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University of Economic Sciences        Berlin, December /18/ 1989
"Bruno Leuschner" Berlin


Short Final Report

on Fulfillment of Activities Performed according to the
Contract No. 89/109 (Projects No. UD/INT/89/144 and XP/INT/
89/059; Activity Code: J12413) between The United Nations
Industrial Development Organisation (UNIDO) and University
of Economic Sciences "Bruno Leuschner" for the Provision of
Services Relating to the Identification and Training on
Computer-Aided Planning Tools in Cuba

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1. Using 4 computer-aided training tools for planners and
   economists prepared by the University of Economic Sciences,
   which can be used for both practical and teaching activi-
   ties, the a. m. University carried out a two-week training
   course for members of the Cuban focal point of UNIDPLAN
   (the Cuban National Commission for the Economic Administra-
   tion and the University of Havanna).

2. The activities performed were:

   a) a lecture on the system of administration and planning
      of a centrally planned economy and the utilization of
      different computer-aided planning tools in the GDR-
      economy;

   b) the presentation of the model "Plan project 4" - ppj-e -
      (i.e., a unisectoral model for plan project elaboration
      on national economic level), including:

      - a lecture on the theoretical and methodological back-
        ground of this model
      - a practical demonstration of the model and introduc-
        tion of the participants of the course into the construc

tion and structure of the model "Plan project 4"
- guiding the participants while autonomously utili-
  zing the model when solving tasks of practical exer-
  cises
- adopting the model to the needs of the intended
  using authorities (in close cooperation with the
  participants of the course);

c) the presentation of the model "Fineff"
   (i.e., financial planning on national economic
   level), including:

   - a lecture on the theoretical background, structure
     and capacity of this model
   - a practical demonstration of the model, taking the
     different economic conditions and demand of socia-
     list and developing countries into account
   - guiding the participants during their autonomous
     training with the help of the computer, this way
     giving some explanations on how to elaborate a fi-
     nancial plan on national economic level
   - adopting the model to the needs of the intended
     user (in close cooperation with the participants,
     this time too)

d) the presentation of the model "LF-89"
   (i.e., a model dealing with labour force planning
   on enterprise level), including:

   - a short introduction into the system and methods
     of manpower planning both on national economic
     and enterprise levels
   - a practical demonstration of the model "lf-89"
     using the computer as well as an introduction into
     the elaboration and assessment of different variants

- a <u>discussion</u> of a possible extension and enlargement of this model;

e) the <u>presentation of the model "GO RR"</u>
   (i.e., a model concerned to the ranking of different investment projects under the point of view of an optimum efficiency), <u>including</u>:

   - a short <u>introduction</u> into the theoretical and practical background of the model (and the possibilities of its utilization)
   - a practical <u>demonstration</u> and explanation of the model and its structure using the computer
   - a <u>discussion</u> on possibilities of practical utilization of this model under the conditions of socialist and developing countries as well as
   - <u>adopting</u> this model to the needs of the intended user (in close cooperation with the participants, too).

3. The Havanna University was <u>handed over</u>:

   - the complete software of all the models mentioned above
   - brochures resp. manuals/course text booklets which unable each of the participants to utilize the handed software by themselves.

4. It was a pleasure to teach the Cuba colleagues. They were very interested, well-versed and talented. The material working conditions were excellent, too. A continuation in the frame of a similar course dealing this time with problems of sectoral and enterprise based planning tools is desirable (First approaches and information was given by a representative of the University of Economic Sciences during the Havanna meeting from Nov./11/ to Dec./02/1989 - GDR training programmes are available -)

-Dr. N. Konrad-                          -Dr. sc. B. Hoene-

Documentation/Description For Using The Computerised
Model "lf-89" - A Guideline To Manpower Planning On
Enterprise Level

# 1. Description of the basic feature

| | |
|---|---|
| **Name:** | "lf-89" (Labour Force Planning On Enterprise Level) |
| **Version:** | 1989 |
| **Format:** | 5 1/4' inch, double sided, high density disks |
| **Language:** | Supercalc 4 |
| **Operating system:** | MS DOS 3.2 |
| **Memory requirements:** | 72 Kbytes of RAM (including for graphics) |
| **System configuration:** | IBM/ AT or XT, colour display possible |

# 2. Contents and aims

- The model "lf-89" is to be used for teaching purposes.
  It should be utilized in context with lectures concerning
  the development and planning the labour force as well as
  methods of manpower planning.
  (see brochures:
  . Development And Planning The Labour Force/ Edwin Stiller
  . Methods Of Manpower Planning/ Edwin Stiller,

  both written and published by the University of Economic
  Sciences "Bruno Leuschner - Berlin/ G.D.R. for UNIDO Inter-
  regional Group Training Programme On Industrial Planning)

- The planning activities supported are:
  - labour force planning on enterprise level
  - precedencly for centrally planned economy (useful for market oriented economy, too), normative type of planning
  - yearly planning
  - phases of planning supported by the model: analysis, detailed analysis, monitoring implementation
  - manpower planning on enterprise level
  - the model is concerned to real sphere

- All input data needed for exercise purpose is already given; by some simple changes of the model other data (e.g., statistical, estimated or forecasted data) can be input (precedencly yearly data)

- The model is of simulation type, calculating results of labour input and its changes (balancing demand and supply of manpower).

