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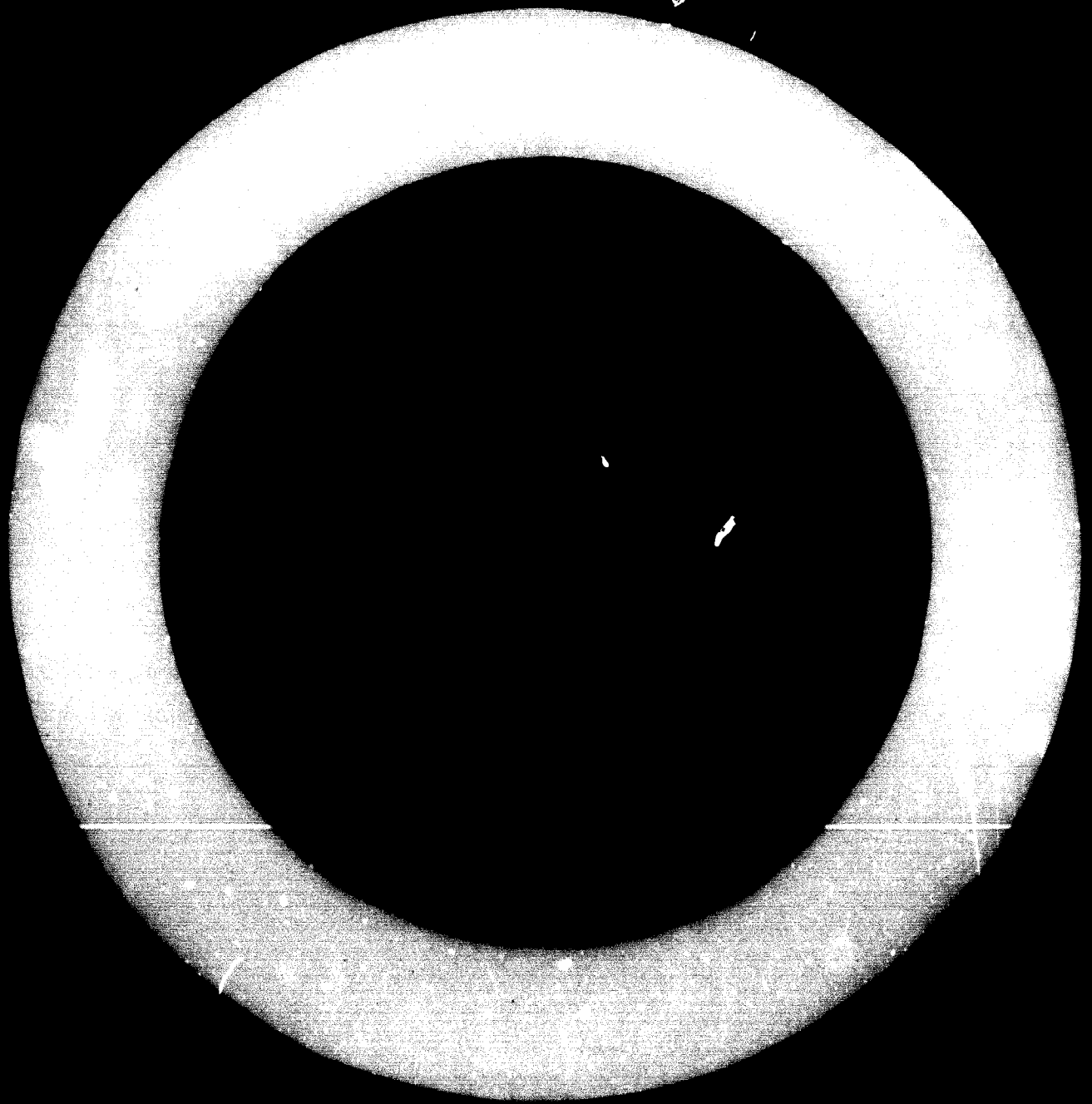
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P R E F A C E

I. In 1970 UNIDO began to prepare projections of industrial development in developing countries in the Second United Nations Development Decade (1971-1980), the purpose of which is to shed light on the prospects for industrial development during the Decade. The projections will also provide inputs that may be helpful in the formulation or rephrasing of programmes in the manufacturing sector in the countries covered by the projections. They will provide background information for field missions, especially those concerned with surveys, programming and planning. One of the subjects to be discussed at the Second General Conference of UNIDO, to be held in 1975, is the prospects for industrial growth in the developing countries during the 1970s in relation to the world-wide objectives and strategies of the Second Development Decade. The projections will provide significant material for discussion.

II. Econometric model building for short-and long-run analysis of developed industrial economies is, by now, widely practised and accepted. Such studies are possible because the relationships that make up these models are fairly stable; the data base is good; and working facilities are available on a broad scale. In the developing countries, however, many factors hinder a straightforward application of the models developed in industrialized countries; imperfection of markets, the existence of a dual economy, influential non-economic factors, lack of adequate data etc. Model building for developing countries must take these factors into account. In addition, it is necessary to make some "adjustments" so as to make the econometric models suitable to the amount of statistics available. Although these factors have been frequently mentioned, they have hitherto not been examined thoroughly as a whole, especially from the point of view of industrial development. Moreover, most of the exercises in econometric projections are related to the macroeconomy, and the number of econometric models especially designed for industrial projections is relatively small.

