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**INDUSTRIAL PLANNING METHODOLOGIES  
AND COMPUTER-AIDED TOOLS**

**Report on the  
High-level Expert Group Meeting  
for UNIDPLAN Programme Implementation  
Tbilisi, USSR, 24-28 October 1988**

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1. OPENING THE MEETING

The Meeting was opened on behalf of the host country by:

- Mr. G. DJAVAKHISVILI  
Minister of Foreign Affairs of the Georgian SSR
- Mr. L. MARSHANIA  
Director of the Institute for the Management of  
National Economy
- Mr. B. KOUROTCHEKHO  
Representative of the State Committee of Science and  
Technology

and on behalf of UNIDO, by:

Head, Industrial Planning Branch.

The list of participants is attached under Annex IV.

The Meeting elected as chairman Mr. L. Marshania, as vicechairmen  
Mr. S. Cheremnykh and Mr. F. Sadler.  
Mr. P. Vasarhelyi was elected to act as rapporteur.

The Agenda has been approved as presented under Annex V.

## 3. UNIDPLAN

### 3.1 WHAT IS UNIDPLAN?

UNIDPLAN is an umbrella project: a framework for coordinated and harmonised activities aiming at the development of industrial planning in developing countries. It covers all types of activities necessary to the improvement of industrial planning, such as the development of planning methods, their implementation in the form of computer programmes, the development of statistical and other information systems and services necessary for the use of the above methods and computerized tools, the training of planners on the introduction and use of up-to-date methods, tools and information and last but not least the establishment of an international mechanism for the sharing of related experiences and mutual assistance.

### 3.2 THE STATUS OF UNIDPLAN

#### 3.2.1 LAUNCHING THE UNIDPLAN PROGRAMME: EXPERT GROUP MEETING IN RIGA/USSR

The first proposal regarding UNIDPLAN was prepared for and discussed by an international expert group meeting held in Riga, USSR, in September 1987. Following this meeting and implementing its recommendations UNIDO launched a series of activities, involving gradually more and more countries and combining different financial resources.

#### 3.2.2. COMPUTERISING THE GUIDELINES FOR INDUSTRIAL PLANNING

As a first step selected parts of the previously elaborated Guidelines for industrial planning have been computerized for use as a teaching tool.

#### 3.2.3 DEMONSTRATING SOFTWARE TOOLS: EXPERT GROUP MEETING IN BUDAPEST/HUNGARY

An Expert Group Meeting was held on the above subject in Budapest, Hungary, 30 May to 3 June 1988. It was organized by UNIDO in cooperation with the Hungarian UNIDPLAN focal point: the Computer and Automation Institute of the Hungarian Academy of Sciences, the Institute for Methods and Information of the National Planning Office and the Computer Application Company.

The Meeting was attended by experts from Algeria, Austria, Czechoslovakia, Egypt, France, GDR, Hungary, Italy, USSR, Yugoslavia and the International Institute for Administrative Sciences.

This meeting offered the first occasion to confront the needs of planners in charge of performing analysis, preparing plans

and/or monitoring implementation with the possibilities offered by microcomputer-based programmes prepared with a view to facilitating such activities.

The meeting formulated concrete recommendations regarding the installation and introduction in use of selected software tools in some of the countries represented here as well as to elaborate more general proposals for consideration by other countries.

In particular:

- the meeting elaborated recommendations regarding the further development of industrial planning methods, the introduction of selected computerized planning tools in the framework of case studies to be implemented in the field of national planning and regarding the planning and scheduling of activities in the energy sector.
- the meeting adopted a standard form for the description of computer-aided planning tools to be offered to developing countries in the framework of the UNIDPLAN programme.
- proposals were made also regarding training activities and the establishment of a UNIDPLAN data base.
- specific recommendations were addressed to the developing countries represented in the Budapest Expert Group Meeting.

#### 2.2.4 FRENCH INSTITUTION OFFER SOFTWARE TOOLS

The Statistical Office (INSEE) of France offered a software simulating an operational model of the French economy: the Micro-DMS model. Using assumptions on the situation in other countries, such as on production, demand, inflation, etc. and the policy of the French Government, this model determines the associated economic equilibrium. Starting from a previous simulation, the Micro-DMS allows to modify some of its assumptions, e.g. the income tax rate, and it presents in the form of tables and graphs the consequences of these changes (e.g. the evolution of unemployment). In addition to the direct consequences of the simulated decisions, the software allows to observe the main economic mechanisms; e.g. the influence of job creation on unemployment will be weakened by the apparition of young people seeking job. Simulations can be implemented at three levels:

- Basic level: the options defined by the producer of the tool are accepted
- Intermediate level: the set of options is accepted, except the production function and exchange rate
- High level: the whole set of options can be redefined.

#### 2.2.5 ITALIAN COMPANY DEMONSTRATES SOFTWARE TOOL

The Dagh-Watson Co. in Italy demonstrated a software tool and database developed with a view to identifying and quantifying industrial wastes requiring disposal, which could be offered through the UNIDPLAN programme.

The database contains the results of the in-site analysis of the quantity of different types of wastes produced by each particular type of industry, related to the number of employees

The software tool allows

- the estimation of the total amount of industrial waste produced in an area under consideration
- the estimation of the total amount of waste produced in a specific type of industry in the country.
- the identification of potential environmental impact without the need for undertaking a large industrial survey which is often beyond the resources and capabilities of the authorities in charge of environment and/or industrial development.

### 2.2.6 INITIATING COOPERATION WITH OTHER UN AGENCIES

The Food and Agricultural Organisation of the UN (FAO) offered its CAPPA system for use in the framework of UNIDPLAN.

CAPPA aims at training planners on the utilisation of the "scenario" approach in planning studies. It enables users to illustrate and evaluate the consequences of alternative strategies and of alternative courses of events regarding exogenous factors.

CAPPA is a set of partial models, each of which is used to facilitate the construction of a particular component of the scenario. It is important to stress that CAPPA is not an optimization system, but a simulation system. It supplies no ready answer to policy problems, but enables users to conduct expeditely the projection and analysis work necessitated by the scenario approach.

Although CAPPA is oriented towards users in the field of agriculture, it contains several components directly related to industrial planning, too. In particular it takes planners through the following steps:

- projecting population and labour force at the horizon year of the scenario
- projecting macroeconomic aggregates, in particular per capita income
- projecting food demand and other demand for agricultural products, etc.

UNESCO expressed interest in implementing joint project activities in the field of training planners and managers: the elaboration of course content and teaching material could be undertaken by UNESCO, whereas the financing of the travel and DSA for course participants could be provided by UNIDO in the framework of the UNIDPLAN programme.

### 2.2.7 NATIONAL REVIEW AND MEETING IN BULGARIA

In Bulgaria the Industry Development Institute (Sofia) as the national UNIDPLAN focal point implemented a review and analysis of the respective national institutions to determine their know-how in the use of computers in industrial planning, their priorities for UNIDPLAN Programme and capabilities to provide inputs including the profiles of the institutions and their facilities (hardware, software and human resources). A list of institutions to be surveyed will be specified at the beginning of the project implementation.

This was followed by the selection of industrial planning methodologies and preparation of demo-versions of corresponding computeraided tools and users' manuals available for UNIDPLAN Programme using the standard form proposed by the Budapest meeting.

On the basis of the above a national technical meeting has been organised with the participation of identified counterpart institutions to:

- verify the findings and agree upon recommendations on national proposed inputs for UNIDPLAN Programme implementation; paying due attention to the status of the UNIDPLAN programme implementation
- elaborate a workplan for national institutions to develop selected elements of UNIDPLAN Programme in 1988-1989; and

### 2.2.8. INITIATING A PROJECT IN CUBA

Cuba expressed interest in launching a UNIDPLAN project in the field of enterprise level industrial planning, in particular regarding short term (yearly, monthly, daily) planning with the following 3 major components:

- preparation of a state-of-the-art report for presentation/discussion at the high level expert group meeting in Tbilisi, USSR, 24-28 September 1988
- organization of a national meeting on methods and tools for industrial planning
- preparation of a final report with recommendation and a workplan for the implementation of Unidplan activities in Cuba under international assistance.

### 2.2.9 INTERNATIONAL SEMINAR IN ST VALERY/FRANCE ON ENVIRONMENT RELATED ASPECTS OF PLANING

The meeting called the attention to the environmental aspects of industrial planning. It was pointed out that any investment



planning should include a global risk evaluation dealing with natural and technological hazards, simultaneously with technologic, economic and social parameters. The waste of resources resulting from risks and the risk generated by the creation and use of resources should be taken into consideration. Complex situations should be analyzed in the framework of case studies, the risk evolution should be anticipated and solutions should be found by the means of global planning.

Regarding future UNIDPLAN activities the meeting recommended, that

Unido in its UNIDPLAN programme introduces the analysis of the costs of risk and crisis management in the overall analysis of the economy preceding the elaboration of plans for the future and improves the planning of industrial investment projects taking into account natural and technological risk factors threatening the new industrial/energy complex as well as the new risks generated eventually by it, using an interdisciplinary and transdisciplinary approach"

### 2.2.10 INITIATING A UNIDPLAN PROJECT IN EGYPT

In Egypt a preparatory meeting has been initiated with a view to:

- 1) discussing arrangements for the hosting and implementation of two case studies in Egypt, as recommended by the UNIDPLAN expert group meeting held in Budapest

- 2) demonstrating one or two computer aided planning tools developed at your center and taking over a documentation in English, possibly with a demo floppy for promotion by UNIDO of the transfer of Egypt's valuable experience through technical assistance projects in developing countries

- 3) discussing the findings of the Cabinet Decision Support System regarding the impact of the use of computerized tools on the efficiency of the actual economic planning and management

- 4) identifying the ways and arrangements to be considered by the Egyptian authorities and UNIDO for transferring Egyptian experience and computerized tools in the field of industrial planning to developing countries

This meeting will take place after the Tbilisi one.

### 2.2.11 INITIATING PROJECT IN YUGOSLAVIA

In the framework of the UNIDPLAN programme two specialists visited the institutions in charge of national planning and energy production/distribution in Yugoslavia and they have identified the fields in which the tools already offered through UNIDPLAN could be introduced and used. A project proposal has been elaborated for consideration by the Government and UNIDPLAN.

### 2.2.12. INTRODUCING UNIDPLAN ELEMENTS IN ON-GOING PROJECTS

#### a) Master planning for Sudan

A project under implementation in Sudan (US/SUD/87 142) has for objective the implementation of the Government's strategy to meet domestic demand for engineering industry products and to strengthen the export capability of that industry through the establishment of a master plan for the development of engineering industries.