- The model contents two variants:
  first: survey of manpower and other main economic points of the enterprise as well as demonstration of manpower planning procedure
  second: demonstration of manpower planning procedure taking different input changes made by the user into account

- The moddl has a simplex mathematical background.

The results are shown at screen (data, tables und views), thus a comparision of different input versons is possible. Output by printer is possible.

Services provided are: planners training, providing information and dat for discussions on plan variants with other planning bodies (e.g., regional authorities).

University of Economic Science "Bruno Leuschner" Berlin


German Democratic Republic


# Computer-aided Balancing of Budget, Credit and Money Circulation


MODELDESCRIPTION


FINEFF


by

Diethelm Hunstock
Dieter Wirth
Martin Kornek

Berlin, November 1980

# 1. Description of basic features

## 1.1. Technical data

Name: FINEFF

FINancial balancing and EFFiciency

Version: 1989 / English

Format: 5.25 inch disks

Language: GWBASIC 2.0, SC3, SC4, LOTUS 1-2-3

Operating system: DOS 3.1

Memory requirements: 256k

System configuration: standard

Documentation: in preparing (1990)

## 1.2. Purpose and utilization

The purpose of this model is mainly directed to lecture programmes for the training of comprehensive problems of the national economy.

This model supports the draft of material and financial plans in the national economic scale. Especially the unity between material and financial planning is shown and main relations and proportions of the national economy are respected.

Following interdependent growth processes have to be an integral part of planning economic growth.

- The use of the resources available in the national economy; this concerns the development of manpower and its productivity, the efficient use of fixed assets, raw materials and energy in connection with the utilization of science and technology for ensuring economic growth,
- the structural development of the national economy,
- the influence of foreign economy on the growth of the national income available in the country,
- the development of the accumulation fund in the national economy,

- the growth of the consumption fund because the individual and social consumption shows the social aims of growth;
- the development of budget, credit and money circulation because currency stability is reflected in these growth processes.

The model "FINEFF" described here is to show how financial processes and the price development are integrated into growth planning. It reflects how economic growth effects

- development of budget
- growth of credits and money circulation and the
- formation and use of income in different spheres of the national economy.

The programme makes it also possible to calculate, in a predictive manner, the effect of price changes on the price level and on the development of financial resources and demands. Thus the programme helps to draw conclusions concerning the attainable integration of growth and currency stability.

The horizon of planning is by choice from 1 till 10 years. The model supports the decision making and give assistance in the field of shaping of economic and social strategies.

The input data needed:
The model works with an internal data store to analyzing and calculating the development of the national economy. The data store is adapted to the national economy of the GDR. Adaptions to any other national economies are possible if there is a similar basic structure and if the indicators are available.

The model is a balance type and simulations of different variants of development are possible. Functions of growth and balance equalities form the mathematical background of this model.

Results are shown in tables or partly by graphs on the screen.

## 2. Description of using

The model consists of four programme steps.
In the course of these programme steps 30 work tables are used.
They are applied for the necessary data input, indicate the degree of consistency between material and financial growth processes and permit it to change the aim data of economic growth if contradictions between the material and financial proportions are recognizable.

1.  The first step of the programme is the input of economic policy and social policy target data for the respective plan period (annual plan, five-year-plan, long-term-plan).
    The input of these data is made through work tables 1 - 5.

    -   The input of target data concerning the production and use of the gross national product and national income as well as the employment of resources is made through work tables 1 - 3. These tables reflect a first material growth variant and show the employment of the available resources.
    -   Table 4 ensures the input of another group of data. These data reflect the financial redistribution which is not contained in planning the material growth variant.
    -   The final group of target data comprises the revenues in foreign currency from exports respectively the expenditures in foreign currency caused by imports. This data input is made with the help of table 5. In this connection international price tendencies and existing credit demands and credit liabilities are taken into account.

2.  The second step of the programme is to show which flows of money result from material growth, from financial redistribution and from export and imports in foreign

currency, that is this step of the programme is to combine all material and financial model data. These flows of money are reflected in work tables 6 - 12.

- Work table 6 shows the effect of the model data on the budget. The revenues of the state resulting from primary distribution and redistribution are shown as well as expenditures of the state for the different spheres of the national economy.

- The task of work table 7 and 9 is to show material-financial growth processes in specific economic fields. Work table 7 reflect the necessary allocations of the budget for financing the social consumption and the investments in the non productive sphere of the national economy.
The specific task of work table 8 is to show the flows of money in foreign economy. Exports and imports in foreign currency are compared with exports and imports in national currency.
Work table 9 reflects, for example, how the credits develop in the producing sphere and which share of productive accumulation is to be ensured by using credit funds.

- Work table 10 indicates the volume and the structure of the monetary revenues and expenditures of the population. It shows the development of the proportions between the population s income available and the supply in commodities and services.
In this connection the development of savings and the ratio between incomes and savings is made visible.

- Work table 11 reflect the development of credits and informs about money circulation. The increase of credits and money circulation and the overall development of money circulation is shown.

