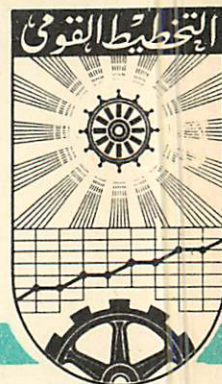


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BALANCE OF NATIONAL ECONOMY-AN
INSTRUMENT OF LONG TERM PLANNING

by

Johannes Rudolph

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INTRODUCTION

1. The Balance of National Economy is an instrument of economic policy in the form of a system of economic figures and relations showing the characteristic features of the total process of reproduction in national economy during a certain period. It shows the circulation of material product (total output) of the whole economy and the corresponding money flows, employment and utilisation of the productive assets, and also the international economic relations, and the standard of living. It shows further, the increase of the productive forces of the society, of the standard of living and the changes in the property relations. It shows all that occurs in the national economy, with all its complexities, in a summarized form, so that it is possible to learn, whether there is a proportionality in the economic development, i.e. whether there exist the necessary equations of equilibrium, and whether the process of development of the main economic relations is consistent with the economic laws in general and the laws of expanding reproduction in particular.

Thus, this system ensures that all the aims and targets are consistent with each other. It is based on the Marxistv-theory of reproduction and is used in the formulation of economic policy as well as for the purpose of control over its implementation to achieve the desired aims.

In connection with perspective programmes for the development of the most important branches^{*} of the economy, in future, this instrument (balance of national economy), based on the statistical data for the past and keeping in view the foreseeable development of the international division of labour (between the socialist countries), the general aims of the State's policy, the increase of population and the necessities

^{*} e.g., Energy, mining, metallurgy, agriculture, forestry and irrigation, basic chemicals, transport; and also for the economic regions of the country. These perspective programmes are often elaborated for periods of 20 to 30 years.

of technical reconstruction of the branches, is used to get rough estimates about the development of the main features (main economic figures and proportions) of the whole national economy and its spheres, divisions, sectors and branches. These estimates form the basis for the elaboration of the long term plan for the development of the national economy. During the process of elaboration of this plan the balance of national economy is used as an instrument for co-ordination of the targets of the parts of this plan (plans for branches, for investment, for living standard, for finances etc.). The balance of national economy itself is an essential part of this plan.

2. The analysis of the proportionality of economic development characterises the various aspects of the process of reproduction, and clearly brings out the following economic facts and tendencies :
 - a) the volume, value and composition, the sources and funds of distribution of the total social product (total output);
 - b) the volume, value and composition of foreign trade and its influence on "a"
 - c) the volume and value, the sources and funds of distribution of the national income;
 - d) the size and structure of population;
 - e) the volume, value, and the composition of the national assets (and liabilities);
 - f) the money flows and the flows of goods;
 - g) the standard of living of the population; and
 - h) the relations of property (state-owned, co-operative owned, private-owned etc., undertakings and institutions).
3. These facts and tendencies of development are shown in a set of balance-sheet and tables :
 - a) the balance of the total social product consisting of balance of sources and funds of the total social product, table for the analysis of the total social product according to means

of production (and their essential parts) and means of consumption,

table for analysis of the composition of total social product according to the following two parts of value (productive consumption and its composition and national income),

table for analysis of the composition of total social product according to main-groups and groups of products and sectors and branches,

balances of sources and funds of distribution of the main-groups and groups of products, showing flows of goods,

tables showing development of prices of the total social product, main-groups and groups of products,

b) the balance of foreign trade, consisting of :

balance of trade,
balance of payments,
(table for the analysis of the development of the rates of exchange);

c) the balance of population and man-power, consisting of :

balance of population and sources of man-power,
balance of demand and supply of man-power according to
qualifications and professions, and
sectors and branches,

table of the development of (nominal) wages;

d) the balance of the national assets (and liabilities), consisting of :

table of the total national assets,
table of the total national liabilities,
balance of productive assets, (fixed capital in the sphere of production),
balance of fixed capital in the sphere of consumption,
balance of stocks in the sphere of production (without the government reserve),
balance of the Government's reserve;

- e) the balance of money flows, consisting of :
- financial balances of the spheres, sectors and branches of production,*
 - financial balances of the sectors and branches of the sphere of consumption*, without family households,
 - balance of receipts and expenditure of the family households,
 - balance of the Government's budget, balance of credit, and
 - the table of currency;
- f) the balance of national income, consisting of :
- balance of generation and primary distribution of national income,
 - balance of redistribution of national income,
 - balance of final distribution of national income,
- g) the analysis of the living standard; and
- h) the analysis of the relations of property.

These balances and tables (in simplified forms) will be found in appendix I

4. The following models and concepts have been used in this paper.

SPHERES, DIVISIONS, SECTORS AND BRANCHES OF THE NATIONAL ECONOMY:

4.1 Spheres:

(i) SPHERE OF PRODUCTION.

Division	A	:	Factories, producing means of production.
Sector A	1	:	Factories, producing investment goods (i.e. equipments & buildings)
"	A 2	:	Factories, producing raw materials and semi-manufactured products for sector A 1.
"	A 3	:	Factories, producing energy products (incl. raw materials required for these products).

* In simplified forms.

Sector A 4 : Factories, producing chemical products for working on other means of production (incl. raw materials required for these products).

" A 5 : Transport and trade.

" A 6 : Factories, producing raw materials and semi-manufactured products for division B.

Division B : Factories, producing consumers' goods.

In connection with this kind of subdivision, it is necessary to further sub-divide the sectors of the productive sphere into branches, e.g. :

<u>sectors</u>	<u>branches</u>
A 1. Investment goods	a) heavy machine building (perhaps still more sub-divided), b) construction of agricultural machines, c) ditto; textile machines etc.
A 2. A 5.	.....
A 6. Raw material and semi manufactured products for consumer goods	a) agriculture b) forestry c) fishing etc.
B. Consumer goods	a) food manufacturing b) clothing " c) paper " d) furniture " e) textile " etc.

(ii) Sphere of consumption

The sphere of consumption is sub-divided into sectors and branches, e.g.

<u>sectors</u>	<u>branches</u>
1. State activities	a) administration (ministries boards etc). b) police, c) army, navy etc., d) justice administration e) diplomatic service etc.

- | | |
|----------------------------|--|
| 2. Services | a) housing,
b) education,
c) health,
d) arts, etc. |
| 3. Banking, insurance etc. | a) banking,
b) insurance, etc. |
| 4. Research institutions | a) academy of sciences,
b) others, |
| 5. Public organizations | a) political parties,
b) trade unions,
c) religious organizations,
etc. |
| 6. Family households | |

4.2 "Main-groups of products" and "groups of products".

- I Investment goods (incl.repairs).
- II Raw materials and semi-manufactured products for investment goods
- III Energy products.
- IV Chemical products for working on other means of production
- V Transport and trade services.
- VI Raw materials and semi-manufactured products for consumer' goods.
- VII Consumer' goods.

4.3 These main-groups of products are sub-divided into "groups of products", e.g.

- | <u>"main-group of products"</u> | <u>"group of products"</u> |
|---|---|
| I. Investment goods | a) equipments for mining
b) " " energy
c) " " the chemical industry,
d) " " construction,
e) <u>machine tools</u> ,
n) buildings, etc. |
| <u>II. Raw material and semi-manufactured products for investment goods</u> | a) ore,
b) metal,
c) materials for construction,
d) raw material produced by chemical industry etc. |

III. Energy

- a) coal,
- b) oil,
- c) gas,
- d) electricity etc.

IV. etc.

5. Symbols :- Symbols used in this paper are as follows:

- A = Total fund of accumulation, i.e. in the sphere of production (new investment fund I_n , increase of stocks V_n , increase of the Governments' Reserve R_n).
- Cp = Value of the products going into the productive consumption, i.e. means of production (= input).
- Cp = $\sum_{i=1}^{iv} C_p(i)$ $i = II - VI$ (main groups of products).
- E = Employment.
- Ep = Employment in the sphere of production.
- Ep(A1) = " " sector A1 etc.
- Ek = " " sphere of consumption.
- Exp = Value of the export goods.
- F = Finished products (from the point of view of each "group of products").
- Gp = Capital stock containing investment goods in the sphere of production (fixed assets).
- Gk = Capital stock containing investment goods in the sphere of consumption (fixed assets).
- In = New Investment Fund.
- H = Semi-manufactured products (from the point of view "group of products").
- Imp = Value of the import goods.
- K = Total fund of non-productive consumption.
- K1 = Fund of consumption for purpose of living standard.
- Ks = Fund of consumption for purpose of "other" non-productive purposes (government etc).
- KM = Means of consumption (products going out of the sphere of production forever).
- N = National income. = $P - C_p$.
- N = $A + K = I_n + V_n + R_n + K$.