- Detailed analysis of resources available
- Preparation of the draft Master Plan, including objectives for short and medium term development, strategies and policies for the development, production and distribution programme, material resources supply and utilisation programme, manpower development, investment programme, etc.

The above could be supported by the models proposed for national level planning

#### b) Strengthening industrial planning in Zambia

In Zambia a UNDP project (ZAM/85/012) has been launched to contribute to the establishment of an industrial planning unit in the Ministry of Commerce and Industry. In the framework of this project the following outputs could benefit from UNIDPLAN contributions:

- Trained staff to prepare, monitor and evaluate industrial development plans,
- Introduced industrial information systems to support planners and decision makers with necessary industrial information,
- management information system for monitoring industrial performance,
- Formulated plans, industrial development and investment policies and strategies.

The above could be supported by the introduction and use of information processing tools and models available in the framework of UNIDPLAN.

### 2.2.13. INITIATING A PROJECT IN ITALY

In Italy the Olivetti Group expressed int interest and readiness to support UNIDPLAN activities with appropriate advisory services and software tools. In particular a meeting is envisaged for 1989 with a view to demonstrating

- software tools of interest to industrial planners
- software tool facilitating the elaboration of computer aided teaching packages
- software tools facilitating the development of new software

3. CONTRIBUTIONS BY THE EXPERTS ON THE NEEDS, REQUIREMENTS  
AND POSSIBILITIES IN THE FIELD OF IMPROVING INDUSTRIAL  
PLANNING

The following contributions have been presented:

- a. BULGARIA  
Mr. V. PARVANOV: Software tools for industrial planning in  
Bulgaria: the FORECASTER modelling and  
forecasting system
- b. CSSR  
MR. F. PARIZEK: A Multi-Decision Support System and  
Integrated Interactive System for  
Monitoring of Economic Parameters
- c. CUBA  
Mr. J. E. GONZALEZ GARCIA:  
Industrial Planning in Cuba: its role, the main  
problems faced and needs to be met.
- d. GDR  
Mr. N. KONRAD: Training on Industrial Planning:  
Possibilities and Proposals for further  
action in the framework of UNIDPLAN
- e. IIASA  
Mr. K. FEDRA: Simulation modelling in environmental  
impact assessment
- f. INDIA  
Mr. S.K. DAS: Planning and the development of information  
and informatics in support of planning in  
India
- g. NEPAL  
Mr. Bhola Nath CHALISE: Starting industrial planning  
and developing information  
system in Nepal
- h. PHILIPPINES  
Mr. E. ORDONEZ: Industrial planning in the Philippines:  
the planning process and industrial  
planning
- i. SUDAN  
Mr. F. EL FAKI: National planning and industrial planning  
in Sudan with reference to the UNIDPLAN  
Programme.
- j. TURKEY  
Mr. Y. D. DEMIRGIL: Planning and econometric studies  
in Turkey
- k. UNITED KINGDOM  
Mr. P. SADLER: Mathematical methods in the service  
of industrial planning.

i. USSR

- i. Mr. SANTELADZE (Institute of Management of Economic Planning:  
Draft Methodological Guidelines for Agro-based Industries Planning Calculations with the view of their further computerisation
- ii. Messrs. BASKAEV, LOSKUTOV, SHUBBENKO, ARTEMENKO, STUCKALENTO, BEBEZHNOI, VLASUK (Institute of Cybernetics, Kiev):  
Software for solving optimisation and planning problems in the manufacturing development.
- iii. Messrs. CHEREMNYKH, DOUBSON (Central Economic and Mathematical Institute, USSR Academy of Sciences, Moscow):  
Demo-versions of computer-aided industrial planning systems for PC for selected industrial sub-sectors.
- iv. Mr. ESIKOV (Ministry of Foreign Economic Relations, Moscow):  
Global econometric model of world capital goods market: a case study of non-electric machinery.
- v. Mr. JAKOBSON (USSR Chamber of Trade and Industry, Tallin):  
Study of planning methodologies for small-scale industries development in the USSR.
- vi. Mr. UTKIN (Computing Centre, Academy of Sciences, Moscow):  
Computer-aided tools for planning and design of schemes of agricultural and industrial development of regions for IBM PC XT/AT/
- vii. Mr. BABUNASHVILI (Institute of Management of National Economy, Tbilisi):  
Demo-version with user manuals of computer-aided decision support systems on IBM PC for planning on sectoral level (preferably for agro-based industries).
- viii. Mr. KONAKOV (v/o Vneshtekhnika, Moscow):  
Adapted versions of COMFAR System.

m. YUGOSLAVIA

- Ms. E. SANBEGOVIC: Planning principles and methods in the SFR of Yugoslavia.

## RECOMMENDATIONS

### I. GENERAL RECOMMENDATION

Unidplan has successfully completed its first phase through the collection of a number of planning tools and the establishment of an international network of focal points. Whereas this work has to continue and expand, a second phase should now start, oriented towards the initiating of technical assistance projects.

To this end individual consultations have been conducted in the framework of the present meeting, which lead to a certain number of concrete project proposals for consideration by the participating institutions/Governments and Unido. They are attached under Annex V.

Bilateral discussions between the participating institutions and the participants from different countries were held which may lead to further co-operation bilaterally.

Appropriate ways should be found to promote S-S exchange of experience on the basis of relevant projects.

### II. RECOMMENDATIONS FOR A WORKPLAN FOR CONSIDERATION BY UNIDO IN 1989-1990.

- 1) Following up Recommendations No. 42/186 and 187 of the UN General Assembly, UNIDO should explore the possibilities in cooperation with interested organisations, in particular IIASA, to develop guidelines, methods, tools, information and training with a view to introducing the environmental aspect in industrial planning. The approach should be interdisciplinary and transdisciplinary, the latter meaning the active involvement of both researchers and decision makers. In particular UNIDO should make use of these methods and tools in its own work.
- 2) Special attention should be paid to the implementation of models which can be used when data are scarce.
- 3) UNIDO should assist developing countries in the building of their own data bases and info systems for planning purposes, at their request.
- 4) An international training course could be organised with the participation of an international team of lecturers, for an international group of trainers, on methods and computer-aided tools for industrial planning as well as on computer-aided-teaching tools available on this subject.
- 5) The development of the UNIDPLAN Programme has reached a stage, when it becomes justified and urgent to make it known in all developing countries. Therefore:
  - a leaflet could be prepared providing concise, easy to understand information on the concept, the objectives, the results and on the ways in which a country can join the programme.
  - appropriate ways should be found to keep the countries

informed on new developments; projects initiated, tools available, training under preparation, etc.

6) Efforts should be undertaken to strengthen and extend the network of UNIDPLAN focal points which are expected to play a catalytic role in the introduction of appropriate methods and tools in industrial planning, in particular by establishing focal points in participating countries which have not yet done so.

7) In order to facilitate the contacts among participating institutions and the selection of methods, tools, etc., a UNIDPLAN data base containing information on

- participating institutions,
- expertise available,
- computerised tools offered,
- documents and teaching material prepared,
- market oriented planning processes identified,
- different organizational structures involving the private sector described
- and simple methods and approaches to industrial planning (even those not requiring the use of computers)

should be established as soon as possible. Communication between this data base and the national focal points should be facilitated. Increased emphasis should be placed on planning tools reflecting market oriented methods and approaches. It should be studied, how a clearinghouse function could be established at an appropriate place.

### III. RECOMMENDATIONS FOR ACTIVITIES TO BE UNDERTAKEN SHOULD ADDITIONAL RESOURCES BE AVAILABLE

1) Recommendations regarding methodological aspects of UNIDPLAN.

a. The Guidelines for industrial planning could be enriched and extended by the inclusion of a description of methodological basis on which the computer-aided tools already offered by participating institutions have been built.

b. New Guidelines should be elaborated for the planning of selected industrial sectors and branches.

c. Guidelines for regional planning should be elaborated as a pilot exercise for one selected sub-region.

d. Increased attention should be paid to short-term and operative planning of production.

2) Recommendations regarding computerisation aspects of UNIDPLAN

a. Participating institutions should document the computer aided tools developed by them in English, using the standard format recommended by the Budapest meeting, and UNIDO should gradually establish a library of demo-versions at its HQ in Vienna.

b. An international forum could be organised with the participation of all institutions having offered software tools in the framework of UNIDPLAN, with a view to allowing individual demonstrations and consultations leading to the selection of tools for introduction in a greater number of developing countries.

c. Attention could be paid also to tools facilitating the development of software in the developing countries as well as to tools facilitating the building of new models.

### 3. Information aspects

a. Efforts should be made to put at the disposal of the developing countries computerised data bases of industrial statistics for comparative analysis needed for the planning of industrial development.

b. Studies should be undertaken on the ways in which the analysis of comparative advantages could be supported by improved information, and on the measures to be taken in order to develop the necessary information system.

### 4. Training

a. The already existing training courses on industrial planning could be oriented towards the objectives of UNIDPLAN.

b. A study could be undertaken regarding the establishment of an international training centre and regional training centres providing regular training on the fields of UNIDPLAN, paying special attention to the use of different languages (Spanish, Arabic, etc).

c. A guide on job descriptions for industrial planning and necessary training could be prepared.

### 5) International co-operation

Studies could be undertaken regarding the development of selected national focal points to act as regional centres or focal point for UNIDPLAN.

With regard to the above recommendations, the possibility of submitting requests for the use of existing resources for their implementation was noted. In particular UNIDO is managing the following resources, which may be available when the request meets appropriate criteria:

- Special Industrial Services
- for African countries short term advisory services can be provided in the framework of the Industrial Development Decade
- Special purpose and general purpose contributions to the Industrial Development Fund

With respect to UNDF, use could be made of:

- the opportunities arising during preparation of the next programming cycle (in particular large-scale projects over US\$ 400,000)
- the new Management Development Fund;
- the regional and inter-regional UNDF funds.

All projects submitted for UNIDO or UNDP/UNIDO co-operation including UNIDPLAN activities should be approved/cleared by the co-ordinating authorities of the respective Governments. The offers of donor countries could be conveyed to UNIDO through their representatives accredited to UNIDO.