By using these individual balances a first evaluation of the integration of material and financial growth processes can be made. Criteria of this evaluation are, in particular, the revenues and expenditures of the budget, the financial effect of foreign economy, the development of credit and savings and the increase of money circulation. In this connection tables 12.1. and 12.2. give a summarized survey of all financial sources and expenditures of state and economy.

3.    The third step of the programme is directed towards finding variants of a solution if the programme processing shows that there are contradictions between the planned material growth and the processes of financial distribution. Such contradictions would be expressed by the following, for example:
   - unjustifiable budget deficit;
   - unreasonable credit demands in the national economy which indicates insufficient results of efficiency;
   - a savings ratio in the sphere of the population, which reflects contradictions between commodities and services available and the disposable income of the population;
   - unjustifiable high increase in money circulation;
   - disproportions in the structure of creating and using the financial funds of the state.

Such disproportions can be caused by the fact that the planned efficiency, which is taken as the basis of growth, does not ensure the planned distribution and use of the national income.

A better solution, however, would be to strive for a higher increase in efficiency.
Therefore, work tables 13 - 15 analyse indicators of efficiency as they have been used for growth variants so

6

far. They indicate cost structures, coefficients of efficiency and the growth of productivity in comparison with the increase of fixed assets and wage funds.

In this connection work table 16 offers the possibility to change selected coefficients of efficiency and to fix higher demands on efficiency within the frame of actually existing conditions.
As a result of changed demands on efficiency or changed foreign economy aims, work tables 17 and 18 contain a changed balance concerning the creation and use of the national income. The increasing national income made available by higher efficiency or changed foreign aims can be used for accumulation or for social individual consumption.
This is made by work table 19.

4. The fourth step of the programme of our model simulates price policy effects. The starting point is that due to the interlocking of economic branches, price changes in one sector have also their effect on other branches.

In order to make these complex consequences of price policy tendencies calculable, an input-output table of the national economy is presented in work tables 20 and 21. It proceeds from the balance of the creation and use of the national income and shows the branch structures of the national economy.

The following work table 22 offers the possibility of changing the cost and net income elements in the input-output table and to calculate, for example

- increasing depreciations,
- increased wages,
- higher levies and taxes,
- growing net profits.

Work tables 23 and 24 show a method of calculating these price policy effects in a complex manner. Work tables 25 and 26 reflect the overall volume of the price increase by means of a new input-output-table.

Work tables 27 and 28 analyze the effect of price changes on the scope of national economic efficiency. They show that price changes have an effect on export profitability, and the resulting new production profitability of branches creates new standards for employment of investment funds.

Finally, work tables 29 and 30 reflect the structure of price changes and the effect of price changes on financial sources and financial demand.

3.   Hardware and software configurations

The programme works reliable if standard configurations and the operating system DOS 3.1 or higher are available. For using DOS-variants 2.0 special programme versions of FINEFF are necessary.

Description of planning tools for UNIDPLAN
"Ranking of Investment Projects"


1. Description of basic features

1.1. Name:      "GO-RR"
     Version:   1
     Format:    3.5 inch   320 K bytes
     Language: GW-Basic
     Operating system: MS-DOS  3.0 or higher
     Memory requirements: 256 K bytes
     System configuration: IBM-PC compatible
     Documentation: manual of 13 pages

1.2.

   0. The model's purpose is to train the process of decision-
      making. in the field of investments especially the ran-
      king of single investment projects.

   1. The software supports the planning on sectoral and enter-
      prise level. The problem of ranking stands in every na-
      tional economy. The horizon of planning depends on the
      volume of investment projects, mostly it is medium term
      planning. The model imitates the process of definition
      of preferential investments.

   2. The input data consist of estimated data for 10 invest-
      ment projects.

   3. The necessary input data are included in the model.

   5. The mathematical background is a ı. ıified model of the
      so called Pattern method.

   6. Results are shown at the screen.

   8. The program requires the user's interactivity.

   9. We offer to demonstrate the model for training purposes
      together with other models.


2. Description of modules and functions

A partial task in the process of investment planning is to make
a comparative evaluation of different investment projects with
the aim to grade and rank them under efficiency aspects. Our
model assumes 10 investment  projects which are under discussion
for implementation. Each of them is characterized numerically by
indicators (e. g. costs, funds, effects, investment expenditures).

For the solution of the task of ranking a number of 10 selected
criteria is used. The task and the essential economic problem,
the model is dealing with, is to formulate criteria according to

the user's choice and interests.

By using scores for each investment project and every criterion a certain ranking is reached. The model uses and compares four calculation procedures

- unweighted criteria

- the same, with weighted criteria

- unweighted criteria with a relativization of scores (determined by the ratio between the level of a single project and the maximum per criterion)

- the same, with weighted criteria


3. Hardware and software configurations

I B M - P C   compatible

G W - B a s i c

E G A - C a r d   f o r   g r a p h i c s


4. Tests, references and demo program

Since 1986, the model has been used annually in UNIDO training courses held at The Berlin University of Economic Sciences "Bruno Leuschner".

The model has been presented successfully for training purposes in the Republic cf Cuba in 1989.


(The facts of this description are following the pattern given by UNIDPLAN.)