- (P) = value of production (=output): Value of all goods, sold by each factory (incl. the new investment and the increase of stocks of the means of production made by themselves, i.e. out of their own production; plus trade: costs of circulation).
- P = Total value of production of all factories, belonging to the sphere of production (gross social product).
- P = $\sum_{i=1}^n P(A_i) + P(B)$.
- P = PM + KM.
- PM = Means of production (products going into the next stage of the productive sphere to be used up wholly or partially).
- P(A 1) = Sum of the value of production of all factories, belonging to the sector A 1.
- Pop = Total population:
- R = Governments' Reserve
- V = Capital stock, containing stocks of raw materials semi-manufactured products, fully-manufactured products in the productive sphere (commodity stocks).
- Vn = Increase of stocks in the sphere of production.
- v = Rate of turnover of the stocks of commodities in the sphere of production; $v = \frac{V}{P}$.
- α = Net investment rate = $\frac{I_n}{N} = \frac{(\Delta G_p)}{N}$
- β = Output/capital ratio = $\frac{P}{G_p}$
- Δ = The difference between two years in absolute terms, e.g. $\Delta G_{p1} = G_p(1) - G_p(0)$.
- Δ' = The rate of growth between two years, e.g. $\Delta' G_p = \frac{G_p(1)}{G_p(0)}$.
- η = Fund of consumption for purposes of living standard per capita = $\frac{Kl}{Pop}$

θ = Capital intensity per worker = $\frac{Gp}{Ep}$.

α = National income/output ratio = $\frac{N}{P}$

π = Productivity of labour (in terms of man-years). = $\frac{P}{Ep}$

6. In order to settle the list of branches and groups of products it is necessary to base this on the given division of labour in the country. Each product is to be attached to a "group of products", and each factory to a branch. Beyond this, each product must be settled either as "finished" (F) or as "half-finished" (semi-manufactured) product (H) in accordance with its preponderant use, from the point of view of the "group of products" to which the product belongs. In the end, each product has to be fixed as a "means of production (PM) or "means of consumption" (KM) in accordance with its preponderant use (all this is to be determined by the statistical organization in the process of collection of the statistical data in the factories, the trade enterprises etc.).
7. It may be mentioned here that for long term planning purposes, all figures (except P_{op} and E) have to be valued in terms of prices of the base year, i.e. the year before the long term plan begins (year 0). This would be the best way. However, it is also possible to take the prices obtaining during one or two years before the year 0. At this stage of long term planning we have to work with these constant prices over the whole period.

Chapter - I

Estimation of the Rate of
Growth of National Economy.

1. The Starting Point.

1.1 Under conditions of full employment, we shall start with the following data:-

- (a) Values of all figures and proportions mentioned in the Introduction for the year 0.
- (b) Trends of all figures and proportions previously mentioned (see 5 Introduction) for about the last 5 years.
- (c) Yearly Balance of population and manpower from year to year, over the whole plan period = 15 years.

Total population

- Children (0-14 years)

- Population out of the working age (more than 60/65 years).

- Population in the working age (15-60/65 years)

- Students, pupils in secondary schools etc.

- Invalids (in the working age)

- Other non-working persons (Housewives etc.)

- Population out of working age, but still working.

- Total of working people.

(d) Trend of changes in the proportion E_p ; E_k ($E_p : E$)

(e) " " " " C_p ; N ($\frac{N}{P}$)

For the first approximation in calculating the development of the figures P , $\frac{E_p}{E}$ and $\frac{N}{P}$ a rough extrapolation of the two trends (d & e) is sufficient. Besides this, an attempt may be made to compare the levels of these proportions for each year or longer periods with the more advanced industrial countries in order to get lines about the inter-relation between level and trend.

1.2 Under conditions of under-employment; here also we shall start with the same kind of approach and data as under 1.1, except in the case of "Other non-working persons", who have to be further divided into two parts.

- (a) people who are never likely to work.
- (b) people un-employed involuntarily.

Presumably, in this case also we will be required to find the trend of the proportion $E_p : E_k$, but here the absolute magnitude of E depends on

- (a) the initial net investment rate α and the possibility of its increase in connection with the development of the population and the (political) decision as to the development of η
- (b) the techniques chosen in the different branches of national economy.
- (c) the possibility of creating new jobs on the basis of the increase of the consumption fund (services, administration etc.)

2. The first approximation

2.1 The volume (= value) of production in the year 0 is given by $P_0 = E_p \times \pi_0$

There may be set : $\Delta' \pi = \frac{\pi_1}{\pi_0}$ and $\Delta E_p = E_{p_1} - E_{p_0}$
 we get $= (E_{p_0} + \Delta E_p) (\pi_0 + \Delta' \pi)$

In the case of full employment ΔE_p is given from the balance of population and man-power; the problem consists in the destination of $\Delta' \pi$

From the relation between the three important figures P , E_p and G_p expressed in the relations

$$\pi = \frac{P}{E_p}, \quad \beta = \frac{P}{G_p} \quad \text{and} \quad \theta = \frac{G_p}{E_p}$$

We get $\pi = \beta \theta$ and $\beta = \frac{\pi}{\theta}$

It is possible to set as well $\Delta' \pi = \Delta' \beta \Delta' \theta$ and $\Delta' \beta = \frac{\Delta' \pi}{\Delta' \theta}$

Now we have $P_1 = (E_{p_0} + \Delta E_p) \times [\pi_0 (\Delta' \beta + \Delta' \theta)]$

If we do not require the total value of P_1 , but only want the rate of growth, we get

$$\Delta' P = \frac{P_1}{P_0} = \frac{E_{P_1} \times \pi_1}{E_{P_0} \times \pi_0} = \frac{E_{P_1}}{E_{P_0}} \times \frac{\pi_1}{\pi_0} = \Delta' E_P \times \Delta' \pi = \Delta' E_P \times \Delta' B \times \Delta' \theta$$

$$\Delta' \theta = \frac{\theta_1}{\theta_0} = \frac{\frac{G_{P_1}}{E_{P_1}}}{\frac{G_{P_0}}{E_{P_0}}} = \frac{\frac{G_{P_1}}{G_{P_0}}}{\frac{E_{P_1}}{E_{P_0}}} = \frac{\Delta' G_P}{\Delta' E_P}$$

$$\Delta' P = \Delta' E_P \times \Delta' B \times \frac{\Delta' G_P}{\Delta' E_P} = \Delta' G_P \times \Delta' B$$

Thus, there are two ways to estimate

$\Delta' P$:

$$\Delta' P = \Delta' E_P \times \Delta' \pi \quad \text{and} \quad \Delta' P = \Delta' G_P \times \Delta' B$$

and the equation $\pi = P \cdot E$

links both these methods.

The rate of increase of the capital stock can be expressed in the following manner :

$$\Delta' G_P = \frac{G_{P_1}}{G_{P_0}} = \frac{G_{P_0} + \Delta G_{P_1}}{G_{P_0}}$$

Hence from

$$\Delta' P = \Delta' G_P \times \Delta' B$$

$$\text{We get } \Delta' P = \frac{G_{P_0} + \Delta G_{P_1}}{G_{P_0}} \times \Delta' B$$

ΔG_{P_1} is the main part of the accumulation fund A; it is equal to I_n , the net investment fund (in the sphere of production).

i.e. $\frac{\Delta G_{P_1}}{N} = \frac{I_n}{N} = \alpha$ = the net investment rate. It may be noted that the absolute amount of N is dependant on the proportion $P = C_p + N$.

$$\text{Now, we have } \Delta' P = \frac{G_{P_0} + \left(\frac{\Delta G_{P_1}}{N_1} \times N_1 \right)}{G_{P_0}} \times \Delta' B$$

$$= \left[\frac{G_{P_0}}{G_{P_0}} + \frac{\frac{\Delta G_{P_1}}{N_1} \times N_1 \times P_1}{G_{P_0}} \right] \Delta' B$$

$$= \left[1 + \left(\frac{\Delta G_{P_1}}{N_1} \times \frac{N_1}{P_1} \times \frac{P_1}{G_{P_0}} \right) \right] \Delta' B$$

$$= \left[1 + (\alpha_1 \times \gamma_1 \times \beta_0 \times \Delta' P) \right] \Delta' B$$

and, by further transformations, we get, at least

$$\Delta' P = \frac{\Delta' \beta}{1 - (\alpha_1 v_1 \beta_0 \Delta' \beta)}$$

2.2 The above equation shows, that the rate of growth of the total output ($\Delta' P$) depends upon

- (a) the capital intensity per unit of output in the year 0 ($1/\beta_0$) and its rate of increase $1/\Delta' \beta$ depends upon the relation between the growth of productivity per worker and the investment in the previous year under conditions of full utilisation of capacities. It may be noted that β being equal to π/θ is another way of expressing the level of techniques;
- (b) the state and development of the proportion of N (or C_p) in P ($= C_p + N$) i.e., $\frac{N}{P} = \sqrt{\quad}$, which, again depends upon the level of technique of production and the extension (profundity) of the division of labour.

Usually, however, $\sqrt{\quad}$ changes slowly and this may be treated as constant; and

- (c) the rate of net investment.

In other words, it is possible, from the equation $\Delta' P = \frac{\Delta' \beta}{1 - (\alpha_1 v_1 \beta_0 \Delta' \beta)}$ and $\Delta' \beta = \frac{\Delta' \pi}{\Delta' \theta}$, to find out the changes in production, productivity per worker and employment, on the basis of different assumptions about investment rate α , taking into account the desired growth in the standard of living and other requirements of non-productive (Government etc.) consumption, as well as about γ , β_0 and $\Delta' \beta$

Also conversely, it is possible to determine the amount of new investment necessary in order to maintain certain rates of growth of P and π . The calculation, however, is to be made from year to year. In this way it would also be possible to change the rate of new investment (α).