BRIEF SUMMARIES OF CONTRIBUTIONS

- BULGARIA:** Software tools for industrial planning in Bulgaria.
- CSSR:** A multi decision support system and integrated interactive system for monitoring economic parameters.
- CUBA:** Industrial planning in Cuba; possibilities for further action under UNIDPLAN.
- GDR:** Training on industrial planning; possibilities and proposals for further action in the framework of UNIDPLAN.
- IIASA:** Simulation modelling in industrial development planning and environmental impact assessment.
- INDIA:** Planning and development of informatics in India.
- NEPAL:** Starting industrial planning and information system in Nepal.
- PHILIPPINES:** Industrial planning in the Philippines.
- SUDAN:** National planning and industrial planning in Sudan with reference to the UNIDPLAN Project.
- TURKEY:** Planning in Turkey.
- UNITED KINGDOM:** Mathematical methods in the service of industrial planning.
- YUGOSLAVIA:** Planning principles and methods in the FSR of Yugoslavia.
- USSR:**
- A. Babunashvili:** HIPLAN: Hierarchical Iterative Planning System.
  - A.A. Bakaev:** Software for solving optimization and planning problems in the manufacturing development.
  - S.V. Cheremnykh / M.S. Doubson:** Demo-versions of computer-aided industrial planning systems for PC for selected industrial sub-sectors.
  - I. Jakobson:** Study on planning methodologies for small-scale industries development in the USSR experience in this field for developing countries.
  - V.R. Khatchaturov:** Computer tools for planning and design of industrial and agricultural development of a region for IBM PC XT/AT.
  - N. Santeladze:** Methodologies for forecasting the development of intersectoral food complexes of the region on the example of the Georgian SSR.
  - A.V. Yesickov:** The econometric model of world market of capital goods: a case study of non-electric machinery.

## SOFTWARE TOOLS FOR INDUSTRIAL PLANNING IN BULGARIA

V. Parvanov

The Industry Development Institute conducts applied research and development activities in the industrial areas concerning

- long term planning and strategic development;
- resource, market and investment policies;
- technology policy and technology transfer;
- production, work and management organization;
- management information systems;
- standardization and product quality control;
- effective use of production capacity and raw materials.

Services are provided to all levels of the management of the national economy: i.e. to national, sectoral and enterprise levels

The Institute supports strategic development planning and the elaboration of resource policy by the means of providing analyses, forecasts and development programmes in the fields of industry, including the development and use of econometric models and paying special attention to the introduction and effective use of raw materials, innovation management, planning and effective use of manpower resources, value-engineering, etc.

Technical-economic studies are carried out, including international analyses and comparisons, forecasts, etc. regarding international labour division and socialist economic integration.

The elaboration of investment policy is supported by forecasts, analyses of investment policy effectiveness, balancing of production capacity and management of R-D activities in the investment process.

The elaboration of technology policy is supported by studies carried out on organization-technological solutions, managerial procedures, methodological-conceptual solutions.

Research is carried out for economic organizations and enterprises regarding the organization of the production under the conditions of accelerated technological development; regarding the development of team work approach and regarding the improvement of the managerial mechanisms in the case of self-management.

Management information systems are designed and implemented for the purposes of enterprises in the fields of

- planning and control of manufacturing
- operative production management
- management of product and process engineering
- sales management
- labour management
- management of purchasing, inventory, finances and accounting
- design automation

Research is being undertaken. Analyses, forecasts, normative-technical and technological materials are prepared in the field of quality control and the standardisation of industrial production.

The Institute has a Management Consulting Division, offering consultancy services for managers of associations, business organisations and enterprises, including strategy development, organisational-managerial structures, production and economic activities.

The Computer Centre of the Institute implements projects and develops software for the following kinds of management activities:

- management of science and technological progress
- management of the investment process
- technological-economic plans
- management of material resources
- management of labour resources
- management of personnel
- management of production quality
- management of complex objects
- creative production management
- management of labour safety
- management of economic integration and foreign trade
- accounting and control of electric energy expenses
- complex economic analyses
- control of decisions and implementation of derivative documents
- utilisation and transfer of production equipment

The Computer Centre processes numeric and textual information, including the transfer of information between mainframe and microcomputers.

The Training Centre of the Institute organises courses aiming at improving the qualifications of managing and operative personnel from industry.

A MULTI DECISION SUPPORT SYSTEM AND INTEGRATED INTERACTIVE SYSTEM  
FOR MONITORING ECONOMIC PARAMETERS

P. Feriecek

The Multi Decision Support System MDS is an all-purpose system for multi-criterial evaluation of discrete alternatives, characterized by the following properties:

- it enables a simultaneous solution of several independent decision-making problems which are freely organized into groups.
- it is open towards the methods used. i.e. an unlimited number of methods may be included in the system.
- the individual algorithms/methods may be implemented in any programming language and they are not a direct part of the shell of the system
- in the simplest case the system may serve as a data base providing an overview of alternatives and their parameters.

The system is hierarchically divided into four levels:

a) level of programmes P(1)...P(p)

b) level of goals G(1)...G(g)

The term 'program' designates complex areas of evaluation, e.g. program of development of the food industry, etc.

Every program P<sub>i</sub> may incorporate a number of goals. The term 'goal' designates evaluated objects, i.e. products, technologies, etc. The goals are characterized by attributes P<sub>i</sub>(1)...P<sub>i</sub>(n), eventually rules P<sub>i</sub>(1)...P<sub>i</sub>(r), whereas alternatives of the goal V(1)...V(v) are subjects of evaluation.

Attributes together with rules form the characteristics of the goal. The selection of appropriate attributes is made by experts P(1)...P(p) or by the moderator of the decision-making program. From the point of view of the decision-making program we divide the attributes into qualitative and quantitative depending on their values being objectively measurable or not, the subject of appraisal by experts.

By the means of rules experts express general characteristics of the goal, which can not be expressed by the values of attributes or where it presents considerable difficulties. Rules serve to define limitations, eventually relations between attributes. Every rule has an allocated weight, which influences the final evaluation of alternatives. The rules are defined by the experts.

Every goal may be expressed by a number of alternatives. The aim of MDS is to specify the optimal ranking of alternatives with the help of the knowledge expressed in attributes, in the weights of the particular rules and in the alternatives applying methods of multi-criterial evaluation.

Experts from the given field participate in the definition of the decision-making task and its solution. Their responsibility is to choose the attributes and general rules for the given goal, to select the weights of the attributes and to determine the qualitative attributes of every alternative.

The operator is responsible for the management of the process. He is the only person who can modify parameters of the system and provide common and final evaluation.

The Integrated Interactive System for Monitoring Economic Parameters PEMSI aims at providing an information basis for the Management and decision making process.

It consists of two logical parts:

- a data base compatible with other subsystems using the standard data base management system dBase III+.
- a spreadsheet and CP graphic superstructure for data retrieval and manipulation using FRAMEWORK II and the PEP programming language.

The structure of the data base is compatible with that of MRS and the planning objects in PEMSI can be observed as alternatives for evaluation inside MRS. A special application of PEMSI has been developed to support the management of research and development at the national level.

Summary Report by the representative of the Republic of Cuba to the meeting of high-level UNIDO experts held in Tbilisi on October 24-28.

The importance Cuba attaches to UNIDPLAN-UNIDO programme was underlined as it is considered an important means of learning from the experience of other countries in the area of industrial planning, especially in the development and introduction of computer-aided tools for this purpose.

An explanation was given as to the Cuban methodology for the preparation of the national economy plan which regards planning as an uninterrupted process of various cycles through the various levels of territorial planning (nation, province and municipalities) as well as institutional wise (ministry, union, enterprise and workers groups).

In relation to industrial planning, it was indicated that the methodological basis and the specific parameters for planning had been defined. These include those indicators expressing production in physical terms, the establishment of standards in physical units, the definition of production volumes intended for export also expressed in physical units and in value.

Problems for planning faced in Cuba were explained, and the following were pointed out:

- incongruity among the various sections of the plan (production, manpower, investments, etc.);
- lack of computation capacity and availability of little methodological experience for dealing with standardization and quality control, substitution of imports and introduction of achievements from science and technology in the plan; and
- insufficient information on the development of products, techniques and technologies of industrial production due to the lack of equipment and software in the union and enterprises to secure access to remote data bases.

The interest by Cuba to request assistance from UNIDO, in the framework of UNIDPLAN, to overcome these problems of industrial planning at branch (Unions) and enterprise levels was expressed, indicating that major emphasis was to be placed in the textile, dairy, rubber and machinery construction industries, among others.

It was particularly noted that the aforementioned assistance should focus on strengthening planning and operational management of the productions in these branches, through the introduction of integral systems of information and management supported by application of computer-aided tools in decision-making.

Later, a briefing was given on the planning lines and trends in Cuba, indicating that a number of measures have been presently taken in order to overcome the problems faced, and that research activities and experiments are being conducted in the area of planning in some unions and enterprises, on the following aspects:

- . methodology for Plan preparation at that level;
- . simplification of the Supply System;
- . addition of new ideas in manpower planning and control; and
- . design of computation system to assist in production planning and management.

It was explained that the existing system in Cuba for training planners is being carried out in nine higher education centers in the country, where the trainees are given Diplomas in Economics and as Industrial Engineers after having passed successfully ten academic semesters.

For further training of planners and managers, courses on some individual subjects and other inter-related subjects will be conducted, as well as post-graduate trainings which include some practical work at the enterprises.

There is also a system for higher scientific studies which are conducted for a period of three to four years, granting to the trainee the category of Ph.D candidate in Economic Sciences.

There are two Centers for Studies on Management Techniques intended for managers, with the major aim of disseminating and teaching modern techniques of enterprise management, including computation.

It was finally pointed out that in this area of training and upgrading of planners and managers, the major assistance required is in computers, processing systems in microcomputer networks and specialized software for training, as well as application of computation techniques in industrial planning.

## TRAINING ON INDUSTRIAL PLANNING: POSSIBILITIES AND PROSPECTS FOR FURTHER ACTION IN THE FRAMEWORK OF UNIDPLAN

N. Konrad

Information and information industries are analysed as a subject of industrial planning in developing countries in the form of

- microelectronics and its consequences for the development
- on-line data bases and international information systems.

The conclusions drawn and the recommendations for the development policies differ according to the point of view of the researcher and the group of developing countries considered. But information technologies will also change and improve the planning and management itself in developing countries. UNIDPLAN is to serve this purpose. There are only a few studies in this area of research. Case studies, e.g. in form of pilot projects about experiences and developments in the introduction of computerised planning tools could make an impact on further co-operation in the framework of UNIDPLAN. The case studies should not be academic exercises but form the basis for practical progress in co-operation. They should focus on one of the main points of UNIDPLAN: information systems, planning tools, training, etc. and help in defining the needs and conditions for different groups of developing countries and thus strengthen the further implementation of UNIDPLAN. There are already UNIDP case studies regarding India and the Republic of Korea on national information systems. Therefore the meeting may wish to recommend pilot projects aiming at analysing and defining the needs of different groups of developing countries regarding international exchange and national use of computerised planning tools and related training facilities.