Exercise: <u>Ranking of Investment Projects</u>

## 1. The planning problem

This exercise is intended as a certain help to train and to
discuss the (preliminary) solution of the following planning
problem:

As a partial task in the process of investment planning in many
cases it is necessary, among others, to make a comparative eva-
luation of different investment projects with the aim to grade
and to rank them under efficiency aspects.
This grading and ranking will support to select those projects,
which should be implemented, and to answer the question, how in-
vestment potentials should be concentrated on selected projects
or - by other words - which projects should enter the process of
project planning, project preparation and project implementation.
This planning problem may arise from different conditions. At
least two of them must be noted:

- In many cases different solutions do exist for a certain invest-
  ment task.
  Then the problem is to select the best one of parallelly existing
  variants.

- For the economy, for a certain sector, branch or firm or for
  a specific region mostly competing investment necessities will
  exist simultaneously. It is impossible to satisfy all of them,
  because the available investment funds always are limited and
  the demand for investment means often or mostly exceeds the
  investment potentials - especially, if economic growth and so-
  cial development are typical national characteristics.

  In this case the process of selection leads to the formulation
  of priorities. The consequence is, that certain projects must
  be rejected or postponed. Postponement means, that a certain
  sequence of project preparation and implementation is fixed.

The secondly mentioned situation needs an additional comment:

A certain number of those projects, which enter the process of grading and ranking, may be inter-related in such a way, that their later utilization (after commissioning them, i.e. after finishing their implementation) only is possible, if the corresponding projects are completed simultaneously. These interdependencies may be caused by the flow of commodities and services, between firms by the necessity to diminish the input of certain resources at a certain place, so that a free amount is available for newly arising tasks etc.

If such interdependencies do exist on a high level of intensity between some of the projects, the implementation of all these closely inter-related projects must be provided or postponed - or, at least, the consequences of a step-by-step implementation must be analysed additionally.

Explicitly this condition is not included in the following calculations. If such direct interdependencies actually exist (ex-ante-analysis), the concerned projects should be aggregated and dealt with as if one.

If such direct interdependencies do not exist, the answer is unambiguous. This situation especially is given, if all the projects serve the same purpose or if they are defined as different variants for the solution of a certain investment task - besides of the possibility, that they belong to different production lines and serve quite different investment purposes, which are inter-related only by so many mediating links, that a high elasticity between their differentiated development can be assumed.

In the following these assumptions are taken for granted.
Besides of the task to find the most effective grading and ranking of a certain number of investment projects the specific purpose of this exercise is to demonstrate, to study and to discuss the advantages (and the limits) of a computer aided approach to the solution of this (partial) planning task.

As a result it should become obvious, that this computer aided approach not only extremely facilitates the (routine) calculation procedures. It permits - and this is of main importance -, to prepare (by modified criteria) different variants in a minimum of time, thus widening and completing the basis for preparing and taking definite decisions (computer aided planning!).

## 2. Basic information

- We assume, that there are 10 investment projects, which are under discussion for implementation in the plan period.
- Each of them is characterized numerically by basic indicators.

  A system of indicators is necessary in order to describe each project comprehensively.
- From annex No. 1 (page 1 + 2) You can see the composition of this system of indicators as well as the respective numerical values.

  For further processing it is useful and necessary, to number (to cipher) these indicators (first colume: 1,...,34).
- These 34 indicators can be classified to two groups:
  - Investment expenditures (total and structure) (indicators No. 29 - 34), incl. time of implementation (33) and combined expenditures (34).
  - Effect and results (indicators No. 1 - 28)

    From annex No. 1 can be seen, that all projects are added to existing fixed assets.

    The level of the different kinds of effect and results therefore are reflected per indicator (and project) by the comparison (difference/increment or ratio/quotient) between its amount in the basic period (before commissioning of the project) (0) and in the plan period (after commissioning of the project) (1) (third column).

    (These figures 0 and 1 do not belong to the identification number of the indicator. On the other hand this differentiation between basic and plan period explains, why from 1 to 28 always two identification numbers are used per indicator).

All this basic information widely should be taken from the preparatory documents per project. The more the numerical values only are estimated (because of a lack of specified and well-based documents), the more uncertain the results of grading and ranking will be.

Of course, the system of basic indicators can be modified in accordance with specific interests.

It is possible, too, of course, to enlarge the number of indicators, if additional information is available. This may widen the basis for the formulation of the criteria, which are used on the following stages for grading and ranking.

## 3. Definition, formulation and identification of criteria

For the solution of the task of ranking a limited number of selected criteria must be used.

The formal starting point for defining, formulation and identifying these criteria is to decide, how many criteria should be included. - In this context, the following tendency should be taken into consideration: The larger the number of criteria, the more advantages and disadvantages tend to be compensated per project and when comparing them; the differentiation between the projects diminishes, and the clear and obvious ranking may become hazy. - In this exercise we suggest to use 10 criteria.

Their definition, formulation and identification consists of 3 steps:

- Construction principles and formulation

  The criteria are formulated (in algebraic terms; not numerically) on the basis of those 34 basic indicators, which can be seen from annex No. 1.