2.3 The last step consists in working out the balance of national income showing only the following items: (see Table 17 - Balance of Final Distribution of the National Income):-

Total output	-	
minus	-	
Productive consumption	-	$P - C_p = N$
=	-	
National income	-	

Distribution of national income :

- | | |
|---|----------------------|
| (1) Accumulation fund | A |
| a) New investment | $In = (\Delta Gp_1)$ |
| b) Increase of stocks | Vn |
| c) Governmental reserve
(increase) | Rn |
| (2) Consumption fund | K |
| a) For purposes of living
standard | Kl |
| b) For others purposes
(governmental consumption etc.) | Ks |

3. Examination of the results given by the calculation for the first approximation.

3.1 After getting this rough estimation about the main figures and main proportions of the economic development it is necessary to examine this result. For this purpose we have to use a seven sector model see para 4.1 Introduction sectors A 1 A 6 and B)

3.2 It is obvious that the development of the structure of total output, given by the main groups of products (I to VII, of para 4.2 Introduction), changes in a continuous way in a planned economy according to the growing productivity of labour and its need to step forward always towards a higher level of technique.

The main features of this process are

mechanisation and automation
application of new chemical processes
use of more effective energy sources
(electricity, atomic power).

The result is, that the main-groups of products I, III & IV.

- I- Investment goods (particularly equipments),
- III- Energy - products.
- IV- Chemical products for working on others means of production.

and, in accordance with main-group I,

- II- Raw materials and semi-manufactured products for investment goods,

become a relatively greater part of the total output P. On the other hand, growing economy in using the equipments, raw materials, energy etc. as well as a better organisation of transport and trade lead to a relative decrease of this part of P.

However, experience (in all countries) shows that the first factor i.e., the improvement of technique outweighs the latter one.

In order to find out, how this law of economic development would act in future, we have to come back first to the results of the first approximation (para 2). From this we get

- the volume of the productive consumption fund Cp,
- the volume of the new investment fund In,
- increase of stocks in the sphere of production Vn.

We also have the volume of increase of the governmental reserve.

The analysis of the data for the past years shows the trends of development of the structure in the main-groups of products of the three funds (Cp, In & Vn). Out of the plan of development of the governmental reserve also we can see this structure.

The most important of these funds are Cp and In. In consists only of investment goods. But the fund Cp consists of the main groups of products except VII. The main task now is to estimate the future development of its structure, because from this we get the main part of the demand of these products. For this purpose, we have to analyse the structure of the costs of production as far as it concerns the consumption of material products (belonging to P) :

- (a) costs for replacement (amortization) and repairs,
- (b) costs for the consumption of raw materials and semi-manufactured products,
- (c) costs for the consumption of energy,
- (d) costs for chemical products for working on other means of production,
- (e) costs for transportation and trade services.

This analysis is an important statistical task. But to get the future development, it is not sufficient to extrapolate the given trends; it is necessary to compare the levels of economic development (in P per capita) for each year or longer periods with more industrialised countries in order to get lines about the inter-relation between the level of P (per capita) and the structure of Cp.

Finally, we have to analyse the structure of the funds of non-productive consumption K_l and K_s. To start from the level of η (= individual consumption per capita) in the year 0 and the structure of K_l we have to estimate the future development with rough calculations concerning the inter-relation between the level of the standard of living, expressed by η and the structure of K_l (comparisons with comparable groups of income within the country or with more industrialized countries).

The funds K_l and K_s consist only of the main-groups of products I, III, V and above all VII. In this way we get the structure of the demand of the whole economy in terms of main-groups of products. This forms one part of the side of distribution of the balance of total output.

3.3 Now, we have to derive the output of the sectors of the sphere of production (A₁ to A₆ and B). This is necessary because the output of a sector does not consist only of the corresponding main-group of products. For example, in the sector A₂ the output P(A₂) consists of

x p.c.	main-group of products			I
y p.c.	"	"	"	II
z p.c.	"	"	"	III
and so on;				

Of course, the group II represents the biggest share. The estimation of the composition of each P (A_i) has to be based on statistical researches; in the same way, we get a set of figures that show in what proportions comes the volume of a main-group of products out of different branches; e.g. 100 main-group III comes in the amount of

10	from sector	A1
20	"	"
45	"	"
10	"	"
5	"	"
5	"	"
5	"	"
		B

If we use both these "structural figures" we get a table from which we can distinguish output of each sector of the sphere of production.

In this connection attention has to be paid to another phenomenon namely; that the input (C_p) of every branch consists not only of products coming from other main-groups of products; rather there is also consumption of semi-manufactured products of the self-same main-group. We have, therefore, to divide the output (the volume) of each main-group of products into

- (a) products going into the individual consumption fund or into the investment fund or into the productive consumption of another main-group of products (F-finished products from the point of view of each main-group of products), and
- (b) products going into the productive consumption in order to produce products of the self-same main-group of products (H semi-manufactured products from the same point of view).

Thus, we find that the productive consumption of each sector of the productive sphere C_p (A1-B) consists of

- (a) products coming from the main-group of products, corresponding to the respective sector, and
- (b) products coming from "others" main-groups of products,

For example

C_p (A 4) = x p.c. products of the main-group	I
y p.c. " " "	III
z p.c. " " "	IV
t p.c. " " "	V and
u p.c. " " "	II

The knowledge of the structure of each P (I... VII) is of importance when we are deriving the volumes of production of the main-groups of products from the aggregated figures of the balance of national income like K, A and from replacement of the capital stock, and furthermore going backward from one stage of production to another, for instance from A1 to the main-groups II, III, IV, V and to the corresponding sectors. Having done all this we get a table which shows what assortment of P (in main-groups of products) has to be set up (approximately, as it will be shown later), and what volumes of production have been fixed (approximately) to each sector of the productive sphere.

3.4 Now we have to enquire what is the development of the figure $\frac{N}{P}$ or, in other words, the proportion $C_p: N$ in each sector. From this we shall see if our first approximation (para 2.1) has gone in the right direction. After this, it is necessary to see in what manner the figures of C_p -structure of each sector are developing, and from this we have to derive the demand for the means of production for all the seven sectors (in so far as they are going to the fund C_p).

3.5 The next step is to calculate investment requirements for each sector in accordance with the development of labour productivity, (man-power available, only in the case of full employment), technological choice and the new investment fund available (para. 2.3). From para 2.1 we have the equation $\Delta' \pi = \Delta' \rho \Delta' \theta$

which is valid for the whole sphere of production. The allocation of investment has to be done in such a way that the average increase of productivity of labour, achieved by the calculations on the basis of the sectors, at least comes up to the amount of $\Delta' \pi$, set up in para 2.1. By this we arrive at the most efficient way of economic development. However, for the purpose of an economic analysis the above is not sufficient, but we also require a full and detailed technical knowledge of the average level of technique used in the different sectors (and in the branches belonging to the sectors), as well as the possibilities of technological development.

3.6 Here we have another opportunity to put the question (in the case of unemployment), whether it may be better to have a slower development of technique in order to create more employment, i.e., to create the necessary capacities of production on a lower level of technique. In this case, the actual rate of growth of production ($\Delta' P$) remains the same (not so the rate of growth of productivity of labour ($\Delta' \pi$)); but this means that the future $\Delta' P$ (and $\Delta' \pi$ as well) will be smaller than before. On the other hand, if we choose a lower technique but more employment, one productive worker has to support a smaller number of absolutely unproductive people. At this stage of work we are also able to examine and change the rate of new investment (α), in the light of the changes in the volume of the funds K_1 and K_s (individual and governmental consumption), and the fund K_1 also can be expressed approximately by η (individual consumption per capita).

- 3.7 After we have decided the question put in para 3.6 we are in a position to fix all figures of our model, and then we have the following balance - tables ready :
- a) Balance of production and distribution of output
(like an input and output table),
 - b) Balance of population and man-power,
 - c) Balance of capital stocks,
 - d) Balance of national income,
 - e) Tables of relative figures showing the development of $\beta, \pi, \theta, \gamma, \eta, \Delta', \bar{P}, \alpha$ structure of C_p , structure of K_l and K_s , structure of P in terms of sectors and of main-groups of products.
- 3.8 All calculations must be made in such a way that the development of all figures occurs from year to year. This means that we have to step forward from year to year. Unless the projected development is sufficient for a certain year it is not possible to calculate the figures for the next.
- 3.9 In order to ascertain whether the projected development over the whole period is sufficient from the economic point of view we have to ensure that the rates of growth of I, π and η have the highest possible values. To find these values, we have to change the figures expressing the distribution of the national income, particularly the accumulation fund and the non-productive consumption funds K_l and K_s .

P.T.O.

Chapter II.

CHAPTER II

THE ESTIMATION OF THE RATES OF GROWTH
OF THE BRANCHES OF NATIONAL ECONOMY

1. As a result of the first step of elaboration of the Scheme of balance of national economy, for a long term plan, we get a set of figures showing us the main features of the development of the whole economy in terms of their order of magnitude. On the one hand, only in such a way is it possible to have a survey of the economic strength of the country and on the other only these aggregate figures and proportions enable us to compare the development of the country with others. Later on, we shall also have figures of per capita production and consumption. However, this general survey is not sufficient for managing the national economy. It would be further necessary to have knowledge about the development of all branches of the national economy, viz :

- a) branches of the sphere of production,
- b) foreign trade,
- c) branches of services (housing, education, health etc)
- d) consumption of government (army etc.)
- e) standard of living.