III. UNIDA felt, therefore, that it should take the initiative in organizing an Expert Group Meeting to appraise various methods and applications of industrial projections for the developing countries. For this purpose, UNIDO submitted to the Sixth Session of the Industrial Development Board the proposal for the Expert Group Meeting on Projections of Industrial Development, under the Programme of Work for 1973 (ID/B/97/ Part II, para. 231), which was approved by the Board at that session.

IV. The Expert Group Meeting which was held in Vienna, 27 - 31 August 1973, consisted of the following persons :-

Mr. H. Frisch	Professor, Institut fuer Volkswirtschaftslehre, Technische Hochschule Wien, Vienna, Austria.
Mr. G. Gaspari	Senior Scientist, Austrian Research Institute for Development, Vienna, Austria.
Mr. A. Ghosh	Professor, Economic Department, Jadavpur University, Calcutta, India.
Mr. L.R. Klein	Professor, Department of Economics, University of Pennsylvania, Philadelphia, Pa. 19104, U.S.A.
Mr. W. Mikhail*	Assistant Professor, Institute for Statistics, Cairo University, Cairo, Egypt.
Mr. J. Millendorfer	Scientific Director, Austrian Research Institute for Development, Vienna, Austria.
Mr. A. Nagy	Head of Department for Research and Foreign Trade, Institute for Economic and Market Research, Budapest, Hungary.
Mr. S. Schleicher	Assistant Professor, Institute for Advanced Studies, Vienna, Austria.
Mr. G. Tintner	Professor, Institut fuer Okonometrie Technische Hochschule Wien, Vienna, Austria.

V. The terms of reference given to the Experts were :-

1. To prepare in advance for the Meeting a discussion paper concerning general methods of industrial projection, empirical applications of industrial forecasting techniques and experience with industrial projections in selected developing countries;
2. To evaluate all possible major techniques for projecting industrial growth;

* He prepared a discussion paper, but was unable to attend the Meeting.

3. To appraise preliminary results of projections for several countries, regions and manufacturing branches;
4. To recommend methods of projecting industrial growth suitable to developing countries;
5. To recommend such supporting and operational activities in the area of industrial projection as can be carried out by UNIDO.

VI. The Group elected the following officers from among its members to serve for the duration of its mandate :-

Chairman	-	Mr. L. Klein
Vice-chairmen	-	Mr. A. Ghosh and Mr. A. Nagy
Rapporteur	-	Mr. S. Schleicher

Mr. G. Eleish and Mr. S. Higuchi of UNIDO acted as technical secretaries to the Group.

VII. At the outset of their work, members of the Expert Group prepared the following discussion papers :-

- Schleicher, S. "Survey on Econometric Models for Projections of Industrial Growth".
- Klein, L. "Industrial Projection Models for Developing Countries".
- Millendorfer, J. and Casperi, C. "Considerations on Sectoral Growth in the Manufacturing Industry".
- Tintner, G. "New Methods for Computing Elasticities".
- Frisch, H. "A Prototype macro-model for the Manufacturing Sector in Developing Countries with special reference to the Philippines, Brazil and Colombia".
- Frisch, H. "Simple Macro-econometric Models for the Manufacturing Sector of Developing Countries with special reference to Argentina, Chile, Mexico, and Venezuela".
- Frisch, H. "A Regional Model for the Manufacturing Sector with special reference to Argentina, Brazil, Colombia, Mexico, Peru and Venezuela".
- Ghosh, A. "Methods of Projection for Industrial Development in India".
- Nagy, A. "Methods of Industrial Projection in Hungary".
- Mikhail, W. "Experience of Some African and Middle East Countries in the Projections of Demand and Production".