It should be noted that solutions which are applicable in industrialised countries can not be transferred directly and without any change in the third world. The problems may have the same or similar structure and therefore probably the same solution, but these solutions should be introduced in different economic and social environments. It should be stressed that the most important is

- to generate the necessary capacity in the developing country to use and adopt the existing knowledge in the area of industrial planning.
- to generate the capacity to construct their own computerised tools and models in the following phase of co-operation.

The training of planners is, therefore, a very important element of UNIDPLAN. Training of planners on the use of personal computers for their daily job is a task well known in the industrialised countries. In developing countries this training is particularly important because of the complexity of the problems to be solved during the process of introducing computer-based tools and models in industrial planning in these countries:

- the lack of qualified manpower especially at the lower levels of industrial planning makes it necessary to strengthen training at this level and to use tools and models which take into



consideration this fact,

- mathematical models can not substitute adequate statistical data bases. On the contrary, their results depend on the quality of these data bases. Again, the tools and models have to be selected taking into account the information base available.
- in order to strengthen the links between industrial planning and statistics, planners should be offered training on statistics.
- the comprehensive and effective introduction of computers in planning necessitates the establishment of a (computerised) national statistical information system.
- the results and effects of computer aided tools and models depend also on their theoretical background, e. g. on the assumptions and abstractions introduced in a model to determine its structure and priorities. Before the transfer to a developing country, the validity of these assumptions and priorities has to be checked: they have to be consistent with the national conditions and development strategy. If necessary, modifications should be introduced. This adjustment requires flexibly structured tools and models as well as sufficient knowledge of the planners to be able to conduct the corrective dialogue with the experts involved.

Taking into consideration the above, training activities should be considered as one of the main tasks of UNIBPLAN. In particular this training should

- impart to the planner and manager the necessary knowledge to use the computerised tools offered and to interpret the results of the computer-based planning models. This can also reduce the psychological barriers and facilitate the larger and quicker introduction of computers in industrial planning.
- through this knowledge qualify the planners and managers for the dialogue to be conducted with experts of informatics. This communication is the precondition of the national adoption of the tools and models offered as well as for the national evaluation of projects proposed by international software houses,
- on the basis of this knowledge qualify the planners and managers for their participation in the national model-building process.

## SIMULATION MODELLING IN INDUSTRIAL DEVELOPMENT PLANNING AND ENVIRONMENTAL IMPACT ASSESSMENT

K. Fedra

Industrial development planning and environmental impact assessment which are increasingly being recognised as an important component of comprehensive and integrated planning, require the qualitative and quantitative prediction and analysis of the consequences and impacts of human activities on the socio-economic system and the environment. Major tools for the prediction and analysis of these impacts are various types of models.

Numerical or symbolic simulation models, implemented on computers, provide powerful and versatile tools for the assessment of potential impacts of planned policy or action. Designed to describe and simulate future impacts that are obviously not yet observable or lead themselves to data collection, simply because the corresponding action is only in the planning stage, models can also operate in data-poor situations, analyzing scenarios of sets of assumptions at least at a screening level. The ability to provide useful information in data-poor situations is especially valuable in developing countries, where data collection programs and monitoring schemes may just be starting and reliable background information is usually scarce.

In data-poor situations models are useful to stimulate insight rather than provide exact answers. Gaining insight into complex technological, economic, social and environmental relationships is very much supported by directly understandable, symbolic and graphical ways of presenting model results, and, in general, by a conversational, interactive and symbolic approach to simulation modelling. Building necessary data and background information as well as domain specific knowledge and experience, etc., helps to overcome the bottleneck of technical expertise often found in developing countries and in fact allows the systems to function as interactive training tools.

The use of models and in particular of interactive simulation and optimization models that combine traditional modelling approaches with new techniques of artificial intelligence and dynamic computer graphics is demonstrated by a number of application examples in air, surface and groundwater modelling as well as risk analysis.

## PLANNING AND DEVELOPMENT OF INFORMATICS IN INDIA

S. Das

Economic and industrial planning in India started in the fifties, when the first five-years plan was launched in 1951. Indian planning was based on an input-output model and a Planning Commission was constituted to prepare the five-years and annual plans. The planning document defines the pattern of sectorial development and the targets to be reached by the end of the plan period. Within each sector subsector targets were set too.

The planning document was a guide for the respective ministries regarding the implementation of the objectives set. The industrial policy of the country was based on the Industrial Policy Resolution of 1956, which gives prime importance to the development of the public sector.

The first 30 years of industrial planning were based on the policy of self-reliance and import substitution was encouraged. The main purpose of this strategy was to develop a sound industrial base, which the country has achieved. The industrial sector, in particular the engineering sector was protected to allow the industry to develop and mature. The fiscal and trade policies were also supporting this orientation.

From 1980 onward with the launching of the sixth five-year plan, industrial policy was being liberalised, and the fiscal and trade policies changed accordingly. Imports of products and technology were liberalised for modernisation. Specific development strategies were adopted for newly emerging sectors, such as telecommunication, electronics, petro-chemicals, etc. Credit policy was also liberalised for these sectors.

Regarding the development of information and informatics required for industrial planning, the creation of the National Informatics Center should be noted. It has a fourth generation mainframe computer and it has been entrusted with the development of a computer-based information system for different ministries and organisations. The data bases so developed are linked to the main computer. The main computer has been linked to the district statistical offices through satellite. The possibility of interaction between district and center will be of immense help to the planners.

The change over from the manual system to the new computer based one necessitates the training of a very large number of persons. In this respect UNIDPLAN could be of considerable help.

Another new aspect of industrial planning is the attention paid to environment and industrial pollution. In the past many of the industrial units were set up at riversides and the industrial waste is being poured in the rivers without treatment. What is needed in this case, is proper industrial waste management. UNIDPLAN is expected to contribute to this objective, too.

## STARTING INDUSTRIAL PLANNING AND INFORMATION SYSTEM IN NEPAL

B.Chalise

Planning for development in Nepal started in the fifties. Until now planning is not very sophisticated. It would be no wonder if somebody would make the remark, that it is only the collection of projects prepared by different ministries in the country. The National Planning Commission is working on some macro-economic models, but these are not yet ready for use.

The process of planning in Nepal is simple. The plan runs for a period of five years. The Planning Commission first sets the target of the economic growth rate. In order to achieve this target, it estimates the investment requirement, which is based on some estimated capital output ratio. Then an investment limit is given to all ministries to prepare their sectoral five year plan. In doing so, little attention is paid to interlinkages among the subsectors and sectors. Estimates of savings, investment and consumption at this point is only a guess work. This is the area where some models could help immensely. UNIC itself as well as other countries could offer help in supporting Nepal's development planning by computer aided tools.

In the area of industrial planning, the Ministry of Industry is launching a project with UNDP/UNIDO assistance. The Asian Development Bank has also provided technical assistance to achieve the objectives of the Ministry, in particular

- to build an input-output model.
- to conduct sectoral studies regarding textiles, food and beverages, chemical, electrical and electronics engineering, non-ferrous metals, etc.
- to collect data on international trade and value added in different products, so that Nepal's comparative advantages can be exploited.
- to establish an information system which collects and generates data at national as well as international level; national data could include investment, employment, production, value added, capital needs, foreign exchange needs, etc. and international data could include mainly trade and value added.

The main areas where co-operation is sought can be listed as follows:

- input-output model for Nepal's economy.
- establishment of an Industrial Information system and access to international data bases,
- training the local staff on computer applications
- training of trainers on the above matter.
- development of software tools, by which the planners can identify viable sectors using data generated by subsectoral studies, data on international trade and value added,
- development of a package by which "effective protection rate" available to industries could be measured.

## INDUSTRIAL PLANNING IN THE PHILIPPINES

E. Ordones

The Trade and Industry Plan is the basis for industrial planning in the Philippines. The elaboration of this plan is an integrated and cyclical process involving the entire machinery of the Government, its entities and instrumentalities at all levels, and the active participation of all sectors of the society. It consists of the following major phases:

- plan preparation, approval and adoption.
- plan implementation.
- plan monitoring, evaluation and review.

The process is undertaken on a sectoral and real basis and commences with the issuance of planning guidelines. The entire planning process constitutes one full cycle which includes one full year of plan preparation for each year of the plan period. In this plan targets are normally set on a five year period and revised taking into account the developments in the environment.

The elaboration of the plan for industry starts with the Department of Trade and Industry preparing a first draft based on inputs from the various agencies and offices. The subsequent steps primarily focus on the validation of plan targets with the active participation of the private sector and other government agencies, with the latter working through the interagency and coordinating committees.

The implementation of the approved development plan is the actual execution and completion of programs and projects. The process covers a period of one year and commences upon the issuance of a budget call in January. Plan implementation encourages active participation and involvement of all sectors of the society.

The plan monitoring, evaluation and review is undertaken regularly at all national, regional and local levels and includes the participation and cooperation of the whole administrative machinery of the Government. An annual assessment is undertaken to evaluate the plan in terms of development performance. A midterm review and appraisal of the plan is undertaken at the third year of the plan period.

The development of sectoral/industrial plans closely follows that of the creation of a company plan. Like a corporate plan, it considers external and internal forces and factors that affect the operation of the sector.

The basis for the sectoral plan is the Trade and Industry Plan which provides the general strategy and plan for the sector. The general framework for sectoral planning, however, is based on the concept of PHILIPPINES INC., the plan for industry development and growth. PHILIPPINES INC represents in qualitative terms the overall objective and strategy for the development of industry. In quantitative terms, it means a growth rate of about 9% annually for the industry for the next five years, with rising growth targetted after this period.

The above objective can be realized if plans and targets, e.g. for each sector can be achieved. But by focusing solely to a sector level would introduce some problems since each sector is comprised normally of various subsectors. Hence, the concept generally calls for the development of plans at the subsector level, where plans, programs and targets are generally controllable, more realistic and can be managed.

Further, the idea is to treat each subsector as a growth center. Hence it is an autonomous unit with its own set of plans and programs. With this framework in mind, the structural organization is set up more easily, which consists of both private and public sectors with the former taking a more active role with its representative as President of the subsector unit.

The industrial planning just described involves a complex process to which computers are a necessary tool. To a certain extent, computers are indeed used in the planning process. Various units involved in the process make use of computers to work on specific sets of data or to analyse trends and growths. Computers are also used to manage data bases containing indicators generated by regular surveys.