This knowledge we get in two different forms (according to the two different stages of elaboration of the plan); at first, we have to calculate the development of the main feature (main figures) of each branch in terms of value, and later on when we have to elaborate the complete plan, in physical terms also (capacities, production, import, export, productive and non-productive consumption, investment-objects etc) as supplementary to the targets in terms of value.

In this chapter, we shall concentrate on the first step. Here, the following concrete stops are necessary :-

- a) An analysis of the development of the structure of the (non-productive) fund of consumption (K) in terms of "groups of products";

- b) A similar analysis of the total investment fund and the increase of stocks in the branches of production as well as in the governmental reserve;

2. The estimation of the development of the sphere of consumption.

2.1. Here it is necessary to have estimates of the following:-

- a) The development of the average level of (individual) consumption (per capita) $\frac{K_1}{Pop} = \eta$ in the figure; the total fund of consumption (K) available, and the manpower available for the sphere of consumption; this we get from the "first step" of elaboration of the balance of national economy (Chapter I.)
- b) The composition of the total consumption fund (see Table 9).
- c) The composition (structure) of the consumption fund of the sectors (see Table 9), subdivided as shown in the above table (investment etc), according to "groups of products".

The composition of the consumption fund in accordance with 'B' and 'c' is given for the year 0; it is further necessary to analyse the past years in order to get lines for the future development in the form of trends.

2.2. The first step we have to take is to fix (approximately) the development of the standard of living. In the Table 9 it is expressed in the total amount of goods going to the items signified by 'X' - the sum of these items is equal to the fund K_1 (See para 2.3 Chapter I) and can be expressed as well by the equation $K_1 = Pop \times \eta$

The purpose of this work is to ensure the projected development of the average standard of living, and, furthermore to see in what way this increase has to be realised (consumption of services like housing, health, education etc or direct individual consumption like food, clothing etc bought or received in kind by the family households). In order to solve this problem we

have also to fix the development of the consumption of the workers in the productive sphere (on the basis of the sectors), of the workers in the non-productive sectors, and of the other groups of people (capitalists, pensioners and others). At this stage of work, it is necessary to fix only the relations between these groups of workers and people because we have still to distribute the fund K_0 (for consumption purposes other than the standard of living, signified by 'o' in the Table 9). This requires an estimation of the future development of these sectors concerning the consumption of goods as well as employment. This would enable us to fix all figures in the Table 9 (in their absolute amount). It is obvious, that this is a very difficult problem; because it requires that the government influences the formation of the rate of profit afterwards (to be realised through wage-policy) and the amount of profit remaining in the hands of the private owners of factories etc. (by taxation-policy). This means further that we have to take into account a set of non-economic questions as well, for example; decisions of the government about the magnitude and the equipment of army, navy, air force; about the aims concerning the improvement of education (in the primary and secondary schools, in the field of technical training etc); about the care for health; about the fulfilment of the needs of the field of research institutions etc. It is obvious that without knowledge about the directives in these fields, it is impossible to calculate the development of the branches in the sphere of consumption. If such directives are not already given (for the plan period) the Planning Commission has itself to make proposals about them. However, with regard to some of the problems the economist is not able to make such proposals, for instance as regards the military development of the country he is only in a position to suggest the order of magnitude to which it is possible to allow expenses for that purposes, and he can show what consequences this or that level of military expenses would lead to with regard to investment and standard of living. In any case, it is advisable to request the authorities responsible for these questions to give certain

outlines and principles. More difficult is the estimation of the consumption of the public organisations (parties, trade unions, religious organisations), because it is as a rule impossible to get the necessary statistical data for either the past or the present.

Once we have estimated in which way approximately the total fund of consumption is to be allocated to the seven 'parts' of this fund (see Table 9) we are in a position to see what possibilities exist in the Sectors 1-5 (and the branches) for creating new jobs. This can be seen approximately from the given structure of expenses of each sector and branch, if we base our calculation upon the average income of the engaged persons. But we have to examine the probable development of the composition (structure) of the expenses in each sector (in comparison) with other countries or highly developed institutions of each sector in the same country); then we can correct the employment estimates in accordance with the development of the average income per engaged person. This average income we get from the above mentioned statement of the relations of income between the different sectors of the sphere of the sphere of production and consumption.

After the coordination of all figures in Table 9, we have to check up whether and in what degree our initial estimation of the proportion between the funds K1 and Ks on the one hand, and the development of N on the other, is able to maintain or in what direction does it require to be changed.

2.3. A special problem is to inquire as to what needs of investment arise from the general rate of development (expressed in terms of total expenses and employment per sector, or branch respectively) of each sector and branch on the one side, and from the existing stocks of buildings, equipment etc. (=stock of formerly invested goods, still used), which will further be expressed by the symbol 'Gk', on the other. This means, expenses arising from replacement. It is obvious that, as a rule, only the 'new investment' will create New 'Capacities' (enlargement of schools,

universities and other training facilities, of hospitals etc.). In order to see this it is necessary to elaborate a 'balance of capital-stocks, containing investment goods' (Balance of the Development of GK) in the following form :-

S.N. and Description	Sectors and branches	Sectors 2 - Services		
		Education:	Health:	Housing
1. Total value of GK (replacement value) * beginning of year.				
2. Sum of depreciation (less replacement).				
3. Rate of actual depreciation ('2' ÷ '1').				
4. " " annual "				
5. Sum of " " (necessary for replacement).				
6. Replacement.				
7. New investment.				
8. Total value of GK - end of year.				
9. Costs of repairs (not included in replacement).				

2.4. Finally, we have to inquire into the composition of each part (sector, branch etc) of the consumption fund in 'groups of products'. We get some idea from the subdivision of the total expenses of each sector (see Table 9) which breaks the figures into;

- a) Investment and repairs,
- b) Consumption of material, energy etc. and
- c) Individual consumption of the employees.

This problem can be solved in the following way :-

- a) The composition (structure) of the items 'investment etc.' and 'material, energy etc' in terms of 'groups of products', we know in absolute terms for the year '0' and we also know the trends of development of each relative part in the past. In connection with these trends, and paying attention to the fixed principles of the further development in the sectors and branches we have to make an estimation. Here we have to study the conditions in other countries and in highly developed establishments within the country.

* Cf. P.C. Mahalanobis, The approach of operational Research Sankhya 1955 - Volume 16, Parts 1 & 2, Page 29 (para.14).

b) To solve the same problem for the individual consumption of all persons, we have to sum-up the items individual consumption of the employees in the sectors 1-5 and the 'Parts' 6&7 of the consumption fund, which all together from the 'demand of people', (a part of this is met by 'natural income', another is bought by means of money, viz: at the retailer, direct at the factories, handicrafts, peasants etc). But it is not possible to derive directly the composition (structure) of this demand in terms of 'groups of products', rather, we have at first to find out the development of this demand in the following groups (kinds of needs):

- a) Food,
- b) Clothing,
- c) Habitation (including housing services, fuel, furniture, linen, refrigerators etc),
- d) Transport etc. (cars, fuel, conveyance of passengers, postal services etc.),
- e) Education (books, newspapers, services etc),
- f) Health (pharmaceutical and cosmetic products, medical services etc.),
- g) Recreation and entertainment (radio-sets, television sets, photo apparatus, sport articles, camping articles, cultural services etc),

Between these kinds of needs of the human beings a principal economic trend exists which shows that with higher income the more elementary needs decrease in favour of the higher needs (better food, more fat and meat, better clothing, better and greater flats, better furniture, more cultural needs, less material needs etc). It is an important statistical task to enquire into the development of each group of needs on the one hand, and of the composition of each 'group of needs' in terms of 'groups of products' on the other.

At this stage of the elaboration of the plan, it is only possible to get a rough estimation, on the basis of the development of the average income, approximately fixed as mentioned in Para. 2.2.

2.5. From these calculations, we get the 'demand' arising from the total consumption fund K.

3. The estimation of the demand in terms of 'groups of products' arising from the investment and from the Government's reserve.

3.1. The total demand of investment goods coming from the sphere of production results from :-

- a) New investment,
- b) Replacement,
- c) Repairs (of buildings, equipment etc).

The total amount these three items we get from the results of the 'first approximation' (Chapter I).

At first, we have to inquire as to what part of these items are formed by "INVESTMENT COST STRUCTURE".:-

- a) buildings,
- b) equipments (machines, tools, transport equip etc.),
- c) other products (office furniture etc).

3.2. The demand arising from the development of the Government's reserve is to be derived from the decisions of the state regarding the creation of such a reserve (e.g. corn, rice, steel, fuels etc). There is no economic problem, involved here; the amount is given by the results of the "first approximation" (Chapter I).

4. The estimation of the development of foreign trade and its composition in terms of "groups of products".

4.1. The main principles concerning the foreign trade in a planned economy are :-

- a) The equalization of the "balance of payments" (including "planned" foreign credits) at any time, and
- b) To have a sufficient reserve of foreign exchanges.