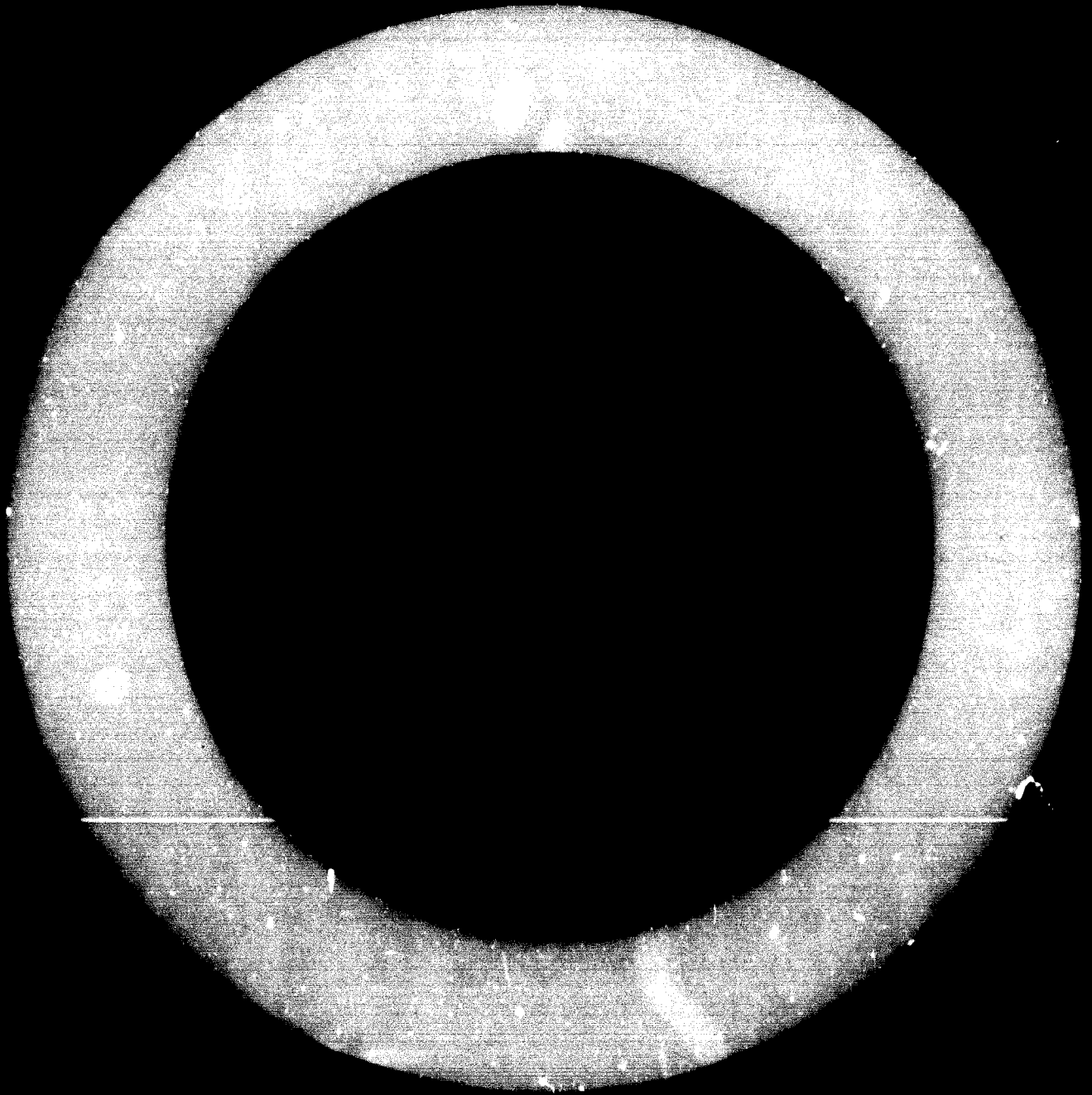
The UNIDO secretariat also prepared the following working documents :-

"Extrapolation of Historical Trends of Output, Employment and Trade for Developing Countries in the Second Development Decade".
"Prototype Macro-models for the Manufacturing Sector and Simulations".

VIII. In the course of its deliberations, the Expert Group sought and received the explanations on the status and activities of UNIDO in the area of industrial projections.

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LETTER OF TRANSMITTAL

31 August 1973

Dear Mr. Abdel-Rahman,

I have the honour to present to you herewith the draft final report of the Expert Group Meeting on Projections of Industrial Development.

The report is the result of the efforts and co-operation of the members of the Group during the Meeting. I trust that this report will be useful to UNIDO in carrying out supporting and operational activities in the area of industrial projection.

I wish to take this opportunity to express my thanks and that of the other members of the Group for the confidence placed in us, as well as our appreciation to the members of the UNIDO secretariat who assisted the Group in its work.

With best wishes.

Yours sincerely,

Lawrence R. Klein
Chairman
Expert Group on Projections of
Industrial Development

Mr. I.H. Abdel-Rahman,
Executive Director
UNIDO.

1. GENERAL PROBLEMS OF ECONOMETRIC MODEL BUILDING
FOR DEVELOPING COUNTRIES.

1.1 The Representation of Supply and other Specific Structural
Features in Models of Industrial Development

The typical model of the developed industrial economy which may serve as an example for the developing country, emphasizes the demand side of the economy. That is to say, such models devote a great deal of attention to explaining relationships for consumer demand, investment demand, public demand and foreign demand. The main channels of explanation of total production (GNP or GDP) can be obtained through the summation of the components of demand.

The income side of the national account is not neglected. This covers factor demand, such as labour requirements, and consequently wage income, but the aspects of the supply side are not emphasized. To give better treatment to the supply side, it is essential to include production functions by sector and condition of supply of the factors of production, such as total capital, labour force, land, and basic materials used in the industrial production process. An important part of the production process, governing the conditions of supply, is the time distribution of lags - decision, construction, shipping and production lags. These must be explicitly treated in the supply side of the model.

An added dimension of the supply side will be revealed in the input-output structure of the flow of intermediate production. This specific form of supply analysis will be taken up separately in section 1.2 ; suffice it to note here that inclusion of input-output tables will be an integral part of representation of the supply side.

To summarize, we emphasize that careful and detailed treatment by sector be given to conditions of supply through production and

factor requirements equations in developing country models. Supply of capacity limitation should be built explicitly into the model specification. The whole supply analysis should be carried out in as much sectoral detail as possible by main industrial sectors, such as types of manufacturing, construction, and supporting industries (power, transport, and communication).

Other features besides the emphasis on the supply side of the economy that must be taken into account in model building for the developing nations are :-

- (a) Reliance on a limited number of particular export lines;
- (b) Comparatively high inequality of income and wealth distribution;
- (c) Dependence of money supply on internal and external balance ;
- (d) Dualism (side-by-side co-existence of modern and traditional methods of production) ;
- (e) Urbanization ;
- (f) Import substitution.

All these are important aspects of economic structure that exist in lesser degree in many industrial countries and have consequently not been emphasized in their model construction. These are important features that should be given explicit display in the models of developing countries.

1.2 Integration of Input-Output Technique

In section 1.1 the structural problems of model building have been developed for models which do not involve sectoral elaboration. For our purpose, however, of providing operationally useful information, sectoral projections are certainly essential.