There are also special units mandated to interface with the public as regulatory, intervening or quality control agencies. They too are part of the planning process as their volumes determine the efficacy of the Department of Trade and Industry services. These units are now aided by computers, the outputs of which become inputs to the industrial planning process.

The computer systems utilized in the planning process are mainly microcomputers, as they have become easily accessible and truly user friendly. The basic software tools used are wordprocessors, spreadsheets and data base management. Statistical tools are also used, although to a very limited extent only.

There are plans to integrate the whole planning process using the computers as the main medium. A blueprint has been developed to computerize the bulk of the Department's data holdings and services. The plan is projected to be undertaken in four years. In tandem with this is the current effort to rationalise all report generation activities to minimise gaps and overlaps and to streamline all service oriented activities.

In line with the above plan several computer based systems are now being developed. Foremost of these are the Funds Planning and Monitoring System, which rationalises the planning, disbursement and monitoring of the budget, the Performance Monitoring System, which monitors the performance against targets and the Business Registration System, which stores in a data bank all existing and registering private business companies.

NATIONAL PLANNING AND INDUSTRIAL PLANNING IN SUDAN WITH REFERENCE  
TO THE UNIDPLAN PROJECT

F. El Faki

The first comprehensive plan in Sudan was prepared in the sixties: it was called the ten-years plan for economic and social development. It was followed by a five-years plan and by a six-years plan. Nevertheless none of these three plans was given time for completion.. As a matter of fact, Sudan's economy was and still is lacking a realistic and scientific planning. That means, that Sudan is really in need of the support offered in the framework of the UNIDPLAN program regarding all aspects of planning: methodologies, techniques, training, etc.

In the industrial planning area technical assistance is needed in particular in the following fields:

- the collection, evaluation, storing, analysis and dissemination of industrial information and statistics for industrial planning.
- the launching of industrial sectoral studies with a view to setting priorities and formulating masterplans in specific sectors, especially in the food industries sector and in the engineering sector.
- the provision of computer systems such as IBM PC computers for the introduction of already available simple computerised methods, especially in sectoral and subsectoral activities.
- training in planning methodologies and techniques: advanced training programmes on computer-aided industrial planning tools would be necessary and vital.

## PLANNING IN TURKEY

T. Denizgil

The Turkish planning process started in 1961 with a transitory program covering the year 1962 and with the first five-year plan covering the years 1963-1967.

Planning encompasses

- long range planning.
- five-year plans.
- annual programs.

Long range planning covers 15 years and represents the strategy of planning. Its main target was a 7 percent growth rate and defined the investment requirements to realise this objective.

The five-years plans are made up of a macro-equilibrium of the economy, where the public sector's expenditures are exogenously determined. The five-years plan contains targets for investment, production, exports and imports. These are given at the sectoral level, which contains seven consumer goods sectors, seventeen intermediate goods sectors and eleven investment goods sectors. These targets are quasi compulsory for the public sector, but indicative for the private sector. The achievement of targets in the private sector requires the establishment of a set of incentives especially for investment and exports. The number of private firms involved is roughly 500 for investment and 25 for exports. Private export firms are more numerous but 25 of them export more than a certain minimum.

The incentive system in investment and exports is the tool, which allows the mobilization of private firms. Differential incentives to regions and to sectors are instrumental in the realisation of targets for regions and sectors.

The application of private firms for investment incentives creates the crucial link through which sectoral investment targets are brought into implementation.

There are two econometric studies which have been recently completed on the Turkish economy. They should be given special consideration to from the point of view of short term forecasting of macroeconomic variables.

The Econometric Model of the Turkish Economy has been prepared in 1987 by Ercan Uygur in Ankara. Simulations are of the Gauss-Seidel type and they cover ex-post 14 years: 1971-1984. The model contains 20 behavioural equations and 40 endogenous variables. Ex-ante forecasts have been made for 1986 and 1987.

The Quarterly Econometric Model of the Turkish Economy has been prepared by Suleyman Ozmuur for the Turkish Industrialists and Businessmen Association. It covers 1981 I-1986 IV and quarterly estimates for 1987. Computer programmes used were time series processor and general econometric package. It contains 44 behavioural equations and 46 equalities.

The Chamber of Industry of Istanbul gathers, processes and publishes regularly annual data on the Turkish industry. It also gathers and publishes quarterly data on a sectoral basis for the industry.



## MATHEMATICAL METHODS IN THE SERVICE OF INDUSTRIAL PLANNING

P.Sadler

It is hardly necessary to stress that the use of the computer in forming development plans requires both systems and information in order to give those systems numerical form capable of mathematical manipulation. But, it is worthwhile reminding ourselves that the models we use in economics, and from which we derive the mathematical models we transfer in a systematic way to the computer, can be classified in a number of ways according to their end use, or use of the output from the modelling and manipulation, which should dictate the type of the model used, and which also determines, at least in part, the reservations which must be applied to the results obtained.

A particular distinction must be made between the positive and the normative model. Almost by definition, planning is a normative exercise, and requires the use of a model in order to reach preconceived goals. Yet it is surprising how often in the past a positive model has been elaborated in great detail to give an elegant portrayal of an economy, and then manipulated in a normative way to provide normative information without ascertaining whether the responses of the economic actors and agents will be the same as those the model assumes.

The variety of systems available are well documented in UNIDPLAN, but an understanding of the workings of the economy or sector under consideration is necessary, as well as a clear knowledge of the objective sought to be attained, before a model is chosen. But, it must be stressed continually that the type of model and its level of refinement must not be over-demanding of data: it must not require data input at a level beyond that which is available. This is fundamental yet it is surprising how often over-demanding models have been adopted in the past, and found to be useless. However, there is one point that should be made in the other direction. If a government agency or ministry is setting up a statistical or survey section, it is as well to have a long-term view of the ultimate use of data gathered, and to have some knowledge of the various models which may be used, so that data may be gathered and stored in forms most likely to be of maximum use. Data gathered without purpose usually is stored without form, and is often useless.

Apart from the economic aspects of the models, it must always be remembered that economic activity has both social and political consequences. While it is unlikely that these may be directly incorporated in a mathematical model, the model can be designed to facilitate the deduction of such consequences from the results produced. This may take a variety of forms, and will be elaborated further later.

Next, it is always advisable to be aware of the sensitivity of results used, to errors, or changes in the parameters used, or assumptions made. Also, to know that parameters themselves may change as the desired objectives are attained. How far will results be affected, and how far will crucial decisions in other fields be rendered ineffective, by the failure of the economic

entity analysed to produce the results expected? These types of question can be handled easily by simulation techniques, and the computer is an admirable tool for this purpose. The model can be designed to do this automatically, or post-hoc changes may be introduced after production of an initial result. Either way the computer has presented planners with opportunities which hitherto would have been impossible. Increasingly, decisions are being taken on the basis of ranges of values and the presentation of the results of economic analyses in this form allows decision takers to assess the risks, both economic and non-economic, of being wrong.

And the last point to stress is the need for consistency. Consistency between the criteria used for national, sectoral and project planning. Given the approach outlined in UNIDPLAN this would not be difficult to accomplish, but there is real difficulty on occasions where various aid-giving agencies require cost-benefit analyses to be carried out according to their own adopted method, and the maximand and numeraire of each differ, while none may accord with the overall economic plan of national development. The basic difficulty often occurs because the effects of projects on the component parts of the economy are assumed to be marginal. That is to say, they are assumed to leave prices, wages, interest rates, etc. unchanged. However, in a sectoral or total economy context, the return of each project is generally dependent on the phased development of other projects. Elaboration is hardly necessary, but the value of the output of a power station cannot be viewed except in the context of the use to which the power will be allocated. This is where the overall integrated plan approach becomes important for any country wishing to industrialise.

This may sound all-embracing, and carried to a detailed conclusion would almost certainly be over-planned and too bureaucratic to be efficiently managed. But in conditions of development, where a country low down the industrial scale is trying to establish an industrial presence in the world, the planning of the industrial base, and its evolving development over time, cannot be left to piecemeal project planning. This is where the UNIDPLAN approach is such an improvement on past approaches. It does not attempt to offer new solutions, or new methods. But it does attempt to bring together projects, and sector analysis, and marry them with accepted national planning methods in a consistent way.

The latest decisions of the General Assembly of the United Nations requiring more attention to be paid to environmental matters adds a new dimension to an already multi-dimensional problem. There is no doubt, that an approach on an overall sectoral and intersectoral basis will be necessary, rather than on a project basis, due to the nature of environmental damage and its causes. The interaction of various industries and sectors must be considered as a whole before any assessment of environmental effects can be made, and again UNIDPLAN's approach offers the best basis for extension into this field.

Turning now to some of the more popular methods, and their corresponding models.

Firstly input-output models. This is a generally data-hungry method, and unless there is a fairly comprehensive data base available, then it is not an advisable method to adopt. It is, however, an excellent form of model to use as an objective, as its data requirements are closely defined, and can form a good basis for the construction of an industrial census. Thus the lack of data base should be the incentive to construct one, not a reason for abandoning a whole class of useful models. An input-output picture of the economy must be viewed, however, as a starting point only.

What type of changes can we envisage and what problems do they create for the input-output analyst?

- 1) Problems concerning scale and slack resources
- 2) Problems of capital use and replacement
- 3) Problems of "shortage among plenty"
- 4) Problems of regional and social equity.

In short, the input-output tables are admirable positive additions to the planning toolbox as they provide comprehensive pictures of an economy and the inter-relationship of its component parts which are invaluable. With careful adaptation they can also give narrative indications to planners of the effects of likely changes in output, or can be used to provide optional solutions when constraints or a multiple objective function are introduced. One of the commonest errors, however, is to seek a level of sophistication in a model which the quality of data does not warrant. Consequently, short-cut methods within the overall input-output approach are available, which are especially useful to help planners concentrate on main industries and utilities or on vital export sectors, etc. An excellent method here is the semi input-output method developed by Tinbergen especially for developing countries.

Turning from input-output to others, some developing countries, dependent on the export of a single resource or product, often use some form of forecasting model to estimate the income anticipated over the medium-term future and then to plan their development around the deployment of the export earnings. The inherent dangers are obvious.

As usual, there are ways to handle such problems without abandoning model building. A common way is to use the computer to turn the development model into a simulation model. The crucial parameters can be allowed to vary between limits and the results assessed. A good ploy also is to split the medium term plan into rolling periods, with forecast values being allowed to fluctuate. Then at frequent intervals throughout the period of the plan an assessment can be made of whether shortfalls or surpluses are occurring and whether these are, due to variations, within the limits of reasonable probability around the forecast made. If they are, then the planned activities can be allowed to continue, and the variations expected to be balanced by movement in the opposite direction in the foreseeable future. Where variations are outside expected limits of probability, or where variations persistently occur in the same direction, however, then it may well be time to re-appraise and to amend the plan.