The "reserve of foreign exchanges" has the same character as the Government's reserve of wheat, rice, steel, etc.

It may, however, be permitted by the Government to somewhat reduce this reserve.

The balance of payments and the balance of goods are, as a rule, closely inter-related, since a surplus of import or export corresponds to a deficit or surplus respectively in the balance

of payments position and entails either paying out to or receiving from other countries. This may also arise in case of services (insurance, costs for fairs in foreign countries and vice versa, costs for diplomatic institutions etc) and transfer of profit.

4.2. The first task consists in the estimation of this excess in order to learn, whether the economy has to give a part of its national income to foreign countries or, is participating in the national income of other countries. The main reasons may be capital import (or export) and transfer of profit. Of course, it is a difficult problem to be solved by the planner; he cannot do it without consulting the government about the principles of international policy, and without knowing if other countries are willing and in a position to give credits. Foreign credits (investment credits) should not be the main or too important a source for the development of the national economy. At this stage of elaboration of the plan it will only be possible to make an assumption as to such credits.

4.3. The next step is to inquire as to the proportion between the total national consumption (productive and non-productive) & imports, and the development during the previous years, the composition of the imports in terms of groups of products[‡], and lastly, the countries from which they have come. Taking into account the trend of the proportion, import : total consumption and the prospects about getting credits (as above mentioned) it is possible to get an estimation about the necessary volume of export, in order to cover volume of imports required for the national economy.

4.4. Next, we have to enquire what kinds of goods have to form the export. For this, it is necessary to have a concrete knowledge of the economic situation in other countries in order to find out which products are likely to be solid.

[‡] In so far as there are not only investment goods and consumer goods the composition in terms of groups of products will be corrected later on, in connection with the calculations concerning the development of the branches of the productive sphere.

4.5. This gives us the composition of the export, which forms a part of the total demand, from which we have to derive later on the increase in output.

5. The estimation of the demand of investment goods and consumer goods and the calculation of the development of the branches producing these goods.

5.1. From our calculations made in the sections 3, 4 & 5, we get that part of the volume of production (output) of the groups of products, belonging to the main groups of products of i and vii, which has the character of "finished products". We get furthermore, especially from the export and the increase of Government's reserve, partly the demand for "semi-manufactured products" (H) of some "groups of products"; we take this into account later when we are ascertaining the demand for these "groups of products".

Before deciding on the basis of the figures of the total demand for each "groups of products", we have to find out which part of this demand can be met from internal production and how much of the residual is it possible to get through import.

Now we have to see what proportion exists (and we have to make an estimation what the development may be) between the part of "finished" and "semi-manufactured products" of the different groups of products. And then we have to consider which "branches" participate in the volume of production of each "group of products". Then we have to see (and to estimate the future development) what part of the volume of production (output) of the corresponding branch this means. In each branch we have "branch-typical" and "non-branch-typical" production.

5.2. Thus we find out approximately the development of the volume of production (P = output) of the branches of the sectors A1 and B. In each "group of products" we get in that way (now only approximately, but later on, more precisely), the following table (for 'equipment');

1. Demand

(a)	Consumption fund	---
(b)	Investment	2000
(c)	Export	100 (e.g. only finished product)
(d)	Government's reserve	---
	Total	<u>2100</u>

2. Supply

(a)	Production	2100
(b)	Import	---
	Total	<u>2100</u>

3. Balance of production of the 'group of products'

(a)	Finished products	2100
(b)	Semi-manufactured products	900
(70F : 30H)	Total	<u>3000</u>

4. Distribution to branches:

(a)	Machine building	2850	(95 : 5)
(b)	Other branches (e.g. transport: repairs) ..	150	
	Total	<u>3000</u>	

5. Balance of production of the branch 'Machine Bldg'

(a)	Typical production	90 P.c.	=	2850
(b)	Non-typical (e.g. energy)	10 P.c.	=	315
	Total			<u>3165</u>

6. Estimation of the productive consumption C_p in the branches of the sectors A1 and B for getting the demand of products of the 'groups of products' belonging to the 'main groups of products' II-VI.

6.1. Starting from the already known volume of production of the branches belonging to the sectors A1 and B, it is now possible to derive the greatest part of the volume of the 'groups of products' and branches respectively, belonging to the main-groups of products II-VI and sectors A2 -A6. For this purpose, it is necessary to know the proportion.

$$P = CP + N$$

in each branch (of the sectors A1 and B), and its future development is to be estimated.

From C_p we get the demand of products of the preceding groups of products, if we analyse the structure of C_p given in Chapter 1 (sub section 3.2). But it is additionally necessary to know the structure of these items in terms of "groups of products" (and to estimate the development). Costs for replacement (depreciation) and repairs would be of interest later.

The demand arising from these branches forms part of 'finished products' of the preceding 'groups of products'

In this way, we get the output p and the productive consumption C_p of each branch, and the volume of production P of each "group of products", so that we are in a position to fix a table (similar to the input/output table), which shows from where the volume of each "group of products" available is coming and for which purposes it is applied (see table 3).

6.2. When this work is finished, we are in a position to check our previous calculation concerning the volume of the national income, because we have now the development of the proportion $P = CP + N$, for each branch and the amount of N as well. We only have to total up the 'N' of all branches. We can now also take into account the "Balance of Foreign Trade" (excess of import of export). Thus we have:

National income, produced in the sphere of production.	... N_p
+/- Balance of foreign trade	... $Ex = Im$
= National income, disposable for the purposes of consumption & accumulation	... N_d

and we get $N_d = A + K$.

7. The calculation of investment necessities in each branch of the sphere of production.

7.1. From the first step of elaborating the balance of national economy (Chapter 1) we have a rough estimation about the allocation of new investment to the Sectors, and we have also a system of figures showing to us the development of π, β, θ . This gives us the first line for the allocation of new investment to the branches. Secondly, we have to inquire as to what are the necessities of replacement and repairs. This we get roughly from the development of C_p (its costs for replacement and repairs component) and more precisely from the 'balance of capital stocks' (without stocks of raw material, finished products etc), which has the following form:- (See Table 7).

7.2. Now, when we are going to investigate the investment necessities of each branch, we have a concrete knowledge of the conditions which led in the past to the average values of π, β, θ particularly we know from the biggest and most important factories the development of these figures and the composition of the capital stock in relation to the level of technique and the age of the plants and

Furthermore, we take into account the value of the rate of depreciation and their development as well as the rate of current repairs. By comparison of time (development) and between the younger and 'older' plants we can see in what condition the capital stocks in each branch are. By this analysis we get a basis to decide what parts of capital stock (equipments, above all) have to be replaced in the form of

- (a) replacement with the same efficiency (simple replacement), and
- (b) replacement with more efficiency: is higher than before so is θ , but β must not be higher; it is possible to come to a lower degree (reconstruction, investment; 'rationalisation & modernisation investment' in Prof. Bettelheim's terminology).

In practice as a rule, the greater part of replacement is of the latter kind; beyond this every investment of this kind increases the productivity of labour as well as the capacity of production. So we find :

- (a) π, β, θ of simple replacement are about equal to the average values of these figures for the 'old' capital stock ...available at the beginning of the year;
- (b) π, β, θ of reconstruction replacement and of new investment as well as higher than the average value of the 'old' capital stocks.

7.3. To fix (preliminarily) the pattern of investment (each of them has its own parameters π, β, θ) of each branch we have to inquire;

- (a) in which branches is the average level of π (compared with the newest plants and with newest plants and with other countries) relatively low, and
- (b) in which branches is the rate of actual depreciation relatively high.

Starting from these investigations, we are in a position to find out that investment pattern which seems to be the most advantageous from the point of view of the branch. Thus we get for each branch:

- (a) the equation $\pi = \beta \theta$, and r
- (b) the new investment (in connection with the balance of capital stocks), and
- (c) the employment.

7.4. The economic problem to solve here is, in what way do we get the given growth of capacities (given by the increase of output, if we assume an optimal use of the capacities) with a minimum of new investment (or what degree of additional capacity can be created with a given investment).

The condition which the solution of this task has to satisfy is, that the π achieved is equal to or greater than what we have got in the 'first step' (Chapter 1). However, at this stage of the work, we have the opportunity to change these figures if we want to get more employment, in this case, π is lower and the costs of production are higher than before and this in turn further restricts the possibilities of the reduction of prices or an increase of wages (or other personal income), lastly, the rate of growth of the living standard (expressed by $\Delta \eta$) is lower than when we choose the higher level of technique.

7.5. Once we have solved this problem, we have to investigate the composition (structure) of the investment etc.. in each branch (and its development over the plan period) regarding buildings, equipment etc.. and their breakdown in terms of 'groups of products'.

After this we are able to examine the initial fixed demand for investment goods, as a whole, and we can now calculate more exactly the development of the branches of the Sector A1.

This may lead to the modification of some of our calculations.