The most obvious next step therefore is to proceed from macro-models for the total economy to models which integrate detailed sectoral information. This is best achieved by integrating input-output models with the overall macro-economic frame already set up. The integration of the input-output approach raises several problems. They may be briefly outlined as follows :-

(a) An input-output model involves detailed sectoral information which is aggregated in most macro-models. Hence, consistency of the input-output tables with the national accounts which generally form the basis for the macro-model has to be assured. It is sometimes found that the two sets of information do not agree. In such cases, generally, input-output provides the more reliable base, while national accounts may be used to get a set of time series indices and in line with the concepts used in national accounts.

The second important point to note is that input-output elaboration should not be such as to make correspondence difficult with the national accounting system. This means that input-output tables should be reasonably moderate in size, especially in developing areas and in line with the concepts used in national accounts.

(b) A final demand model is generally set up with time series data, but detailed sectoral elaboration of the same may not be possible on a time series basis. Generally speaking, effort should be made to use time series to get the sectoral final demand estimates as far as possible. For the rest, the obvious way would be to use some form of fixed coefficients on the basis of the input-output table itself. Thus one may use historical time series to estimate capital formation in machinery, construction and other sectors, and make minor sectoral capital formation as a simple fraction of total investment. Alternatively final demand figures from a priori or distributed macro model sources might be used to get detailed sectoral projections from the input-output table.

I.3 Statistical Methodology: Prior information, Structural changes, errors in data

The role of prior information and structural change in projection models is of great importance, particularly for developing countries. Prior information may relate to key variables in the macro-model, sectoral or total. Definite policy changes or changes in external situation may have taken place which bring about far reaching changes in the structure of foreign trade or in domestic substitution of foreign goods or in the pattern of investment. Wherever these changes can be quantified even in a crude way, they have to be brought into the picture. Shift or so-called dummy variables may be used to denote the presence or absence of certain factors but they have to be incorporated into the whole analysis. New industries may be set up, and there may be a severe outback in investment of a particular type; in case medium-scale or small industry is especially encouraged; if severe drought affects the supply position of raw materials; such effects should be introduced through various devices like assigned parameters or shift variables.

Coming to the input-output coefficients, one should be on the look-out for important changes in some of them. If the changes are expected and strong, suitable correction should be made from outside information to the associated coefficients. But there is another class of changes in the coefficients which is known to be happening over time but which cannot be corrected from prior information. This may happen in the coefficients of the input-output matrix or in the macro-model for final demand. For the correction of such continuous secular change, especially in the input-output coefficients, which depend on single point observation, various techniques have been suggested. A simple technique for taking account of gradual changes in the input-output coefficients is to compute the historical error obtained by using a constant input-output matrix together with changing final demand and output, and to correct forecast on the basis of the computed pattern of error.

The biggest difficulty and greatest degree of arbitrariness

enters the model of the developing countries due to the presence in significant amount of the so-called subsistence sector, where transactions are rarely recorded and valuation is somewhat arbitrary. In such cases, the unreliability of the recorded data may throw doubt on coefficients estimated with such data. In such cases, allowance must be made for a large band of uncertainty in the projection process.

To deal with the problem of data errors and changing economic structure, typical of the developing countries, we recommend the undertaking of pilot studies using non-conventional estimation techniques that rely heavily on a priori information.

In the area of a priori information, data error and structural change, close contact with local experts is essential in order that the model builders use a realistic set of estimates in their exercises.

1.4 Influence of non-economic factors

The importance of non-economic factors in forecasting industrial development depends essentially on the scope of the forecasting exercises. It is obvious that for short-term predictions it is usually sufficient to rely on models which essentially describe the relation of purely economic variables. The longer the forecasting period, however, the greater will be the number of factors which will influence the development to be predicted. Therefore medium and long-term forecasts of industrial development (5 - 10 years) will be much improved if they take into account the influence of non-economic factors.

This broader view will help to evaluate the prerequisites of certain measures of economic policy in other social sectors, as for instance in the field of education and social structure (i.e., value systems and behaviour patterns of the population) which seem to be closely related to economic performance. Knowledge of such relationships between non-economic factors and the economic system is important insofar as bottlenecks impeding industrial development can be analyzed. One important aspect will be the estimation of time-lags of the influence of non-economic on economic factors.

Many of these problems will be of general importance and of interest to most of the developing countries. It seems to be advisable, therefore, that UNIDO headquarters should take into account this set of problems. For obvious reasons, extensive preoccupation with non-economic factors will not be possible; nevertheless the collection and sifting of pertinent information seems advisable. The most important relationships will probably give insight into the influence of educational, demographic and health development on problems of industrialization. Problems of common interest to UNIDO and other international organizations (UNESCO, WHO) will arise.

1.5 Formulation of socially desirable targets

One of the major problems of model building for developing countries is how to treat the main targets expressing the interests and desires of society. National plans or planning and optimization models are by nature target-oriented and are explicit in terms of social preferences. Economic projections endeavour to show how far certain targets can be achieved within a given period, with their consequences and necessary conditions. This point is taken up again in section VI, below.

Based on past planning and projection experience, our group feels that in formulating and checking these targets, in certain cases, perhaps too much emphasis was placed on simple quantitative indicators of output, and not enough on some other very important aspects of the interest of the community, like indicators of the quality of life (health, education, environmental hazards, housing, etc.), removal of social injustices, self reliance and the population's actual participation in development.