## PLANNING PRINCIPLES AND METHODS IN THE FSR OF YUGOSLAVIA

E. Sakbegovic

In order to improve the system of planning it is necessary to develop quantitative methods and models. In Yugoslavia scientific research work is in progress in order to obtain the best possible model facilitating realistic planning. In particular the following fields should be mentioned:

### 1) Yugoslav model of General Economic Equilibrium.

This is a structural model based on social accounting matrices SAM. In most of the countries the system of national accounts is not set up in a manner allowing to represent an integrated system of social accounts. In such cases a methodological procedure was developed for the construction of the integrated social accounts, used as an information basis for the model of general equilibrium.

The existing version of the model is static and it is used to examine the effects of economic policy measures. A dynamic version of the model is presently being developed to serve the needs of medium-term planning. The time horizon is 5 to 10 years. The work on the model is based on GAMS and HERCULES software. In addition software is being developed for

- the construction of the integrated social accounting matrix in cases when the system of social accounts does not provide enough information,
- the interactive construction and survey of the relations in the model of general equilibrium,
- the automation of the reporting in line with the needs.

### 2) Input-output analysis and the corresponding software.

This software package is completely integrated and interactive, which enables easy and rapid application in the planning.

In this software package the following methodological solutions have been incorporated:

- balancing production and consumption
- examining the effect of domestic and import prices
- probing the effect of devaluation
- up-dating the I/O matrix (RAS method)
- inspecting the effect of structural change
- calculation of shadow prices, etc.

The software package can be made completely flexible and usable in input-output analysis based on I/O tables of any country.

A. Babunashvili

### Hierarchical Iterative Planning System

is assigned to support current industrial planning process on the sectoral level. It ensures the iterative process of preparation and co-ordination of production plans of central (sectoral) planning unit with sub-sectoral planning units when the global recourse amount is limited.

The main iterative mode provides preparation and co-ordination of production plans in cases where central planning unit makes a decision according to preliminary data about sub-sectors of system (sector). Insufficiency of information is recovered by means of specially organised data exchange between central and sub-sectoral planning units).

Uncommon principles of co-ordination of plans realised in the enable to prepare a production plan of a sector in finite number of steps.

provides Input-output model using mode for problem solving of intra-sectoral inter-product balance.

is realised on a IBM personal computer. It operates in a dialogue mode and is available for non-programmer user.

Software for solving optimization and planning problems  
in the manufacturing development

A.A. Bakaev

The Glushkov Institute of Cybernetics, USSR Academy of Sciences,  
represents the following software:

1. PLANER-system for solving manufacture-transport planning problems in economies. Main features are: large-scale problems, highly efficient calculating programmes. Purposes: allocation, transport planning, industrial reconstruction problems. Application fields: steel industry, transport, agricultural, long-term planning different branches of national economies.
2. SLP-stochastic linear programming (LP) system. SLP solves LP problems under incomplete information involving uncertain, probabilistic and accurate source data. Applications: industry planning (steel industry for India), investment strategy, stock-piling, electric power line designing, water resource planning.
3. DISCOP-manufacturing planning system.  
Main features: system approach, planning under problem modifications.  
Applications: yearly planning, choice of the new technologies.
4. RCMS- repair management system.  
Features: large-scale problems and forecasting. Applications: steel industry repair.
5. DISPLAN-planning and optimization system.  
Features: based on input-output models. Applications: decision support system for planning.
6. DISMEM- forecasting systems. Applications: farm production, foreign trade, demographic situation, farm resources forecasting.

M.S. Doubson, S.V. Charennykh

Central Economics-Mathematical Institute  
of the USSR Academy of Science.

DEMO-VERSIONS OF COMPUTER-AIDED INDUSTRIAL PLANNING  
SYSTEMS FOR PC FOR SELECTED INDUSTRIAL SUB-SECTORS.

The objective of this report is to describe the CAIPS:UTILITY PROGRAM PACKAGE. It is an interactive system to analyze problems with multiple criteria. It is an universal dialogue system for personal computer.

Hardware requirements: IBM PC XT/AT and compatible with minimum 256 K RAM, CGA or EGA adapter and monitor.

Software requirements: DOS 2.x or DOS 3.x .

Application: multiple-criterion optimization model with linear and linear-fractional criteria (factors), standard-form linear constraints and variable limitation on both sides (number of criteria  $\leq 10$ , number of standard-form constraints  $\leq 50$  ).

The package has been developed as an instrument in simulating efforts required to balance market and public economy interests from a production unit viewpoint. It is supposed to be useful in solving broad scope of theoretical and practical problems, especially, for computer-based planning system.

The package contains modern optimization procedure, well-developed service and other special features:

It is a universal software as it can be easy adapted to various objects (models).

It contains easy-to-use means of setting and control of initial model:

- view and editing of data related to product nomenclature and resources,
- setting of resources constraints that go into the optimization model,
- setting of criteria and control parameters,
- information search in database,
- rebuilding of a working model from standard database to new one by introducing new criteria and resources constraints.

Interactive routines solve problems using man-machine dialogue approach which accounts for strategy adopted by the decision maker (DM) and the optimizing module. Solution is selected from a Pareto-optimal set following priorities determined by a DM. Decision making assumes the form of a dialogue between the DM and computer. At some point of this process the DM has to review an efficient point in a space of criteria found by the computer. He has to accept it or refine his preferences. In response, the computer formalizes the new priorities and solve the optimization problem. The structure of this problem gives the DM a free hand in:

- converting some of the criteria to constraints,
- changing priorities of criteria,
- checking feasibility of the point in space of criteria,
- finding a "closest" efficient point in the neighborhood of given.

The package offers simple interaction tools that can be handled even by unskillful user. They include tutorial and help files.

The graphics interface between the computer and user has a great role in contemporary software and CAIPS has a lot of possibilities to help the DM via bar, line, pie graphics and diagrams.

This system has been applied to a number of practical problems in agriculture, power supply and consumption, business and so on. Some examples are supposed to be done in this report.

A N N O T A T I O N

Subject of the paper: "Study on Planning Methodologies for Small-Scale Industries Development in the USSR Experience in this Field for Developing Countries"

Igor JAKOBSON, USSR

Small-scale economic units began their development in the Estonian SSR starting from the beginning of 1987, taking the following forms:

- State-owned small-scale firms;
- co-operatives;
- co-operative establishments for farming.

The main aim of their development is to provide people with better goods and services, especially with those the demand for which has not been met so far, but also to increase export production, to make a better use of domestic raw materials and labour resources, and also to expand the range of industrial activities of businesses consisting of services.

Small-scale economic units are independently balanced juridical persons operating on special basis of management and directing. They are wholly self-supportive, there is no State subsidy whatsoever.

Currently, on October 1, 1988, there are more than 1300 functioning small-scale economic units of which 149 are State-owned firms.

Co-operative and small businesses are a flexible link in the whole structure of national economy that self-plan their activities the goals of which depend on market demand. Pay for work is dependent upon commercial profit made not on meeting the planned goals of activities.

The prices of products and services are solely determined by the firms and co-operatives themselves according to the factual conjuncture. The prices at State-owned firms are set conformably to the general regulation of State prices, i.e. State prices, temporary prices, agreed prices, etc.

The author considers the developing of small-scale economic units especially promising in the following directions:

- production based on high-tech and involving much scientific research (biotechnology, laser technology, and so on) and holding high scientific potential, and carried out by qualified specialists;
- improvement of infrastructure in historically established country towns not suitable for large and medium-sized enterprises;
- organizing foreign economic collaboration, especially in case of joint-ventures.



Computer tools for planning and design of  
industrial and agricultural development of a region  
for IBM PC XT/AT

V.R. Khatchaturov, V.A. Tsoy, S.L. Utkin, P.A. Vitushkin, In.N. Zshidkov

Computing Centre of the USSR Academy of Sciences, 1988.

In the Computing Centre of the USSR Academy of Sciences, for a large number of years mathematical methods and software systems are developed for planning and design in various fields of industry and agriculture. In particular, in the Department of Methods of Design of Developing Systems the software tools and systems are created for solving various problems of planning and design of industrial and agricultural development of a region, such as planning and design for oil and gas deposits, planning and design of schemes of complex industrial as well as agricultural development of a region, planning of automobile transportation, multicriteria decision support, etc. This software is widely put into practice in the Soviet Union as well as abroad (in Cuba - for agricultural planning, in Mongolia and North Korea - for industrial planning and design, in Vietnam - for agricultural planning and for design of oil deposits in the ocean.

In this report, the following decision support systems are presented:

The first one is a decision support system for planning of development and design of an agricultural region. It can be used in working out a strategy of development of an agricultural region taking into account rational exploitation of soil and water resources, for choosing technologies for plant growing and live stock breeding, for distribution of cultures among various areas, for design of irrigation networks.

/..

The second system is used for industrial planning in regions containing minerals. The system supports decision making by generating various alternative projects both for extraction of minerals and for utilization of them. The system is based on nonlinear model of balance type.

The third system is developed for multicriteria decision support. The problem of multicriteria decision making often arises in planning and design, so the system can be used together with any of the above systems as well as separately, in case the problem can be expressed in terms of linear model.

The systems operate on the IBM Personal Computer (either XT or AT model or compatibles) and have been tested for various practical applications.

"Methodologies for forecasting the  
development of intersectoral food complexes of the region: the  
example of the Georgian SSR

H. Santeladre

1. The paper analyzes the methodologies and techniques of forecasting and long-term planning of agro-based industries in the Georgian SSR and undertakes comparative analysis with the methods and techniques used in developing countries.
2. Analyzes further the interrelation between the targets and programmes of different sectors of agro-industrial complexes and prepare recommendations on the methods and tools to harmonize objectives and programmes for integrated national agro-industrial development programmes.
3. Outlines are proposed for the guidelines for agro-industrial planning for developing countries to be presented and discussed at the Expert Group Meeting to be held in Tbilisi (USSR) in October 1981.  
The methods and techniques for these guidelines should be clearly defined with the view of their further computerization.

The econometric Model of World Market of Capital Goods:  
A Case-Study of Non-Electric Machinery

A.V. Yesickov

Nowadays we witness the continuing proliferation of global economic modeling both geographically and in terms of issue areas and research approaches. In recent years new models have been constructed somewhat broadened in scope and put to use by policy-making institutions in order to aid in short-to-medium term projections. The modeling time horizons in general become shorter, the issues addressed more specific and policy-oriented. Most modeling efforts continue to be located in the USA and in Europe but a gradual geographical dissemination is underway.