A P P E N D I X - I

Some balances and tables, belonging to the "Balance of National Economy"

Table - I

Balance of sources and funds of the total social product:

Sources	Funds
1. Production	1. Gross investment and repairs a) sphere of production b) sphere of consumption
2. Import	2. Used up raw material energy, etc. in the sphere of production
3. Taking from the Governments' reserve	3. Carry to stocks
4. Taking from stocks	4. Carry to Governments' reserve
5. Other sources	5. Supply of the sphere of consum- ption, without population. 6. Consumption(individual)of popul- lation(family households) 7. Exports 8. Plan reserve ¹
6. Total	9. Total
7. Excess (balance)	10. Excess (balance)

1. This item appears only in the plan-balance, and is not mainly by the "money reserve" in the Governments'budget.

Table 3: Table of sources and funds of the total product.

Group of	Sources							Total Volume of pro- ducts available
products	Sphere of production			....	import		others	products
	Sector A1			.....			
	branches							
	A1, 1 A1, 2 ...							
1	2	3	...	....	...	n-2	n-1	n
I Investment goods								
I,1 equip-ments for mining								
I,2								
.....								
Total								
Funds of consumption etc.								
Sphere of production			Sphere of consumption			Expert Other 2		
Sector A1			Sector ...			Family h/holds		
Branch A1, 1			Branch			Branch 1,1 Branch		
Cp In-vest-ment			Mate-rial ener-gy ...			In-vest-ment		
n + 1			n + 2			....	

1. Without replacement and repairs
2. government's reserve (e;g)

Table 2 - Table for the analysis of the total social product according to means of production & means of consumption.
(in main-groups of products)

[illegible]

Table 4: Balance of sources and funds pro "group of products"
(e.g. "energy products")
(in terms of value)

Sector & branches	Out-put	Sources			Funds				
		Increase(+) Decrease(-) of stocks (forsale)	Effective sale	Effective Supply	used for	used for	Investment	Non-productive consumption, health culture etc. belonging to factories.	Other purposes
1. <u>Sector A1</u> Machine bldg.	20	-	20	100	5	90	-	5	-
<u>Sector A3</u> Coal mining.	1100	-50	1150	150	10	130	-	10	-
Energy	1500	+100	1400	300	20	265	-	15	-
Sector.....									
Branch X1	-	-	-	1500	100	1380	-	20	-
" X2	-	-	-	300	10	280	-	10	-
" X3	60	-	60	400	10	380	-	10	-
2. <u>Foreign Trade</u> (imports)	-	-	400	150	-	5	-	-	145 export
3. <u>Inland Trade</u> Whole trade	-	-	300	310	-	5	-	5	300 sale
Retail trade.	-	-	200	210	5	5	-	-	200 sale
4. Govt's reserve	-	-	10	120	-	5	-	-	115 increase
	-	-	3540	3540	160	2545	-	75	760 of reserve

[illegible]

Table 7: Balance of fixed assets in the
sphere of production.

Sectors and branches	Sphere of Production (total)	<u>Sector A1</u>	
		branch A1, 1	branch sector
1. Stock at the beginning of the year			
(a) total value (replacement value)			
(b) sum of depreciat- ion (less replace- ment)			
(c) rate of actual depreciation			
2. Separating parts (destr oyed, put away as worn out etc) in the course of the year			
(a) TV (total value)			
(b) SD (sum of depreciation less replacement)			
3. Gross investment (new inv. & re- placement) new used in the process of production.			
4. Stock at the end of the year			
(a) TV			
(b) SD			

Sectors and branches	Sphere of production (total)	Sector A1		
		branch A1, 1	branch	sector
5. Investment under construction				
(a) at the beginning of the year				
(b) at the end of the year				
6. (Average) Rate of depreciation (annual)				
7. Sum of depreciation, total used for:				
(a) replacement				
(b) "general repairs"				
8. New investment				
9. Rate of current repairs				
10. Amount of current repairs				
11. Average values of the stock				
(a) TV				
(b) SD				
12. Rate of depreciation ($\frac{SD}{TV}$)				
13. Output/capital ratioB				
14. Capital intensity per worker				

Sectors and branches	Sphere of production (total)	Sector A1		
		branch A1 ,1	branch	Sector
15. Composition of stocks				
(a) buildings				
(b) equipments				
(c) others				
16. Composition of gross investment				
(a) buildings				
(b) equipments				
(c) others				
17. Composition of "General repairs"				
a - c				
18. Composition of current repairs				

Table 8: Balance of fixed assets in the sphere of consumption

Items	Sectors and branches	Sector 1	<u>Sector 2: Services</u>	
			education	health housing..
1.	Total value of GK (replacement value), beginning of year			
2.	Sum of depreciation (less replacement)			
3.	Rate of actual depreciation ("2" : "1")			
4.	Rate of annual depreciation			
5.	Sum of annual depreciation (necessary for replacement)			
6.	Replacement			
7.	New investment			
8.	Total value of GK - end of year.			
9.	Costs of repairs (not included in replacement)			

Table 9: Table for analysis the composition of the fund of consumption (K)

Parts of the K-fund (sector subdivided in branches)	Employment (in terms of man- years)	Consumption (in terms of value			
		total	invest- ment & repairs	means of con- sump- tion energy trans- port etc.	indivi- dual consum- ption of the emplo- yees in te- rms of wages.
1. State activities		0			X
2. Services		X			
3. Banking etc.		0			X
4. Research work institutions		0			X
5. Public organisations		0			X
6. Wage fund of the workers in the productive sphere		X	-	-	1)
7. Individual (net) income of other peoples (capitalists, pensioners etc.)		X	-	-	1)
Total		=	= K		

Table 10: Financial balance of the branches
of the sphere of production.

Receipts	Expenditures
1. Value of the sold goods	1. Value of the bought goods
2. Receipts in order to increase the capital	2. Wages
3. Compensations from insurance	3. Taxes
4. Interest from deposits	4. Insurance fees
5. Decrease of deposits	5. Interest for credit
6. Increase of credits of bank	6. Revenue for the proprietors of the enterprises.
7. Decrease of commercial credit	7. Value of the bought services of all kind
8. Increase of commercial liabilities	8. Increase of deposit on loans
9. Decrease of currency	9. Decrease of banking credits
	10. Increase of commercial credit
	11. Decrease of commercial credit liabilities.
	12. Increase of currency.
Total	

Table 11: Financial balance of the branches of the sectors of services, state activities, public organisation research institutions (withoug banking).

Receipts	Expenditure
1. a) Receipts for using the services by people, enterprises etc. (sector of services, state activities, research institutions)	1 - 10 = like 1 - 9 and 12 in the balance of production
b) Receipts from the budget of Government (sector of services, state activities, research institutions)	11 Government allowances like pensions, scholarships etc. (in the balance of the sectors of state activities and services, e.g. high education)
c) Receipts from the contributions of the members (public organisation)	
d) Receipts from the insurants (insurance enterprises)	
2. - 6 = like 3.4.5.6. and 9 in the balance of the sphere of production	
Total	

Table 12: Financial balance of the
household of peoples.

Receipts	Expenditure
1. Wages	1. Value of the bought consumer goods
2. Revenue of the (private and cooperated proprietors of the enterprises in the sphere of production and consumption	2. Value of the paid services
3. Government allowances	3. Taxes
4. - 8 = 3, 4, 5, 6 and 9 in the balance of the sphere of production	4. Insurance fees
	5. Savings for partnership
	6. - 7 = 5,8,12 in the balance of the sphere of production
Total	

Table 13: Financial balance of the banking system.

Receipts	Expenditure
1. Interest for credit	1. -7 = like 1-7 in the balance of the sphere of production
2. Compensations from insurance	8. Excess of receipts on expenditure (sec. No. 3 on the left)
=	
3. Excess of receipts on expenditure (for increasing the capital or reserve fund of security)	9. Decrease of deposits
4. Increase of deposits	10. Increase of credit
5. Decrease of credit	11. Decrease of currency
6. Increase of currency	
Total	=

Table 14: Balance of credit

Given credit	Sources of credit
1. Home credit	1. Capital of the banks
a) short-term	2. Reserve funds of security of the banks
b) long-term	3. Deposits
c) re-financing	a) short-term
2. Foreign credit	b) long-term
	c) re-financing
	4. Foreign credit
	5. Emission

Table 15: Balance of the Government's budget(including the district authorities, municipalities etc.)

	Receipts	Expenses	Saldo (Balance)
1. <u>Sphere of production, total</u>	X	X	X
a) taxes, duties etc.	X		
b) income from state owned factories etc. (prpfit)	X		
c) means to promote export		X	
d) means for centralized inves- ment in state owned enterprises		X	
e) increase of Government's reserve		X	
2. <u>Sphere of consumption(without population)</u>	X	X	X
2.1. Sector of state activities	X	X	X
a) Receipt (e.g. taxes)	X		
b) investment		X	
c) current expenses		X	
2.2. Sector of services	X	X	X
a) taxes,profit)for state	X		
b) investment)owned ins-			
c) current expenses)titutions			
2.3. Sector of banking, insurance	X	X	X
a) taxes, profit	X		
b) and (c) like 2.2.		X	
2.4. Public organisations	X	X	X
3. <u>Population</u>			
a) taxes	X		
b) issue of public stocks	X		
c) repayment and interest of public stocks		X	
4. <u>Budget reserve</u>		X	X
Total		+	0

Table 16: Balance of the primary distribution of national income.