It is, of course, extremely difficult to include all aspects of socially desirable targets in a planning or projection exercise, especially in a quantitatively specified way. Nevertheless, it was felt that much more consideration should be attached to these in the process of formulation of the targets and in checking the many-sided consequences of the attainment of certain growth or output targets.

The problem of the improvement of the quality of life arises in very different ways at different stages of development and in different social and economic structures. In vast regions of the developing world the preservation of human life is the most important question and consequently the quality problems are less important. At a higher stage, such problems as sewage, drinking water, medical facilities, possibilities of communication etc., are the major problem of the improvement of living conditions. Deterioration of environmental conditions increasingly endanger the quality of life at a higher level of industrialization and urbanization, but several of the developing countries, or some areas of them, are already attaining, or approaching this stage.

For this reason the group strongly feels the necessity to draw the attention of both decision makers and planning model builders to pay more attention to these problems even if it is, or does not seem to be an acute problem now. This means that, in working out recommendations for development, instead of transplanting or imitating the examples of certain other countries, they should study both the advantages and disadvantages of certain patterns of industrial development in a broad way, including their effects on the conditions of life. It has to be stressed that the earlier a developing country becomes aware of environmental dangers, the easier and cheaper it is to avoid them.

1.6 The experience of centrally planned economies in projection and planning

The countries where the means of production are nationalized have accumulated a great deal of experience in economic and social planning and projections, the knowledge of which can be useful for developing countries. Several of the centrally planned economies have been or still are faced with problems that are similar to those of many developing countries, e.g., structural change in the economy, in social stratification, in income distribution, the necessity for fast growth with limited resources, scarcity of capital and foreign exchange, the necessity of rapid improvements in health, education, and infrastructure, decision about the share of investment and consumption in total net income, etc.

Planning methods have to handle all these problems and they are remarkably different among centrally planned countries. These differences reflect differences in stages of development and differences in national conditions. The performance of the different planning and projection techniques used in the centrally planned economies is naturally very different also, but these experiences - both the successes and the errors, or shortcomings - can be valuable for developing countries in their efforts to adopt planning and projection techniques which best suit their conditions and targets.

Remarkable progress can be observed in the planning techniques of the centrally planned economies from individual commodity balances to more consistent methods, using input-output computation, linear programming, solutions of simultaneous equation systems, etc. An improvement in information flows and a development of more decentralized, parallel and iterative planning processes were linked to this. It has been recognized in several centrally planned countries that more concentration is needed on medium- and long-term structural decisions in the planning process and that it can improve the efficiency and flexibility of the system if much of the short-term and less aggregate decisions are left to the lower-level economic units following financial variables instead of detailed, obligatory, quantitative measures.

The scope of social consequences and preferences has grown in recent applications of planning techniques. Environmental, sociological, educational, cultural, and health targets and social expectations play an increasing role in plan formulation, while the one-sidedness of the quantitative output-orientation is on the decrease. As a consequence of learning from experiences, the realism and consistency of plan targets are improving and they express better the preferences of the decision making organs, as they interpret the interests of society.

Simple projection techniques were always heavily used in the preparatory phase of planning. Projections were found to be useful in cases of socio-economic phenomena in which the influence of central decisions or social preferences are not strong, or have a slow effect (such as demographic development, world market changes, consumption patterns etc.). In these and similar fields, the prediction of the most probable course of events is a necessary prerequisite to planning, i.e. socially conscious and deliberate intervention in economic development.

Apart from the use of projections mentioned above, a different kind of economic forecasting is developing in some of the centrally planned countries. As direct and detailed obligations decrease and indirect financial variables are used more in control and management systems, the need to foresee how the introduction or change of certain regulations will effect the behaviour of the economic units has grown.

This led several research institutes in centrally planned economies to develop more consistent projection methods and models which are not target oriented, but with probability of prediction accuracy. These projections have to be built on certain assumptions concerning the future behaviour of exogenous factors and the relationships of endogenous economic indicators to such exogenous factors. Different projection variants can and are being elaborated, according to different assumptions allowing a choice for the users, but here again forecasters concentrate on probability of prediction accuracy.

Economic projections in the centrally planned economies are generally combinations of econometric and intuitive methods. It was found that the consequent loss in elegance and quantitative assessment of the assumptions is compensated by the gain in realism and accuracy. The need for such a combination of techniques is probably linked to the fact that the stability of historical relationships is lower in countries where structural, technological and policy changes are greater or more frequent. The combined use of formal and intuitive methods together with cross checking by different projection techniques is beneficial in two directions: it helps to improve econometric projection models and helps the users of intuitive methods to specify and quantify their assumptions.

II. SIMPLE METHODS OF PROJECTION USING TREND EXTRAPOLATION TECHNIQUES.

Among the many methods of economic projection, the estimation and extrapolation of simple trends is undoubtedly the most elementary. As the industrial development of national economies shows a wide variety of patterns from country-to-country and sector-to-sector, it is desirable to present trends according to a general statistical method that can generate the different types as special cases, depending on statistical estimation of key parameters. Recent developments in econometric methodology make it possible to estimate (in a sense) the very form of the trend used.

We start from a linear stochastic difference equation of the first order with constant coefficients

$$X_{t+1}^{\lambda} = a + bX_t^{\lambda} + u_t$$

where the constants λ , a and b can be estimated by the method of maximum likelihood. This method also supplies a large sample test for λ , and we might construct confidence or fiducial limits.