As far as the Soviet Union concerned, this trend has also manifested itself in quite a distinctive manner. Recently, several new global models have been developed, and, equally notably, existing models have been restructured for modification, extension or combination with other models.

All-Union Market Research Institute (UNIKI) of the Ministry of External Economic Relations takes an active part in the process. Main area of the institute's specialization is macro-econometric model of world commodities markets. System of models of various markets is now being developed aimed at construction of global model of world trade.

An integral part of the mentioned system constitute macro-econometric model of world market of capital goods. The model was conceived in 1985. Far from being completed it should be regarded as evolutionary product. The first phase of the model deals with world market of non-electrical machinery. The main purposes of the model are:

- to study the present and future short-to-medium term patterns of the world trade flows of non-electrical machinery;
- to provide an analytical tool to estimate the impact of the world trade flows of industrial equipment on the process of industrialization in developing countries;
- to estimate emerging trends in North-South and South-South trade in engineering products.

PROJECT PROPOSAL FOR CONSIDERATION BY  
C O B A

TRAINING IN PREPARATION TO THE INTRODUCTION OF COMPUTER  
AIDED PLANNING TOOLS

OBJECTIVE

To create the necessary capabilities for the taking over and introduction into use of computer aided planning tools at the level of industrial enterprises and branches

OUTPUTS

- 1) Trained trainers for the introduction of training on computerised industrial planning tools
- 2) Computer aided tools and methodology for the training of those who will be in charge of introducing, adapting, applying computer aided tools in industrial planning
- 3) A project document for the activities to be implemented under international assistance

ACTIVITIES

- 1) Undertaking study tours in selected European countries and IIASA with a view to studying
  - computer aided planning tools offered in the framework of Unidplan
  - computer aided teaching tools available for teaching industrial planning methods
  - training programmes for teaching industrial planners
- 2) Sending international consultants to advise on the establishment of appropriate training facilities for the training of industrial planners at enterprise and branch levels
- 3) Preparation of a workplan for the launching of appropriate training activities
- 4) Drafting a full scale project document for the activities to be undertaken under international assistance and discussion with potential funding sources

PROJECT PROPOSAL FOR CONSIDERATION BY  
E G Y P T

APPLICATION OF SELECTED COMPUTER AIDED PLANNING TOOLS

OBJECTIVES

- 1) To implement a case study in Egypt with a view to specifying priority problem areas in decision support of the Cabinet and to present computerised tools of potential interest for the solution of these problems.
- 2) To adapt and introduce in use one particular decision support tool, as a pilot exercise demonstrating the way in which Unidplan tools will be adapted and introduced in Egypt.
- 3) To identify priority areas for further development and application of computer aided planning tools available through Unidplan.

OUTPUTS

- 1) A report assessing selected computer aided planning tools from the point of view of their adaptability and introduction in Egypt
- 2) A decision support tool installed at ministerial level in the Ministry of Industry
- 3) A plan for the joint development of a group decision support system on the basis of the single station solution introduced under 2), including potential modalities of financing

ACTIVITIES

- 1) Preparation of selected tools in demonstration version for presentation in Egypt
- 2) Mission to Egypt to analyse decision support needs and problems and to present and demonstrate selected tools
- 3) Preparation of assessment and recommendations
- 4) Specification of the adaptation needed regarding the selected single station decision support system
- 5) Development, testing, installation of the adapted system in Egypt
- 6) Arabization of the system
- 7) Testing the validity of the above system in selected industrial planning areas
- 8) Training of users on the regular use of the system
- 9) Drafting a plan for the joint development of the tool with the identification of the resources needed in terms of time and budget
- 10) Drafting proposals for follow-up.

PROJECT PROPOSAL FOR CONSIDERATION BY  
E G Y P T

PROMOTING THE DEVELOPMENT OF THE CAPITAL GOODS INDUSTRY

OBJECTIVES

To assist the Egyptian Government in establishing an entity supervising all activities directed toward the promotion and development of capital goods industry in Egypt.

OUTPUTS

1. A system to identify and forecast the Egyptian needs from capital goods sorted by sectors.
2. Capital goods producers data base to provide information on goods, producers, trade statistics and price information and, if possible, trade opportunities in capital goods markets.
3. A data base to provide information on national and international engineering and consultants working in the field of capital goods production.
4. A system to collect and update Egyptian requirements, from spare parts and set priorities and procedures for reverse engineering of these parts.
5. A system to compile the idle capacity of Egyptian companies, possibly within establishing an Egyptian companies data base, and to set rules and procedures to assign capital goods production to utilise idle capacity.
6. A complete training curriculum in reverse engineering and capital goods production related activities.
7. A detailed plan for potential projects to establish manufacturing facilities, engineering offices in the field of capital goods and spare parts production.
8. An investment opportunity guide to be updated and distributed periodically to international and local investors.

ACTIVITIES

1. To assign experts by UNIDO to cooperate with Egyptian experts in preparing an action plan to fulfil the above objective and outputs and to present and defend this plan during the first national conference on capital goods production to be held in Cairo soon.
2. Develop, test and install the capital goods requirement identification system.
3. Develop, test and install the capital goods producers data base.



4. Develop, test and install the capital goods experts data base.
5. Develop, test and install the Egyptian companies data base.
6. Develop, test and install the spare parts identification system.
7. Design and production of capital goods and reverse engineering related activities training curriculum.
8. Produce the Investment Opportunity Guide in the field of capital goods.
9. Elaboration of future project extensions and plans of realisation of manufacturing facilities for selected high priority goods and spare parts.

PROJECT PROPOSAL FOR CONSIDERATION BY  
I N D I A

WASTE MANAGEMENT

OBJECTIVES

1. To implement a computer-based system for the purpose of industrial waste management, in particular to identify problem areas in waste production and to estimate at government and municipality levels the type and quantity of wastes produced.
2. To formulate a waste management strategy for the country.

OUTPUTS

1. A set of methods, nomenclatures, coding schemes necessary for the estimation of industrial wastes.
2. A database containing internationally defined technological parameters needed for waste-estimation, tuned to the country's concrete technological situation.
3. A computer programme allowing appropriate waste management.
4. Trained manpower capable to use and refine the computerised waste estimation methods.
5. A waste management strategy based on computerised estimations.

4. ACTIVITIES

1. Analysis of the industrial statistics available in the country.
2. Initial study of the industrial waste disposal situation and of the main problems faced at present.
3. Using the information gathered to produce an initial order of magnitude.
4. Training/familiarisation of national staff on the waste management programme.
5. Interpretation of results of 3) and identification of critical areas and points.
6. Assisting local staff in implementing identical waste survey, to calibrate the waste model.
7. Inserting data obtained from 6) into the model.
8. Rerunning the model from 2) to obtain a reasonable accurate prediction, estimation of waste production of specific regions for the country.
9. Interpretation of these data to formulate a waste management strategy, appropriate to that country.

PROJECT PROPOSAL FOR CONSIDERATION BY  
I N D I A

INFORMATION AND TRAINING

OBJECTIVE

To improve industrial planning by upgraded information provision and increased qualification of statisticians and economists involved.

OUTPUTS

1. Trained trainers capable to train at the local and regional level statisticians and economists to interact in an appropriate way with the computerised nation-wide statistical information system.
2. Teaching tools, in particular computer-aided tools for use in local training.
3. Computerised tools for facilitating the local development of computerised models and programmes for use in industrial economic analysis and forecasting/planning.

ACTIVITIES

1. Undertaking study tours by the future trainers in selected countries and institutions with a view to
  - a. studying computer-aided planning tools and methods;
  - b. studying teaching programmes and tools used in teaching in their field of interest.
2. Organisation of a meeting with international consultants in order to establish the training programme (curricula) to be introduced in India.
3. Adaptation of selected training tools and aids to the local conditions and needs.
4. Organisation of a pilot training course in India, using the programme elaborated under 2) and the tools adapted under 3), with the participation of international consultants as lecturers, demonstrators, advisers on future larger scale training.
5. Evaluation of the pilot training course and revising, improving the methods, tools, etc. on the basis of this evaluation.
6. Initiating several training courses at district level.
7. Feedback for final evaluation.
8. Finalization of the training programme and initiating follow-up.

PROJECT PROPOSEL FOR CONSIDERATION BY  
N E P A L

OBJECTIVE

To prepare the introduction of additional computer-aided planning tools at macroeconomic level, building on the results of the ongoing UNDP/UNIDO an ADB project.

OUTPUTS

Specification and feasibility study on the establishment of two computer-aided planning tools:

- a. one facilitating the identification of viable investment projects, using data generated by the UNDP/UNIDO project: Industrial Planning and Monitoring.
- b. one for the everyday assessment of the effective protection rate provided to the manufacturing sector using the data provided by the on-going ADB Technical Assistance Project: Industrial Policy.

ACTIVITIES

1. Discussion with the specialists of planning methodology and planners with a view to identifying exactly the methods to be supported by new computer-aided tools as well as to identifying the data and their structure for appropriate model building.
2. Elaboration of the specification for the models and software to be introduced.
3. Identification of models and software which could most easily be adapted to the needs of Nepal.
4. Elaboration of a workplan and methodology for the implementation of model/software adaptation and definition of international assistance needed for implementation.
5. The elaboration of a first draft for a full-scale project expected to start in 1990.
6. Preliminary negotiations with potential funding sources in order to define the order of magnitude of expected international assistance.
7. Finalization of the Project Document in harmony with the financial possibilities.

PROJECT PROPOSAL FOR CONSIDERATION BY  
THE PHILIPPINES

OBJECTIVE

To prepare the inventory of the existing planning system in the Philippines and a plan for further improvements by the means of introducing additional/complementary computer-aided planning tools.

OUTPUTS

1. A document presenting the main characteristics of industrial planning in the Philippines, with the indication of the computer-aided tools used and institutions involved.
2. A plan of action for further improvements.
3. A project document for activities to be implemented under international assistance.

ACTIVITIES

1. Undertaking a mission to the Philippines with a view to
  - identifying the major institutions participating in industrial planning;
  - discussing the existing planning system and the problems faced with high-level decision makers;
  - identifying computerised models/tools actually used in planning.
2. Elaboration of recommendations for further development on the basis of tools offered in the framework of UNIDPLAN.
3. Establishment of a plan of action and preparation of a project document for the activities to be undertaken under international assistance.
4. Preparatory discussions with potential funding sources.