Items	Total sphere Sector & of production branches
1. Income of the employers a) wages and salaries b) other allowances in money c) natural income (e.g. miners agricultural labourers)	
2. Income of the members of co- operatives. a) money income b) natural income	
3. Income from private, capitalistic property in the sphere of production a) money income b) natural income	
4. Income from private, capitalistic property in the sphere of production a) money income of the entrepreneurs through works. b) natural income of the entrepre- neurs. c) income from shares	
5. Income of the state (taxes)	
6. Accumulation a) productive assets b) cash in hand c) deposits	
7. Others insurance fees etc.)	
8. Total	

Table 17: Balance of final distribution
of the national income.

Items	Account
1. Produced national income	
2. Decrease of stocks, total	
a) stocks in the sphere of production	
b) Governments reserve	
3. Excess of imports	
4. Other sources.	
5. National income available	
6. Accumulation fund	
a) net investment	
b) increase of stocks in the sphere of production	
c) increase of Governments reserve	
7. Consumption fund	
a) for purposes of living standard	
b) for other purposes (Governments administration, army etc.)	
8. Insurance fund for replacement productive assets destroyed by natural forces etc.).	
9. Excess of exports.	

A P P E N D I X - II

PROGRAMME FOR ELABORATING A LONG TERM PLAN

- I. To work out a long-term plan we have to proceed in two stages:
 1. Elaboration of the main features of the economic development
 - A. Estimation of the main figures and proportions in the frame of the balance of national economy in terms of their order of magnitude.
 - B. Principles underlying the development programme concerning.
 - a) the procedure of industrialization (what branches and goods have to be forced and priorities in import policy resulting from this investment policy with regard to the different sectors of property etc.),
 - b) the procedure to get a higher productivity of agriculture (irrigation, mechanization, fertilizing, large-scale production and co-operative farms, state trading in agricultural products; forestry etc.),
 - c) the transport system;
 - d) general education, professional and technical education etc;
 - e) living standard
(health, housing, construction and re-construction of towns, supply of food clothing etc).
- II. Elaboration of the plan of the development of the national economy.
 1. After collecting the main figures and proportions of the economic development as well as deciding the principles we proceed to work out the complete "plan"(or a "plan frame").

Both the stages, include analysis of the development in the past, viz. trends of development, and the factors creating this development as well as the figures, needed for the plan, in the basis year (year 0).

The result must be firstly a "draft plan (frame" showing the main features of the development in the plan-period and the aims to be reached as well as the principles of economic policy to achieve these aims; and secondly the complete plan frame with a concrete programme of economic policy.

2. The "plan will cover (principally) the following "plans of branches":

- a) industry (including construction),
- b) handicraft and cottage industry,
- c) agriculture, forestry and irrigation,
- d) transport and communication,
- e) foreign trade,
- f) living standard (including health, housing and other services, supply of food etc., retail trade in consumer goods etc.),
- g) other non-productive sectors (state activities, public organisation, including the reserve of government),
- h) education, science and research;
besides this we also need
- i) a plan of regional development,
- j) the balance of national economy (in order to co-ordinate the "plans of branches".

The plans of branches "a - d" consist of:

- a) plan of output (of each branch, and each "group of products"),
- b) plan of material supply,
- c) balances of sources and funds of distribution,
- d) plan of investment (and supply of investment goods)
- e) plan of employment, productivity of labour and wages,
- f) financial plan (costs, receipts, profits, taxes, etc).

For the plan of foreign trade we shall naturally require a plan of imports and exports and the balance of foreign trade; in the plan of retail trade in consumer goods the plan of retail business supply, stocks and sale; likewise in the branches of services corresponding figures for the services concerned. The plan of living standard includes the balance of income and expenditure of the population. The plan of regional development will show the economic aims for the different parts of the country in the "economic districts" as well as in the administrative districts, and the location of the most important plants and other projects.

A P P E N D I X - III

OUTLINE SCHEME OF A LONG-TERM PLAN FOR ENERGY PRODUCTION

1. In course of the industrial development, which is associated with progressive specialisation and division of labour, there appears a special sector of energy production. It consists of branches producing primary energy products (mining: hard coal, soft coal, mineral oil, uranium ore etc.), and of branches processing (refining) these primary energy products into coke, gas, briquette, petrol, diesel oil, electricity. The transport of gas and electricity belongs to the energy sector.

The rates of growth of the total output of the national economy, of the productivity of labour and of the standard of living depend essentially upon the development of the energy production. One of the main purposes of planning of the national economy is to ensure the proportionate development of the energy sector in the frame work of the whole national economy.

2. Model, balance sheets and concepts used in the planning of the energy sector.

- 2.1. The energy sector comprises all plants the main aim of which is the production of coal, mineral oil, gas, electricity etc. It is sub-divided into branches;

- hard coal-mining,
- soft coal-mining,
- briquette factories,
- mineral oil mining,
- smoulding factories,
- mineral oil refining
- coke factories,
- natural (earth) gas,
- gas plants,
- electricity plants,
- gas network,
- electricity net work,
- district heating works.

In this sector the main part of energy production takes place. But a small part of the whole energy production especially electricity, is produced in factories belonging to other branches (i.e. in chemicals etc.) and it is possible that there is import of energy products. On the other hand, it is possible that the output of the plants belonging to the energy sector consists not only of energy products but of products of other "groups of products" also. These facts we have to consider, too. For example in the German Democratic Republic in 1955: 79.2 p.c. of the output of the branch "energy" consists of "energy products", and these 79.2 p.c. represent only 46.8 p.c. of the volume of the group of products "energy products".)

The main group of products "energy products" is to be subdivided in the following groups of products:

Solid fuels	(hard coal, soft coal, briquette, coke, dry soft coal, wood etc.),
liquid fuels	(mineral oil, benzene, diesel oil etc.),
gas	(natural gas, coke gas, smoulding gas etc.),
electricity	(produced by hydro station, by steam, by diesel engine stations, by gas turbine plants etc.),
steam	(produced by district heating works etc.),

2.2. "Primary energy" comprises all energy products hauled directly out of the earth or nature; e.g. coal of all kinds, mineral oil, uranium, natural gas, water power etc; "secondary energy" comprises all products got in processing primary energy into refined (improved energy products like coke, gas, electricity, petrol etc. "Final energy" may be termed all sorts of energy products going out of the energy sector to be used in all other sectors of the whole national economy. It consists of primary as well as secondary energy.

2.3 In the Planning of energy production of following concepts are involved:

a) Aggregated figures of over-all economic significance:

(i) Rate of growth of the output of primary energy

Rate of growth of the total national output

This figure gives us a rough estimation regarding the order of magnitude of requirements of natural energy resources and enable us to learn whether the internal resources would be sufficient for the needs of the planned development of the whole national economy or imports have to be planned and also as to how many years or decades would be required before it becomes self-sufficient.

(ii) Rate of growth of the total volume of final energy used up in the sphere of production

Rate of growth of the total national output

This figure show the exact relationship between the development of total output and the energy used up for that.

Similar figure has to be used to show the relationship between the rates of growth of the fund of (non-productive) consumption and the consumption of energy products (final energy).

(iii) Rate of growth of final energy used for the sphere of consumption

Rate of growth of the fund of non-productive consumption

(iv) Rate of growth of the total volume of final energy used up in the sphere of production

Rate of growth of the productivity of labour

This gives us another figure showing an important economic relationship. Sometimes in this relation the rate of growth of used up electricity is put into the numerator because the increase of labour productivity is mainly connected with the utilisation of electric power in the process of production. However, both these figures give only rough indications.

(v) Volume of final energy (Kcal)

Volume of primary energy (Kcal)

This figure is a rough expression of the degree of thermal efficiency of the entire energy sector. It shows what volume of final energy will be available if we have a certain volume of primary energy. Two contrary tendencies influence the development of this figure. Technical progress, connected with the refinement of energy products, leads to a reduction in the losses incurred during this stage of production and to an increase of the quotient of thermal efficiencies. On the other hand, more and more a lesser part of the volume of primary energy appears as final energy i.e. an increasing part of primary energy will be transformed into secondary energy. It is clear that in connection with the latter development the losses of energy transformation in absolute terms will grow, but this

may be preferred as the secondary energy has a better-co-efficient of utilisation in the process of consumption of the final energy. However this has to be examined in each case.

(vi) Volume of (produced) secondary energy
Volume of (produced) final energy

With energy improvement in technique in the energy sector, this figure would get an increasingly higher value.

b) Technico-economic figures showing the relations between the different stages of energy production, the investment costs and the efficiency of technique: In order

to be in a position to plan the quantitative relations between the various (successive) stages of energy production we have to use figures as in following examples:

In the process of smoulding soft coal briquette we get out of 1 kg soft coal briquette:

0.520 kg. (smoulding) coke,
0.130 kg. tar and benzene,
0.010 kg. tar dust
0.15 m³ gas
0.010 kg. briquette - coal slack
..... phenol, sulphur etc.

In the process of coking soft coal briquette we get out of 1 kg soft coal briquette:

0.430 kg (hard) coke,
0.505 kg. tar and benzene
0.010 kg tar dust
0.010 kg briquette - coal slack
0.24 m³ gas

also steam out of the heat of coke, phenol, sulphur etc. We need such figures for determining the relationship between the two succeeding stages of production. They naturally depend upon the technical procedure used in the different stages.