Several of the customary trends used in economic projection are special cases of the above difference equation. If $\lambda = -1$, we have a logistic trend. For $\lambda = 0$ we obtain the Gompertz curve as a trend. If $\lambda = 1$, we have an exponential trend, but if in addition $b = 1$ we obtain a linear trend.

The assumption about the random variable u_t are as follows: it is approximately normally distributed, with mean value zero, constant and finite variance, and the individual observations are not autocorrelated.

The above method of using more general trends for projection has the advantage of greater flexibility. Also, if we obtain e.g. a Gompertz curve or a logistic trend, this nonlinear trend will have an upper asymptote. For long term projections, trends which have an upper asymptote are to be preferred to e.g. linear, polynomial and simple exponent trends, which tend to infinity with increasing time

and hence cannot be taken very seriously for projection in the long run. They might however be quite suitable for short term projections, as convenient approximations of more complicated functions of time, which represent the true trend of the economy.

Through computer programming of search procedures (searching for a value of λ , and estimating a and b by regression techniques for a given λ) it is possible to produce fast and efficient estimates of trends for a great variety of cases. We recommend that research be undertaken to prepare a computer programme for trend estimation from the general equation stated above and simultaneously to produce a graph routine to display each of the calculated trends on a comparable basis across industries and countries. This will enable UNIDO to apply trend analysis on a large scale for description and projection purposes.

III. PROJECTIONS WITH STRUCTURAL ECONOMETRIC MODELS

III.1 Integration of existing models for the manufacturing sector into overall country models

Recent model building exercises for developing countries indicate a strong need to integrate models for the manufacturing sector into the framework of an overall model for the economy. Several important links should be taken into account which connect the manufacturing sector with the activities in other parts of the economy.

Full capacity output of the manufacturing sector, e.g. depends on the extent of fixed capital, which in developing economies typically contains a high percentage of imported goods. The utilization of the installed capacity in turn depends in many developing economies on the availability of imported raw materials and intermediate products. The extent to which imports can be financed will be limited by the export performance of the overall economy, and we observe right now that exports of the agricultural sector in many developing economies have become increasingly important in financing imports for the manufacturing sector. A direct influence of the agricultural sector on the manufacturing sector is given by the shipment of primary inputs. Mention should be made of the important

links between the manufacturing sector and the monetary sector, which again reflects the overall performance of the economy.

Three ways are suggested for integrating the manufacturing sector into an overall model for the economy.

First, a model for the manufacturing sector can be added to an overall econometric model as a satellite model depending only on the outputs of the overall model. This type of integration can easily be performed with the econometric models for the manufacturing sector presented at this meeting by using gross domestic product as an output of the overall model as the main linkage input for the manufacturing model.

Second, the manufacturing sector can be modelled in such a way that the sectoral model receives both inputs from other sectors and affects with its outputs the rest of the economy. Typical examples for this type of integration are the three-sector models of UR:TAD, with manufacturing included in the second sector. The other two sectors are primary and tertiary (infrastructure) production.

A third way would be to use an input-output table for the description of the production flows between the producing sectors and final demand, and to include the appropriate feedbacks from production to demand. This method was already mentioned in Section I.2.

III.2 Intra-Regional linkage of national models

The open character of the economies of developing countries requires an international treatment of their specific problems. Because of increasing industrial specialization, not only within but also between different countries, special attention should be given to studies dealing with international and regional trade flows.

The encouraging experiences of the project LINK on a worldwide basis and the regional linkage exercise for the manufacturing sector for some Latin American countries presented at this meeting might serve as important pilot studies. As a first step, regional

trade flow matrices ought to be computed on a one-digit SITC level of disaggregation. Each country's demand for imports will be determined by import functions of a national econometric model. The regional trade share matrix indicates how these import flows will be translated into exports by each of the separate countries. Time corrections of the coefficients of the trade share matrix should be made according to the variation of relative prices and other factors, e.g. bilateral or multilateral trade agreements. The suggested method is but one way of estimating consistent trade flows within a region. Other techniques, relying more on domestic supply conditions for exports, may also be used.

The complete system is a very powerful tool to simulate the transfer mechanism of one country's policy decisions on the other economies of the region considered. Changes of exchange rates, tax rates, the sectoral distribution of output or import restriction - to mention just a few examples - can be studied with respect to their effects on other economies with such a regional linkage model.

III.3 Global commodity models and models for specific industries

The industrialization process depends in the last instance on the decision to allocate scarce productive factors to the production of specific goods. The main problem which arises when decisions on this level have to be made is to know what will be the probable demand for the goods produced. Therefore, it seems to be useful to conduct studies aimed at describing the development of demand for those commodities playing a crucial role in the process of industrialization. Such research work will have to concentrate on the description of the pattern of world demand and world trade of these commodities as well as on trying to describe the shape of the demand curve in the industrialization process of different countries.

On the level of sectors of industry, emphasis will have to be put on the evaluation of supply conditions, trying to find out how productive factors can be combined in best use. This includes the description of how the variation of technologies influences the way input factors have to be combined. At the present stage of data availability, international cross section analysis of sectoral production functions will provide valuable information.

Previous work on model building for basic commodities has not paid special attention to the problem of the exhaustion of non-renewable resources. We recommend that serious consideration be given to this aspect of commodity analysis in future model building research.

