-	-	1066	5
1	2	Banking & Insurance	12791	11627	91	664	5	500	4
5	3	Mining & Quarrying	29012	23220	80	1521	5	4271	15
3	4	Electricity	19830	15843	80	3987	20		
4	5	Other Basic Industries	18463	14733	80	3235	18	495	2
7	6	Cement	7821	6063	78	326	4	1432	18
9	7	Paper & Paper Products	22003	16361	75	4517	20	1125	5
8	8	Agriculture	475289	353967	74	118581	25	2741	6
6	9	Basic Metallurgical	38092	27436	72	6981	18	3675	10
10	10	Petroleum Refining	50702	35395	70	14329	28	978	2
11	11	Other Industries	55599	33357	60	L9577	35	2665	5
13	12	Grinding & Processing of Grains	100596	54134	54	42928	43	3534	3
14	13	Transportation & Communic.	102822	51305	50	42717	42	8800	8
15	14	Dairy Products	83784	34984	42	48566	57.9	234	0.
16	15	Tobacco & Cigarettes	58613	23220	40	35339	60	54	-
19	16	Trade & Financial Services	183049	73028	40	81884	45	28137	1
17	17	Metal Products	2267	8660	38	13752	60	255	2
18	18	Spinning & Weaving	144804	54835	38	74271	51	15698	11
20	19	Sugar Industry	33834	12197	26	18971	56	2666	8
21	20	Oils & Fats	16451	5405	33	10294	63	752	4
12	21	Manuf. & Repair of Machinery	82361	21172	26	60891	74	298	0
22	22	Ginning & Pressing of Cotton	149932	32676	22	1633	1	115623	77
24	24	Basic Chemical	16520	1124	7	15083	91	313	2
25	25	Construction	88232	6209	7	82023	93		
26	26	Other Food Products	40413	2993	7	22740	56	14680	37
27	27	Manuf. of ready made clothes	20579	313	1.5	19325	94	941	4
28	28	Slaughtering & Meat Products	56847	521	0.9	56067	98.6	259	0
29	29	Wood & Furniture	9098	70	0.9	8831	97	197	2
23	23	Other Services	185784	24368	13	161416	87		
30	30	Medical Services	10695	9	0.1	10686	99.1		
31	31	Bread & Bakery Products	68381	39	-	68321	99.9	21	-
33	32	Education	5868	-	-	5868	100		
32	33	Suez Canal	44500	-	-	-	-	44500	100

TABLE VI

Comparison of the Years 1954 and 1959

Industries which increased its deliveries to Intermediate Consumption	% in 1954	% in 1959	Industries which decreased its deliveries to Intermediate Consumption	% in 1954	% in 1959
Agriculture	63	73.6	Mining & Quarrying	88	76
Electricity	73	80	Basic Metallurgical	92	76
Petroleum Refining	68	70	Metal Products	45	38
Other Basic Industries	56	79	Cement	85	76
Construction	4	7	Basic Chemical	86	54
Dairy Products	38.4	42	Slaughtering & Meat Processing	1.4	0.9
Sugar Industry	28	36	Grinding & Processing of Grain	58	54
Oils & Fats	29	33	Other Food Products	27	6
Paper & Paper Products	71	73	Spinning & Weaving	44	38
Fertilizers	79	88	Ginning & Pressing of Cotton	23.3	21
Other Industries	44	59	Manuf. of ready made clothes	5	3
			Tobacco & Cigarettes	42	40

Industries which remained at the same level	% in 1954	% in 1959	Industries which increased its % Exports	% in 1954	% in 1959	Industries which decreased its % Exports	% in 1954	% in 1959
Bread & Bakery	-	-	Mining & Quarrying	7	19	Petroleum Refining	3	2
Transportation & Communication	49	49	Basic Metallurgical	4	23	Manufacturing & Repair of Machinery	4	1
Suez Canal	-	-	Cement	14	20	Other Basic Industry	7	4
			Sugar Industry	1	8	Manufacturing of ready made clothes	7	5
			Oils & Fats	4	5	Fertilizers	21	12
			Other Food Products	12	51	Other Industries	10	7
			Spinning & Weaving	9	11	Banking & Insurance	7	4
			Transportation & Communication	8	10			

TABLE VII

Ranking of the Productive Sectors According to their weight on the Rest of the Economy