  There are two ways of criteria formulation:

  . Direct transfer of certain basic indicators into the list of criteria

  . Combination of basic indicators

  In general, the following construction principles do exist (A,B,C,D: general, unspecified expression of basic indicators):

1 - quotient of two basic indicators A/B
2 - difference between two fractions (quotients) A/B - C/D
3 - difference between two basic indicators A - B
4 - double fraction A/B : C/D
5 - direct transfer A
6 - fraction with a difference as denominator A/(B - C)
7 - fraction with a difference as numerator (A - B)/C
8 - fraction with a sum as denominator A/(B + C)
9 - fraction with a sum as numerator (A + B)/C

Your task is to formulate 10 criteria according to Your choice
and interest, using the above mentioned construction principles
and the list of basic indicators.
List the identification numbers of the (applied) construction
principles and the formulation of the criteria (in algebraic
terms, using the identification numbers of the basic indicators)
in annex No. 2, lines 2 and 3!

Examples:

•     4            (double fraction)
   6/8 : 5/7       (growth rate of fixed assets profitability)

•     7
   (6 - 5)/29      (investment profitability)

Take care to formulate combinations, which make sense economi-
cally, and to avoid useless items in the list of criteria (re-
ciprocal, e.g., of an already included criterion: output fixed
assets ratio/fixed assets intensity per unit of output; fixed
assets profitability/pay-back period etc.).
In the training hours we must find (on the basis of Your sug-
gestions and discussion) a consensus of opinion about the list
of criteria.

- Direction of optimization
   For each criterion it is necessary to decide, whether it should
   be maximized or minimized.
   Also in this context Your decision should make an economic sense
   and should reflect national (or sectoral or regional) interest
   (e.g.: 28 - maximum or minimum?).

List Your decision in annex No. 2, line 4, using the following
identification numbers:

. E (1,...,10) = 1        - maximization
. E (1,...,10) = 2        - minimization
(in brackets: identification number of the criterion)

- Weight of criteria

The different criteria may be of different importance for Your
economy (or sector or region) and economic strategy.

This differentiation must be expressed by different (relative)
weights, which are given the different criteria.

Furthermore, it may be possible, that by differentiated weights
the different level of certainty or uncertainty of the numeri-
cal values is intended to be reflected.

The model, underlieing this exercise, needs to define these
weights as decimals. For the total of criteria (10) the sum of
these weights must be equal to 1 (= 1).

List Your decision in annex No. 2, line 5, using the following
identification numbers:

. W (1,...,10) = ...........
(in brackets: identification number of the criterion)

## 4. Data, inputs and programme run

The data from annex No. 2 are the inputs for the programme run.
The numerical values of the basic indicators of the 10 projects
as well as the programme are already loaded.

The grading and ranking of the projects results in following:
For each project a number of scores is calculated. The higher
this number, the better the ranking of the project. - The number
of scores per project can be seen from the screen.

The pivot of this procedure is the determination of scores per
criterion and project. If this is solved, the sum of scores per
project can be calculated easily.

In this exercise 4 calculation procedures are used, and the
respective results are to be listed in annex No. 3:

- unweighted criteria; ranking of the numerical values of each
  criterion according to their level in absolute figures
  (best/maximum or minimum / level = 10 scores, followed by

9,8,...etc. down to 1) and allotting of the respective number
of scores to the different projects; summarizing of the scores
per project
(calculation procedure No. 1)
- the same, but with weighted criteria
  (calculation procedure No. 2)
- unweighted criteria, but different determination of the scores
  per criterion and project: per criterion the scale of scores
  again reaches from 10 (best) to 1 (least efficiency); within
  this frame the number of scores per grade (numerical value of
  the criterion) is not determined by the place of this value in
  the hierarchy, but by the ratio between this level and the
  maximum (relativity of scores per criterion and project).
  (calculation procedure No. 3)
- the same, but with weighted criteria
  (calculation procedure No. 4)
Each calculation includes the possibility to modify the total of
available investment funds and to demonstrate the consequences.

The programme is finished with the following steps:
- Survey of all results of grading and ranking on 4 ways
  By these data annex No. 3 should be completed.
- Display of data (basic indicators) per project for further in-
  spection and analysis
- Offer of a menu for further processing, including especially
  modified weights and a modified composition of the system of
  criteria (or to end the programme run).
  According to the respective decision the programme is started
  anew (or finished).

## 5. Final interpretation and evaluation

Among others, the following questions should be answered by dis-
cussion:
- What are the consequences of different calculation procedures
  for grading and ranking the projects?
- What calculation procedure should be given the privilege?
- What specific intentions and interest can be reflected by the
  composition of the system of criteria and the specific weights?

- What additional aspects must be taken into consideration in order to come to a final decision over the most effective sequence of project implementation activities (balancing of /material and financial/ expenditures and results; regional integration; proportionality; functional dependencies between projects, etc.).
- Is it possible to use the same approach and procedure for the solution of quite other planning tasks, and what are these?

All these items (and others) should be discussed under the aspect of the specific condition in the participants' countries.