Due to the general interest of these topics for developing countries, UNIDO Headquarters and other UN organizations are in the best position to deal with this set of problems.

III.4 Extensive Case Studies for Selected Countries which are representative for a region

There is a general agreement among the members of the meeting that each country model should take into account as much as possible the specific features of its economic structure. Thus, the level of disaggregation and detail will differ from country to country, and so will the interactions between the sectors of the economy. Instead of forcing a large number of countries into the rigid framework of a standardized model, the members of the meeting would like to encourage research groups to concentrate on a few country models, which are typical for a region. Therefore, case studies like the models for Mexico, presented at the meeting, are recommended. Additional models for important South East Asian and African countries should also be studied in depth. The choice of country should be based on a desire to represent economies in different stages of development and to contain major industrial countries among developing economies.

I. RECOMMENDATIONS TO UNIDO HEADQUARTERS

IV.1 Data requirements

We recognize the central importance of quality and quantity of underlying economic data in the building of sound statistical models generally. In the case of the developing countries, adequate data are hard to obtain, therefore we recommend that special efforts be taken by the UNIDO secretariat in assembling good statistical series for model building in the case of the developing countries. The approach of UNIDO Headquarters should be two fold :-

(a) On the one hand, they should specify model building needs for the UN Statistical Office in New York. This should cover conventional national accounts data for developing countries, and additional data on capital stocks, prices, wage rates, employment, labour force, sectoral production, and other specific series deemed to be of major importance for model building;

(b) On the other hand, they should specify directly to individual developing countries unusual data needs on particular variables that turn out to be important in such countries' models. If individual countries participate directly in data preparation, then appreciation of the resulting models will be enhanced.

IV.2 Projection exercises

Using all methods available to them, UNIDO Headquarters should make regular projections for developing countries - individually, regionally and globally. These projections should be extrapolation of simple trends and forward simulation of structural models. These projections should be short-range (one or two years),

medium-range (five to ten years) and long-run (longer than ten years). These projections should be done by UNIDO staff members and, when needed, in consultation with outside experts. The projections should include industrial production, capital investment, employment, trade balance, and other variables of relevance to industrialization.

IV.3 Communication with developing countries

The model building effort and the projection exercises will be greatly aided and improved in quality through direct contact with professional economists in developing countries. We recommend therefore that UNIDO Headquarters maintain a dialogue with the developing countries by showing their model estimates and associated projections to these countries, receiving comments on their appropriateness, and making corresponding amendments. The involvement of developing countries in model construction and projection exercises is of great importance. Eventually, it should enable the developing countries to do some of this kind of economic analysis on their own.

IV.4 Maintenance of a model inventory

For the past several years, models and projections of industrialization in developing countries have been produced on a large scale. Some of these come from other international agencies, national authorities, academic centres, research institutes or other private bodies. A substantial literature exists and is now growing at a rapid rate. Much of the material is overlapping and a great deal of value having a bearing on the present work of UNIDO exists already. We feel that it is in the joint interest of UNIDO and the developing countries that an inventory be made of already completed work on projections and model building for industrialization. This inventory can be built on to the bibliography submitted in the papers of the Expert Group Meeting, but additional contributions should also be included. Once the inventory is established and classified, it should be kept up to date at UNIDO Headquarters.

V. RECOMMENDATIONS TO DEVELOPING COUNTRIES

These are naturally overlapping with some of the recommendations for UNIDO Headquarters in their relation to developing countries, but we repeat them here for emphasis.

V.1 Technical assistance

There are several ways in which technical assistance can be given to the developing countries by UNIDO Headquarters. Our suggestion is to organize seminars on basic and advanced projection methods, given by outstanding econometricians, statisticians and economists. In addition, a training programme should be initiated to enable members of local model building groups to deepen their experiences with UNIDO Headquarters. If the UNIDO secretariat engages in their own model building and projection activities, a permanent information exchange with experts of the country concerned is highly recommended.

V.2 Specific data needs for economic model building

Model building exercises for developing economies show a specific need for an improvement of the data base for the production sector and the foreign trade sector. As far as the production statistics are concerned, a classification consistent with the trade classification is recommended. For a better understanding of the inter-sectoral and inter-industry relationships more attention should be given to input-output tables. The heavy dependence of developing countries on foreign trade requires a much more detailed study of their trade flows.

V.3 Projection exercises on a dialogue base

Experiences with econometric models for developing countries show that these models have provided an excellent means of organizing the relevant data and the discussion.

of the economic problems in a systematic framework. Full advantage of an econometric model can only be gained from a permanent dialogue between model builders, statisticians and economic experts. These discussions will help the decision makers to pose the relevant questions and indicate to the model builders what are the relevant interactions.

VI. THE USE OF PROJECTION TECHNIQUES AS AN INSTRUMENT FOR SHOWING POSSIBILITIES AND CONSEQUENCES OF REACHING ECONOMIC TARGETS

Broad political, social and economic considerations lead policy makers to set targets for national economies such as growth rates, trade balances, acceptable inflation rates, or a wide variety of other goals. It is up to decision and policy makers in developing countries to set targets, but model building and economic projection methods are of great use in showing whether targets set up by others are, in fact, attainable. Since comprehensive models enable us to project many economic variables simultaneously, they may be of great help in showing how determined efforts to get at certain target levels imply coincident levels of other variables. These other variables may be "side effects" or "trade-off" or complementary levels of variables not specified in the stated targets.