PROJECT PROPOSAL FOR CONSIDERATION BY  
S U D A N

TRAINING ON COMPUTER APPLICATION IN INDUSTRIAL PLANNING

OBJECTIVE

To establish a training unit in charge of providing basic training on the use of microcomputers to industrial planners.

OUTPUTS

1. A small training unit capable to train planners on the basic use of microcomputers in industrial planning.
2. Training materials and computer-aided tools for use in training industrial planners.

ACTIVITES

1. Identification of an organisation for hosting the training unit and the personnel to be trained.
2. Purchasing microcomputers for the unit for teaching purposes.
3. Organisation of a local training course for the designated personnel.
4. Study tours for selected trainers in Arab States.
5. Organisation of the first training course for planners with the participation of an international consultant.
6. Elaboration of recommendations for follow-up.

### Project Concept

Title: Planning and short-term econometric modelling, plan implementation and training tools.

Country: Interregional

Duration: 1 week

Counterpart: Bogazici University, Istanbul, Turkey

### BACKGROUND AND JUSTIFICATION

Turkey participated for the first time in UNIDPLAN activities in USSR, Tbilisi, Expert Group Meeting in October 1988. The representative from Turkey summarized the Turkish experience in planning since 1960. The five year plans of Turkey, adjusted with yearly programmes, is compulsory for the public sector and indicative for the private sector. The Turkish plans are based on input-output methods. During the Expert Group Meeting in Tbilisi several participants expressed their interest in the experience of Turkey in planning. Recently some work has also been done on short-term (quarterly) econometric modelling and forecast. Although the latter model, developed by the University of Bogazici and not yet applied by the State Planning Organization, is available for elaborations and demonstration in the Bogazici University.

Host Institute: Bogazici University - Turkey.

The Economic Department of Bogazici University has developed short-term econometric models which are relevant to UNIDPLAN Programme. The teaching staff of the University was frequently employed by the State Planning Organization.

### OBJECTIVE

The application of skills in computer-aided tools in order to improve short-term forecast and planning and plan implementation.

### OUTPUTS

- i. Elaborated computer aided tools for short term planning for UNIDPLAN.
- ii. 10 senior planners acquainted with Turkish experience in planning.

## ACTIVITIES

### Bogazici University

1. Up-dating the existing model and extending it to 1990-91.
2. Elaboration meeting on the methods of general equilibrium model in Turkey.
3. Investment planning and project evaluation including a case study on environmental effects of the industrial and/or infrastructure projects (to be determined).
4. Presentation and elaboration on short-term econometric modelling (quarterly).
5. Presentation of training tools.
6. Presentation of plan implementation/follow-up/coordination tools. (If available by then: if not, preparatory discussions and elaborations for their preparation):



Project Concept

Title: Training of Trainers in Computer-aided Tools

Country: International

Duration: 2 weeks

Counterpart: Host institute to be determined

**BACKGROUND AND JUSTIFICATION**

Appropriate training programmes will be offered under the auspices of UNIDPLAN Programme in computer-aided tools. The Meeting held on computerized tools and methods in industrial planning in Bonn, USSR, in September, 1977, recommended for other activities under UNIDPLAN Programme.

In the recent Expert Group Meeting in Bonn in October, 1978, several participating countries offered their assistance to UNIDP for organizing training programmes as per the request and needs expressed by other participating countries. India, also, will have to train a large number of planners at national level in all its States, due to the need to be utilized the satellites after 1990. Several other countries like Brazil and Cuba do not have sufficient number of planners trained in computer-aided tools even for their present planning activities. In line with the objectives of the UNIDPLAN and in order to enable developing countries train their own nationals, training of trainers is envisaged in this project.

**HOST COUNTRY:**

India and/or Cuba with the cooperation of the "Instituto de Estudios Sociales (Bruno Leuschner)", GDR and UNIDPLAN Programme.

**OBJECTIVE**

The acquisition of skills in computer-aided tools in order to improve industrial planning at macro and micro levels in selected developing countries.

**OUTPUTS**

1. 20 trained planners (10 from host country)
2. Set of demo-versions from computer-based planning tools for training purposes adapted to the conditions of the host country.
3. Meeting report.

**ACTIVITIES**

1. Presentation of tools prepared by "Bruno Leuschner".
2. Presentation of the training tools available in UNIDPLAN.
3. Adaption of a selected tool to the conditions of the host country as a demonstration and a pilot activity (with the assistance of local/national experts).
4. Drafting of the report.

### Project Concept

Title: Training Programme on computer-aided planning tools for limited data.

Country: Interregional

Planned duration: 1 week.

Counterpart: Calin University (University of Wales)

### BACKGROUND AND JUSTIFICATION

Several developing countries do not have sufficient data basis for economic planning. Manufacturing industry is composed of a large number of sub-sectors and industries. Value added, physical inputs have more complex relationship in a large variety of industrial inputs and outputs. The lack of usable data by planners becomes even more acute and complex problem in the industrial sector compared to other economic sectors. Many developing countries will not have usable and dependable data for planning in the near future. Therefore, UNIDPLAN activities and computer-aided tools will have to include methodologies which can be applied with limited data such as semi-input-output models.

### HOST INSTITUTE

UK was represented in the Expert Group Meeting in Tbilisi by the University of Wales. The workshop will be offered in that university or in a selected developing country with the assistance and cooperation of the University of Wales.

### OBJECTIVE

The application of skills in order to improve and initiate industrial planning with limited data in selected developing countries.

### OUTPUTS

1. 15 planners trained in computer-aided tools which can operate with limited data.
2. Set of computer aided tools for UNIDPLAN.
3. Report of the Meeting.

## Project Concept

### PROJECT PROPOSAL FOR JOINT DEVELOPMENT AND APPLICATION OF COMPUTER-AIDED PLANNING TOOLS FOR YUGOSLAVIA

#### BACKGROUND AND JUSTIFICATION

During the Expert Group Meeting in Tbilisi in October 1988 the participant from Yugoslavia suggested to initiate the project for joint development and application of computer-aided planning tools with Bulgaria and Hungary in the following area:

1. Yugoslavia-Bulgaria: Improved versions of selected computer-aided planning tools for input-output models.
2. Yugoslavia-Hungary: Improved versions of computer-aided planning tools for general economic equilibrium model.

The activities will start with a preparatory meeting to work out a work programme in two countries. For this purpose two Yugoslavian experts will visit each country for 6 days (3 days each country). This activity could be funded under UNIDO or UNDP/UNIDO umbrella projects when available or through individual fellowships or Regular Programme Component.

#### OBJECTIVE

To obtain improved versions of selected computer-aided planning tools developed simultaneously in several countries and to join efforts in adapting and introducing them in selected developing countries, namely Yugoslavia.

#### OUTPUTS

1. Work Programme
2. Improved later versions of two computer-aided planning tools for UNIDPLAN.
3. Two computer aided planning tools adapted and introduced in Yugoslavia.

#### ACTIVITIES

1. Closer examination of two models/software developed simultaneously in two UNIDPLAN participating institutions.
2. Mutual visits for the exchange of experience and comparison of the results.
3. Elaboration of a workplan for joint testing and further development.
4. Implementation of the development work according to the above workplan.

5. Simultaneous testing under the conditions of the different countries participating in the exercise.
6. Evaluation of results.
7. Informing the developing countries participating in UNIDPLAN on the tools and results.
8. Agreement with a selected country following its request on the adaptation of the tools to its conditions.
9. Mission to the developing country to clarify the needs for adaptation.
10. Implementation of the adaptation, sharing the work among the institutions having developed the tools.
11. Preparation of a user manual and its reproduction.
12. Installation of the tool, with training in Yugoslavia.

1. Summary of the agreement between the participants from GDR and Yugoslavia

During the Expert Group Meeting in Tbilisi in October 1988 the participant from Yugoslavia has shown interest in the 3 training tools presented by the participant from GDR. The participant from GDR and Yugoslavia has agreed that 2 Yugoslav participants would be nominated by the forthcoming Group Training Programme in GDR offered with UNIDO on planning (subject to approval of authorities). The participants will be trainer of trainers from an organization in Yugoslavia which will be determined later. If necessary, additional per diem will be provided from the respective training programme to be held from March to May 1989 in Berlin.

Following this first-phase activity, details for adapting and using these and other training tools developed by the University of Economic Science "Bruno Leuschner" will be worked out with Yugoslav authorities, possibly as a UNIDPLAN Programme activity.

2. Project Proposal for Multi-Criterial Decision-Support System

During the Expert Group Meeting in Tbilisi in October 1988 the participant from Yugoslavia has expressed her interest in the computer-aided planning tool from CSSR on Multi-Criterial Decision-Support System for Planning and Management (MDS). Since only the demo-version was available for presentation, the Yugoslav participant suggested to visit the CSSR for 1-2 days to have in-depth information on this particular tool in the Institute of Applied Cybernetics, Bratislava. Depending on the results of the visit the Yugoslav authorities will make the necessary arrangements for further activities.

LIST OF PARTICIPANTS

BULGARIA

1. Mr. Valentin Roussinov PARVANOV  
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2. Mr. Boiko Ivanov NIKOLOV  
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10. Mr. Bholu Nath CHALISE  
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YUGOSLAVIA

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Consultants from USSR

1. Mr. Amiran BABUNASHVILI  
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3. Mr. Stanislav CHEREMNYKH  
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7. Mr. Alexei V. YESICKOV  
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Scientific Research Institute of Economic and Technical Cooperation  
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A G E N D A

EXPERT GROUP MEETING

Tbilisi, USSR, 24 - 28 October 1988

1. Opening ceremony.
2. Election of a chairman and a rapporteur.
3. Adoption of the Agenda.
4. Presentation of the status of the UNIDPLAN Programme and the expected future activities (UNIDO).
5. Presentation of country papers on experience, needs and expectations on the following main issues:
  - a. Industrial planning methodologies.
  - b. Computer-aided tools for industrial planning.
  - c. Industrial information and statistics for industrial planning.
  - d. Advanced training programmes on computer-aided industrial planning tools.
  - e. Cooperation programme to introduce industrial planning methodologies and computer-aided tools.
6. Discussion of the needs, proposals for solutions regarding the development/use of appropriate methods, computer-aided tools, information and training, with demonstrations.
7. Individual consultations with representatives of the developing countries on the ways in which their needs can be met.
8. Recommendations for the development of the UNIDPLAN Program:
  - a. general recommendations
  - b. workplan for the years 1989-90
  - c. institutional framework.
9. Discussion and adoption of the final report.
10. Closing the Meeting.