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| production output | 0 | 1.678.232 | 62.751 | 865.423 | 94.115 | 112.450 |
| | 1 | 1.680.447 | 85.706 | 861.085 | 161.328 | 115.705 |
| persons employed | 0 | 3.000 | 202 | 863 | 256 | 1.578 |
| | 1 | 3.010 | 232 | 845 | 155 | |
| profit (gross) | 0 | 346.147 | 12.925 | 179.550 | 19.306 | 20.225 |
| | 1 | 347.556 | 14.067 | 184.106 | 29.177 | 21.401 |
| fixed assets | 0 | 2.051.725 | 24.357 | 1.695.425 | 132.870 | 105.615 |
| (gross value) | 1 | 2.049.689 | 24.685 | 1.698.013 | 160.855 | 111.223 |
| unfinished investm. | 0 | 24.211 | 1.738 | 14.775 | 18.405 | 475 |
| | 1 | 17.892 | 4.012 | 12.905 | 17.667 | 774 |
| foreign currency | 0 | 221.450 | 1.1000 | 110.406 | 24.205 | 105 |
| inflows | 1 | 225.615 | 3.450 | 111.256 | 38.600 | 1.876 |
| prime costs | 0 | 1.332.085 | 49.826 | 685.873 | 74.809 | 92.225 |
| | 1 | 1.332.891 | 71.639 | 676.979 | 132.651 | 94.304 |
| fixed assets | 0 | 1.272.104 | 10.240 | 1.201.087 | 91.600 | 54.336 |
| (net value) | 1 | 1.262.805 | 23.225 | 1.423.433 | 100.650 | 57.307 |
| cost of repair | 0 | 10.264 | 2.258 | 1.203 | 368 | 581 |
| | 1 | 10.860 | 2.972 | 1.258 | 552 | 563 |
| fixed assets | 0 | 1.066.917 | 5.180 | 1.052.350 | 68.415 | 52.336 |
| machinery | 1 | 1.074.338 | 14.275 | 1.242.108 | 112.050 | 58.000 |
| mech. and autom. | 0 | 880.107 | 812 | 1.007.475 | 57.870 | 40.715 |
| machinery | 1 | 889.046 | 12.475 | 1.160.075 | 102.505 | 46.348 |
| national demand | 0 | 1.680.000 | 85.050 | 870.000 | 110.000 | 115.000 |
| for output | 1 | 1.685.000 | 86.600 | 871.000 | 185.000 | 116.100 |
| utilization (h/d) | 0 | 14,6 | 12,4 | 18,2 | 14,5 | 14,6 |
| | 1 | 14,8 | 15,8 | 18,3 | 16,1 | 14,8 |
| production workers | 0 | 1,450 | 117 | 670 | 125 | 755 |
| | 1 | 1,470 | 147 | 625 | 450 | 750 |
| investm. expenditures among this for: | | 10.510 | 22.555 | 3.588 | 28.225 | 5.855 |
| construction | | 3.665 | 10.500 | 225 | 14.010 | 288 |
| imports | | 7.227 | 1.025 | 750 | 8.455 | 2.465 |
| rationalization | | 2.245 | 5.705 | 1.223 | 2.665 | 1.205 |
| impln. period (moths) | | 19 | 44 | 25 | 25 | 30 |
| combined expend.for general repair | | 950 | 3.200 | 2.440 | 775 | 255 |

| | | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|
| production output | 0 | 112.450 | 245.750 | 52.475 | 425.750 | 665.650 |
| | 1 | 116.023 | 265.600 | 62.335 | 425.900 | 668.765 |
| persons employed | 0 | 1.578 | 2.425 | 185 | 372 | 712 |
| | 1 | 1.575 | 2.405 | 168 | 370 | 715 |
| profit (gross) | 0 | 20.225 | 25.050 | 10.226 | 48.800 | 72.885 |
| | 1 | 20.6000 | 29.200 | 14.025 | 49.400 | 74.700 |
| fixed assets | 0 | 105.615 | 200.150 | 72.375 | 486.700 | 623.030 |
| (gross value) | 1 | 107.283 | 201.150 | 80.800 | 492.320 | 624.000 |
| unfinished investm. | 0 | 475 | 24.750 | 7.215 | 12.450 | 2.410 |
| | 1 | 1.205 | 24.250 | 4.085 | 7.120 | 2.900 |
| foreign currency | 0 | 105 | 28.700 | 21.010 | 185 | 87.650 |
| inflows | 1 | 1.403 | 34.450 | 24.550 | 290 | 88.450 |
| prime costs | 0 | 92.225 | 220.700 | 43.250 | 376.950 | 592.765 |
| | 1 | 95.423 | 236.400 | 48.310 | 376.500 | 594.055 |
| fixed assets | 0 | 54.336 | 105.255 | 22.775 | 201.550 | 289.700 |
| (net value) | 1 | 54.832 | 105.550 | 32.450 | 205.255 | 292.350 |
| cost of repair | 0 | 586 | 2.450 | 795 | 1.450 | 875 |
| | 1 | 611 | 2.300 | 635 | 1.400 | 870 |
| fixed assets | 0 | 52.336 | 147.505 | 42.345 | 189.800 | 324.075 |
| machinery | 1 | 53.535 | 148.220 | 52.680 | 193.250 | 324.895 |
| mech. and autom. | 0 | 40.715 | 122.250 | 38.200 | 125.200 | 300.200 |
| machinery | 1 | 41.787 | 124.000 | 48.350 | 129.350 | 301.890 |
| national demand | 0 | 115.000 | 260.000 | 463.000 | 426.000 | 669.000 |
| for output | 1 | 116.100 | 260.100 | 466.100 | 426.500 | 669.100 |
| utilization (h/d) | 0 | 14,6 | 15,8 | 18,2 | 14,6 | 12,3 |
| | 1 | 14,5 | 15,9 | 18,0 | 15,1 | 13,0 |
| production workers | 0 | 755 | 855 | 145 | 125 | 375 |
| | 1 | 756 | 850 | 140 | 120 | 365 |
| investm. expenditures | | | | | | • |
| among this for: | | 2.150 | 1.552 | 12.345 | 3.120 | 5.100 |
| construction | | 1.200 | 550 | 1.550 | 1.055 | 2.215 |
| imports | | 279 | 1.050 | 8.500 | 375 | 285 |
| rationalization | | 1.975 | 1.400 | 7.330 | 1.010 | 350 |
| implem. period (months) | | 23 | 11 | 24 | 19 | 38 |
| combined expend. for general | | 1.885 | 255 | 575 | 2.385 | 175 |
| repair | | | | | | |