In L. E. 1000 Year;1954

Sectors	Gross Production 1	Gross Production & Imports 2	%1:2 3	Inputs from Domestic Production 4	% 4;1 5	Index of Weight 3 x 5 6
Ginning & Pressing of Cotton	87061	87061	100	84358	97	97
Grinding & Processing of Grains	81660	84815	96	75202	92	91
Slaughtering & Meat Product	46420	46420	100	40351	87	87
Other Food Products	26843	28487	94	22600	84	79
Bread & Bakery Products	57050	57121	99.8	43935	77	76
Tobacco % Cigarettes	49125	54117	91	40356	82	75
Spinning & Weaving	86812	95023	91	67739	78	71
Dairy Products	44611	54743	98	31720	71	70
Manufacture of ready made clothes	14332	17065	84	9740	68	57
Agriculture	400814	416391	96	211685	53	51
Sugar Industry	21104	21906	96	10900	52	50
Other Services	276093	276093	100	13112	47	47
Medical Services	7932	7932	100	3662	46	46
Cement	5545	5665	98	2493	45	44
Construction	71311	71311	100	29263	41	41
Wood & Furhiture	10063	10328	97	3524	35	34
Electricity	12383	12383	100	3932	32	32
Banking	15316	17007	90	3995	26	32
Other Industries	36955	62292	95	16451	45	27
Education	5725	5725	100	1543	27	27
Manufacture & Repair of Machinery	30828	61023	51	15317	50	26
Other Basic Industries	12744	26838	47	6163	48	23
Metal Products	11870	19650	60	4311	36	22
Paper & Paper Products	3621	9609	38	2125	59	22
Trade & Financial Services	249495	249854	99.8	54727	22	22
Mining & Quarrying	13051	17669	74	3552	27	20
Transportation and Communication	86165	92969	93	18159	21	20
Basic Metallurgical	9847	20491	48	3361	34	16
Oils & Fats	13548	14130	96	2567	19	16
Suez Canal	31429	31429	100	3341	11	11
Fertilizers	5747	17359	33	1693	29	10

TABLE VIII

Ranking of the Productive Sectors According to their weight on the Rest of the Economy

L. E. 1000 Year; 1959

Sectors	Gross Production 1	Gross Production & Imports 2	% 1:2 3	Inputs from Domestic Production 4	% 4:1 5	Index of Weigh on other industries 3x5 6
ning & Pressing of Cotton	149612	149932	99.7	138609	93	92
ghtering & Meat Products	56342	56847	99	41237	73	72
d & Bakery Products	68376	68381	99	50110	73	72
ning & Weaving	142561	144804	98	99375	70	69
ding & Processing of Grains	98373	100596	98	68089	69	68
r Food Product	28626	40413	71	22602	79	56
facture of ready made clothes	19044	20579	93	11289	59	55
Industry	32670	33834	97	18037	55	53
nt	7355	7821	94	3904	53	50
cco & Cigarettes	52545	58613	90	26424	50	45
y Products	81899	83784	98	36435	44	43
& Fats	15490	16451	94	6947	45	42
r Basic Industries	14358	18463	78	7033	49	38
ting & Insurance	11991	12791	94	4782	40	38
truction	88232	88232	100	30841	35	35
& Furniture	8501	9098	93	3177	37	34
tricity	19830	19830	100	6266	32	32
r Industries	39307	55599	71	17045	43	31
oleum Refining	36729	50702	72	14003	38	27
e & Financial Services	175722	183049	96	46363	26	25
culture	439806	475289	93	110296	25	23
sportation and Communi-cation	92752	102822	90	22434	24	21
ng & Quarrying	22864	29012	79	5296	23	18
l Products	13626	22667	60	3922	29	17
facturing & repair of Machinery	27564	82361	33	12858	47	16
c Metallurgical	15985	38092	42	5554	35	15
ilizers	8833	20358	43	2393	27	12
ation	5868	5868	100	619	11	11
r Services	185784	185784	100	19448	10	10
cal Services	10695	10695	100	988	9	9
r & Paper Products	15988	22003	73	2688	11	8
c Chemaical	10920	16520	66	1193	11	7
Canal	44500	44500	100	1659	4	4

APPENDIX II

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

Producing Sector \ Purchasing Sector	Agriculture	Industry	Services	Agriculture	Industrey	Services	Final Demand	
Agriculture	Interflow matrix for Egypt			Exports to Syria and imports of Syria from Egypt			Final Demand (Egypt)	Gross
industry	Showing flows from Domestic Production and imports from Countries other than Syria separately						Excluding Exports to Syria	Production (Egypt)
Services								
Agriculture				Interflow Matrix for Syria			Final Demand (Syria)	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			Excluding Exports to Egypt	
Services								
Total imports							(Egypt (Syria	
Total inputs								
Value Added								
Gross Production								

APPENDIX III
TABLE I

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 & 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 & Repair of Machinery	0.166	00.97	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 & Processing of grains	0.027	0.057	0.084
Bread & Bakery Products	0.064	0.065	0.129
Sugar Industry	0.032	0.034	0.066
Oils & Fats	0.052	0.019	0.071
Other food products	0.080	0.063	0.143
Spinning & Weaving	0.055	0.072	0.127
Ginning & 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
Trasportation & 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 & Financial Services	0.017	0.020	0.037
Banking& Insurance	0.012	0.026	0.038
Other Services	0.006	0.106	0.112

APPENDIX IV

An Illustrative example of Calculating the net saving in Foreign currency utilizing the iterative method

The Coefficients of the 1954 were utilized

	Agriculture	Industry	Services	Final Demand
				100
				Agricultural imports which should be substituted 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 which should be substituted 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

orts to be substituted by domestic production 100 + 400 = 500
ect and indirect imports required for the new production = 37 (direct imports) + 26.25
direct imports) = 63.25
saving in foreign currency 500 - 63.25 = 436.75