We recommend systematic and repeated application of scientific projection techniques as the most realistic way to appraise the attainability of targets and the broader consequence of aiming for specific targets. Projection models are widely used in developed countries for forecasting the state of the economies and simulating the consequences of economic policy decisions concerning many variables. Similar methods can be applied for the analysis of industrialization in developing countries. With enough applied research, we feel that similar results can be achieved in practice for the developing countries, and it is in this spirit that we recommend a careful and comprehensive research programme for

the construction of such projection systems for the developing countries.

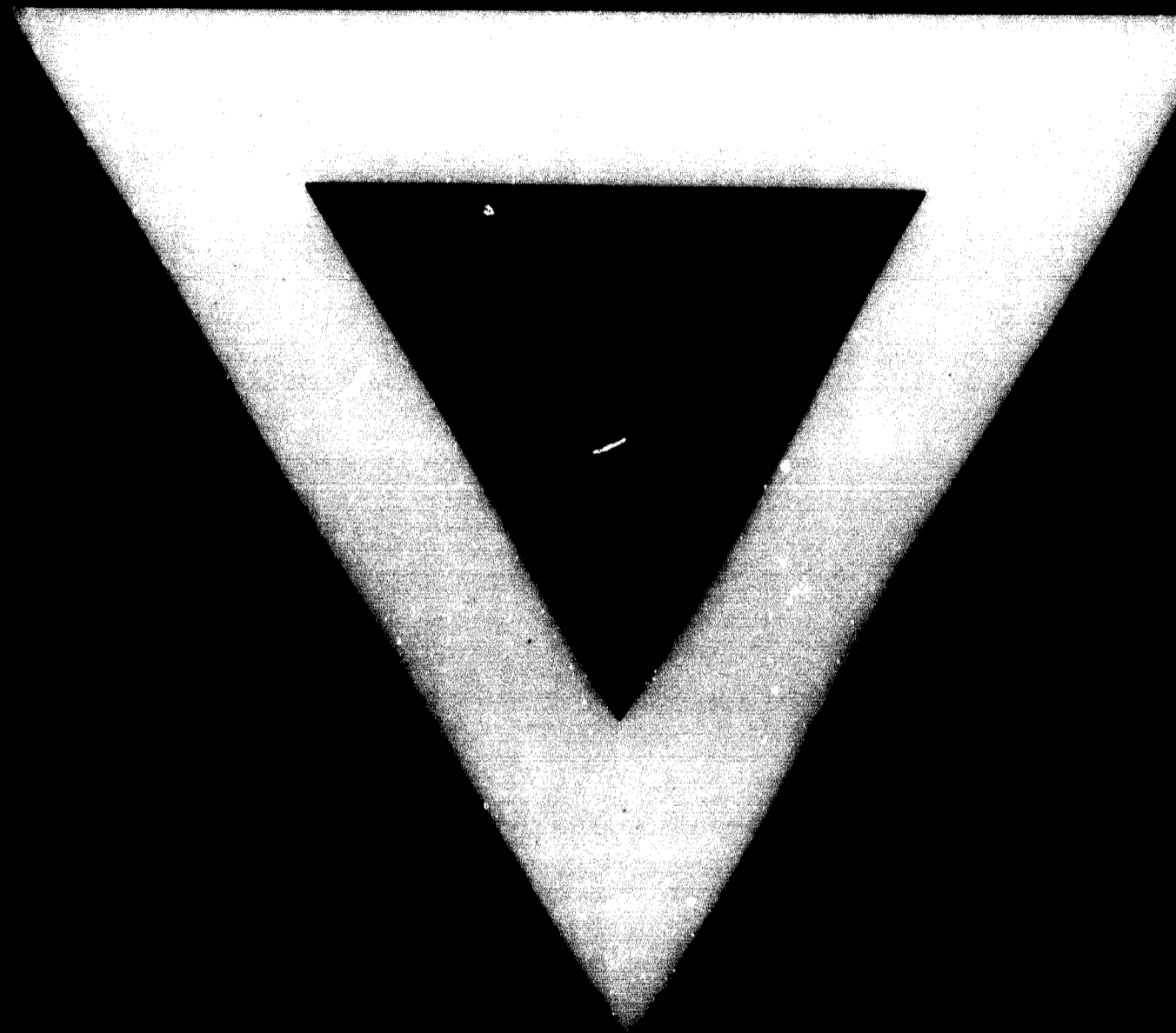
VII. PUBLICATION OF THE FINAL REPORT

Prior to the assembling of the Expert Group Meeting at UNIDO Headquarters, 27 - 31 August 1973, the individual experts prepared separate research contributions on different aspects of the subject of the meeting. These reports, as recommended below, will be revised on the basis of the discussion at the meeting, and edited for publication as a single document.

We recommend that a final report be published by UNIDO incorporating the following material :-

- (a) An introductory statement on the elements of model building and projection techniques for industrialization of developing countries. This statement should be an exposition of the methods used by the group of experts in preparing their papers for the meeting and shall serve as a primer for economists in developing countries.
- (b) A consistently edited collection of the papers presented at the Expert Group Meeting.
- (c) A summary of the discussion and final recommendations by the Expert Group. The final recommendations shall be an expanded and elaborated version of this draft final report, and shall be addressed to the developing countries.

*Each participant has been asked to revise his presentation by 30 November, 1973 and return it to the editors for final style amendment. The revised papers together with items prepared by the editors according to (a) and (c) above will be transmitted to UNIDO for final publication.



12.8.74