| criterion No. | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| construction principle No. | | | | | |
| formulation | | | | | |
| max/min $E(.) =$ | | | | | |
| weight $W(.) =$ | | | | | |

| criterion No. | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| construction principle No. | | | | | |
| formulation | | | | | |
| max/min $E(.) =$ | | | | | |
| weight $W(.) =$ | | | | | |

## Scores per project and calculation procedure

| Calculation procedure | project | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |

## Place of projects after ranking

| Calculation procedure | project | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |

# DESCRIPTION OF THE COMPUTER-BASED NATIONAL ECONOMIC GROWTH MODEL "PLANPROJECT"

## 1. Description of basic features:

### 1.1. Technical data:

| | |
|---|---|
| Name: | PLAN PROJECT |
| Version: | 4.2 |
| Format: | 5,25" disks |
| Language: | standard programm "SUPER CALC 4" |
| Operating system: | DOS 3.1 or higher |
| Memory requirements: | 512 k Bytes |
| System configuration: | PC (XT or AT), |
| | monitor (monochrome or color), |
| | 1 Floppy 5,25" |
| Auxiliary facilities: | printer |
| Documentation: | H. Knop, The computer-based |
| | national economic growth model |
| | "PLAN PROJECT", 69 pg. |

### 1.2. Purpose and utilization:

"PLANPROJECT" is a predictive one-sector national economic computing model. The model allows to work out and computerize basic concepts on the development of the national economy at a high level of aggregation.

"PLANPROJECT" supports planning activities in the initial phase of real economic planning processes. The model can be used for national economic pre-plan computerizations in a centrally planned economy as well as for the forecast of the economic development in a market oriented economy. The model is free to choose the period of time for prespective calculation. So it can be used for long term, medium term as well as annual planning.

The model includes essential material and financial processes.

The calculations with the model requires 2 types of data.
In designing the model "PLAN PROJECT" the basic point, on
principle, is to be managed it with few data of the basis
year. 34 <u>basis data</u> are used for the calculation.
The <u>scenarios</u> of the model contain 37 indicators of economic
policy objectives and probable internal and external growth
conditions of the economy. With their help various alternative
<u>variants</u> of economic development can be calculated and examined
with regard to their consequences.

The basis and the scenarios can be changed by the user with help
of the keyboard.
"PLAN PROJECT" is a simulation model. The calculating algorithm
follows the actual national economic decision making process.
The algorithm contains simple mathematic equations.

The results of the calculations with the model are 73 economic
indicators and 27 efficiency indicators. The results appear in a
spread sheet on the screen. Printing of the scenarios and results
is possible.

The model operation requires a continous interactivity.

The results of the model "PLAN PROJECT" can also be used, when
combined with other models, as

- the "Structure Model 15" by R. Pieplow or
- the model "FINEFF" for computer-aided finance and price
  balancing.

The modification of the model "PLANPROJECT" is possible
according to the special needs of the user.

The services provided are:    training,
                              contact personnel,
                              software updates


## 2. Description of modules and functions

In order to judge the future prospects and conditions of economic
growth by a more effective resource input, it is necessary to
work out and computerize basis concepts on the development of the
economy which are characterized by an optimum fulfilment of the
economic policy targets and social objectives with a sustained
and stable growth of the economy by adhering to the basis
economic proportions and an effective use of the resources
available. Central points are the planning of major national
economic proportions and conditions of efficiency with regard to
the total funds of production and utilization of the gross
material product presented in a unisectoral manner.


The conceptual task is to analyse and forecast growth relations
between the following basic national economic magnitudes at  a
high level of aggregation:

- population, man power,
- production of the gross material product and the national
  income,
- provision and use of energy, raw material and material
  resources,
- development and use of the social labour power in the producing
  and non-producing sectors of the economy,
- use of the fixed assets and the circulating fund in the
  producing and non-producing sectors of the economy,

- exports and imports at domestic prices as well as at world
  market prices, the effects of foreign trade on the domestic use
  of the national income,
- funds of the productive and non-productive accumulation as well
  as their partial funds,
- funds of individiual and social consumption as well as their
  partial funds,
- the turnover and the reproduction of the fixed assets and the
  circulating fund as well as
- funds of the primary distribution, the temporary or final
  re-distribution and the final allocation of the gross material
  product and national income.

Rapidly growing efficiency requirements should be the basis of
the growth relations between theses basis magnitudes and should
be aligned optimally in the overall economic development. The
model "PLAN PROJECT" has been developed for the one-sectoral
pre-plan computations necessary for this purpose.

The calculating algorithm of the model follows the actual
connections existing between the total stock of labour force, the
stock of production funds and the primary distribution and final
allocation of the gross material product.

The algorithm simulates especially the initial phase of the real
economic planning processes.

34 basis data are used for the calculation. This data set is
characterizing the achieved economic level in the basis year.

The second type of input data are the scenario indicators. One
scenario contains 37 indicators. With their help various
alternative variants of economic development can be calculated
and examined with regard to their consequences. We dispensed with
pre-determining absolute quantities as much as possible. To the
contrary, the attempt was made to express targets and conditions
of growth especially through rates of growth, indicators of

materials, fixed assets and labour intensity in production as well as through indicators of proportions of use of the national income.

Initial plan projects with the respective scenarios are to be substantiated by varied analyses and prospective studies to be made before actual national economic model calculation. They apply to the following in particular:

- raw material and energy economy,
- development of population and manpower,
- reproduction of fixed assets,
- scientific and technological development and its economic consequences,
- development of external economic relations as well as the
- development of consumption.

From the calculations with the model "PLAN PROJECT" , we get a lot of economic indicators (altogether 73) which express the consequences of an economic policy strategy designed by a specific scenario. For most of the national economic development magnitudes the annual average growth rates are calculated. Further, we determine 27 economic efficiency indicators for the basis year and the final year of the plan period including nearly all the economic efficiency indicators generally used in planning practice.

The model allows one to work out consistent national economic. one-sectoral plan variaties, with underlying intensification and growth objectives. These plan variants can be  assessed by the help of growth rates and efficiency indicators. The model calculations aim at highly effective plan estimates and show the consequences of differing economic policy strategies with regard to the consumption, foreign trade and reproduction of fixed assets.

The full power of the model "PLANPROJECT" can be reached
only when using it in combination with the national economic
structural calculations as well as further model calculations on
the financial re-distribution and final allocation.

## 3. Hardware and sofware configurations

The model "PLANPROJECT" can be run on a PC (AT or XT) with the
standard software "SUPER CALC 4". Therefore only 1 floppy 5,25"
is required.
In order to start working on the computer the following steps
are required:

1. loading of the standard software "SUPER CALC 4" and
2. loading of the work sheet "PLANPROJECT"

Within the spread sheet the user can make his own changes for
the basis or scenario datas concerned. After the re-calculation
the results of these changes are available.
For the user it is not necessary to know the standard software
"SUPER CALC 4" in details.

## 4. References

Knop, H.: Volkswirtschaftliche Vorausberechnungen – Inhalt, Methode, Analyse; Das Modell "Planprojekt" (National economic pre-plan computations – content, methods, analyses: The model "Plan project"), Berlin 1983, Akademie der Wissenschaften der DDR, ZKI-Information 4/83, Beiträge zur angewandten Systemanalyse, Teil 3, S. 3 – 105

Knop, H.: Vervollkommnung des volkswirtschaftlichen Vorausberechnungsmodell "Planprojekt" auf der Grundlage von Anwendererfahrungen (Completing the national economic pre-plan calculating model "Plan project" on the basis of experiences by users). Forschungsinformation Volkswirtschaftliche Modelle I, HfÖ, Berlin 1987, S. 2 – 12

Knop, H.; Pieplow, R.: Beschreibung des Entscheidungsalgorithmus, des Modells und des Programms für die Verknüpfung der einsektoralen mit der mehrsektoralen volkswirtschaftlichen Planansatzrechnung (Describing the decision algorithm, the model and the program for linking the one-sectoral pre-plan calculation with the multi-sectoral national economic pre-plan calculation). Forschungsbericht, HfÖ, Berlin 1987

The model "PLANPROJECT" has so far been used in the following institutions for planning, research, teaching and further qualification courses and has been extended partly and modified according to the needs of the user:

- Hochschule für Ökonomie "Bruno Leuschner", Berlin, Sektion Sozialistische Volkswirtschaft (University of Economic Science Bruno Leuschner, Berlin, Faculty: Socialist National Economy)

  Ingenieurhochschule Zittau, Sektion Sozialistische Betriebswirtschaft, (Faculty, Socialist Enterprise Managment)
  Technische Hochschule Leipzig, Sektion Sozialistische Betriebswirtschaft, (Faculty, Socialist Enterprise Managment)

- University of Zimbabwe; the model was adapted to the needs of
  an African developing country,

- Zentralinstitut für Kybernetik und Informationsprozesse der
  Akademie der Wissenschaften der DDR (Central Institute of
  Cybernetics and Information Processes of the Academy of
  Sciences of the G.D.R.); here, the model was the basic point
  for the construction of a sequence optimization model with
  several target functions for economic pre-plan computer-
  lasations

- Abteilung volkswirschaftliche Gesamtrechnung der Staatlichen
  Plankommission (Department of National Accounting of the State
  Planning Commission); an adapted version of the model was used
  for the pre-plan computerlisations of the Five-Year Plan
  1986-1990.