Closely connected with these figures are those showing the degree of thermal efficiency in each stage of refining of energy products, they show the Kcal content of the refined products and the relationship of this content with the content of Kcal in the primary product used as input for producing the refined product; e.g.

smoulding of soft coal:	95.5 p.c.,
coking " " briquette	89.0 p.c.,
gasification of soft coal (by pressure):	82.0 p.c.,
electricity out of steam plants:	14-23 p.c.

These figures are of great importance in the assessment of the various technical processes and the level of technique used in the country. Another sort of figures shows the specific investment costs per unit of capacity e.g.

In large scale steam power plants: 500 - 800 DM/KW of
installed capacity,

In open cast soft coal mining incl. rubble: 22-37 DM/+p.a.

The first mentioned figure depends on the technical levels of the steam power plants; e.g. in the last 40 years the specific investment costs for large scale steam power plant have decreased to half. In the latter figure the specific investment costs depend upon the relation of "rubble coal".

A further group of figures shows the degree of utilisation of the capacity, e.g.

"Factor of utilisation of the installed capacity in power plants";

No. of hours of utilisation of the installed capacity per year
x100

No. of calendar - hours (8760 h)

The development of this figure in the GDR was as follows, e.g.:

1950	1951	1952	1953	1954	1955
76.5	79.5	83.0	87.3	91.2	92.5

An important figure is the "amount of heat" (in Kcal) per produced KWh; in modern plants this figure is about 2500 Kcal/KWh.

Lastly there are figures showing the level of technique from the point of view of investment costs without equipment; e.g. in power plants:

"volume of buildings per unit of capacity" (m^3/KW) and from the point of view of manpower:

"operators per unit of capacity" (number of operators/KW). All these figures we use either to calculate the figures of the plan or weight the advantage of this or that kind of procedure and level of technique respectively.

C) Figures for calculating the consumption of energy in the other sectors and branches:

In the course of preparation of the plan for the energy sector we need more concrete figures regarding specific requirements of energy products of the other sectors and branches than the results of the balance of national economy.

yield. We know from the balance of national economy only the development of the volume of production and the share of productive energy consumption. But we want to know of how many KWh's of electricities and tons of hard coal, coke, petrol etc. this item "energy consumption" consists.

To solve this problem we have to enquire into the development of the composition of this item:

x	p.c.	electricity
y	p.c.	gas
z	p.c.	solid fuel
z	lp.c.	coke
z	2p.c.	hard coal
etc.		

We need this composition for the year 0, and the trends of development. Besides this, we should know the reasons of this development. We can express these figures as under:-

In the year 0 1 DM energy - consumption
= X KWh, or $Y \text{ m}^3$ gas, or z t coke etc.

From this we get energy demand of all the branches (other than that of the energy sector) in physical terms.

Another way to get that demand is to see, how many units of energy products have been used up related to 1000 DM value of output, and per worker in the various branches.

Branch	KWh consumed per 1000 DM	Output	KWh consumed related per worker
	9 1.52	1955	1955
Industries, total	481	452	8.010
Mining	1404	1538	19.050
Metallurgy	1009	963	21.800
Engineering	156	148	2.125
Chemical	1259	1140	41.000
Construction materials	410	437	4.160
Electro technique	106	98	.995
Precision instruments and optical	93	86	.860
Woodworking industry	94	85	.980
Textile industry	198	190	2.310
Read made clothing industry	35	34	.428
Leather, shoes and fur	1458	1322	15.800
Cellulose and paper making			
Paper manufacturing industry			
Polygraphy			
Food manufacturing	84	77	2.270

The energy consumption per worker is closely connected with the productivity of labour.

Beyond this we use (later on) figures showing the specific energy consumption of certain energy-intensive products; e.g. (1955):

Product	Physical unit	Specific energy consumption	
Calcium carbide	t	3.400	KWh
Phosphorous	t	15.000	"
Silicium carbide	t	9.800	"
Aluminium	t	20.000	"
Electro-steel	t	1.000	"
SM - steel	t	1.000	m ³ weak gas
Gaskiron	t	100 - 150	kg coke
Motor car	1 piece	1500-1800	KWh
Heavy steam locomotive	1 "	60000	KWh

2.4. Balance sheet used to plan the proportion within the energy sector and the relations to all other consumers:

We have four kinds of balance sheets:

1. Plan of the natural resources,
2. Balance of primary energy,
3. Balances of the various stages of manufacturing (secondary energy)
 - a) Balance of soft coal briquette,
 - b) Balance of smoulding and cooking of soft coal briquette,
 - c) Balance of cooking of hard coal
 - d) Balance of gas,
 - e) Balance of electricity,
 - f) Balance of liquid fuels,
4. Balance of final energy.

In order to make all these calculations comparable we use co-efficients showing the "heat value" of each kind of energy in terms of "hard coal units" (-hcu-.) That means: Hard coal has an (average) "heat value" of 7000 kcal/kg; soft-coal briquette = 4700 kcal/kg; consequently there is:

1 t soft coal briquette = 0.67 t hard coal (hcu).

Other examples:

1 t soft coal	=	0.3 hcu,
1 t coke	=	0.9 "
1000 m ³ natural gas	=	1,33 "
1 m ³ wood	=	0.25 "
1000 KWh electroenergy	=	0.6 "

- 2.5. The plan of natural energy resources shows
- a) the minerals useful for purposes of energy production subdivided into
 - aa) definitely known resources,
 - ab) probably existing resources,
 - b) waterpower unused,
 - c) other resources (e.g. wood etc.)

The resources of minerals we get from the results of geological surveys and researches.

The subdivision (definite and probable resources) results from the density of the drilling spots and the calculations connected with them.

- 2.6. The balance of primary energy shows the sources and the purposes of consumption of primary energy according to the following scheme (see page 61 A).

The balance of secondary energy are built up, in principle, in the same manner as the balance of primary energy. In order to illustrate this we show below two balances, using the first column of table.

1. Soft coal briquette

1.	Raw material incl. raw material for production of steam for production of briquette	soft coal	10 ³ t
2.	Production	s.c. briquette	"
3.	+ decrease - increase	s.c. dust dry coal	" "
	} of stock		
4.	Import		
5.	Total fund	-	-
6.	a) smoulding b) coking c) gas d) electricity		10 ³ t " " "
	}		
7.	Prod. cons. of other sectors		
8.	Non-prod; cons		
9.	Exports		
10.	Government reserve	-11-	

2.- Electricity

	Participation in production of electricity		Quantities	
	10 ⁶ Kwh	p.c.	unit	quantity
1. Raw material, total	28.695	100	-	-
a) Hard coal	1.686	5.9	10 ³ t	1297
b) soft coal	17.994	62.7	"	
c) s.c. briquette	2.798	10.4		
d) s.c. smoulding code	4.136	14.4		
e) dry coal (s.c.)	179	0.7		
f) water power	759	2.6		
g) mineral oil	33	0.1		
h) gas	878	3.1		
i) other	42	0.1		

BALANCE OF PRIMARY ENERGY

Sources and funds	kind of energy	Absolute Quantities		Hard coal units (hcu)		
		Physical terms	Quantity	Co-efficients	quantities in 10 ³ t hcu	p.c.
1. Production	soft coal	10 ³ t	200612	0.3	60184	84.1
	hard coal	"	9667	1.0	9667	13.5
	water power	10 ⁶ kwh	759	0.6	456	0.6
	fire wood	10 ³ fm	1120	0.25	280	0.4
2. Import	mineral oil	10 ³ t	600	1.7	1020	1.4
3. Increase / Decrease of stocks	-	-	-	-	-	-
4. Total fund	-	-	-	-	71607	100
5. Productive consumption of the energy sector	-	-	-	-	-	ca. 89.0
a) for eletricity	soft coal	10 ³ t	42843	0.3	12853	18.0
	hard coal	"	1297	1.0	1297	1.8
	water power	10 ⁶ kwh	759	0.6	456	0.6
b) for briquette	soft coal	10 ³ t	-	0.3	-	ca. 58.0
c) for coke and gassification	hard coal	"	-	1.0	-	ca. 4.0
d) for benzene and diesel oil	mineral oil	"	-	1.7	-	ca. 1.4
e) Others	soft coal	"	-	0.3	-	ca. 5.0
6. Productive consumption of other branches (prod.)	-	-	-	-	-	ca. 9.0
7. Non-productive consumption	-	-	-	-	-	ca. 2.0
a) Branches consumption	-	-	-	-	-	-
b) Family households	-	-	-	-	-	-

	Participation in production of electricity		Quantities	
	10 ⁶ kwh	p.c.	Unit quantities	
2. <u>Production</u>			10 ⁶ kwh	27.530
3. Import			"	210
4. total fund			"	27.740
5. consumption				
a) industries			10 ⁶ kwh	21.505
b) agriculture			"	510
c)				
d) family households			"	1.985
e) exports				1.
6. Net losses			"	1.992

2.7 Balance of final energy shows the results of all stage of energy production as far as they are going out of the energy sector. The composition (structure) of the total fund of final energy compared with that of primary energy shows the degree of the refinement of energy in the whole national economy. The share of primary energy in the total fund of final energy is continually decreasing.

That part of the balance of final energy (showing the distribution of all sorts of final energy) to the sectors and branches etc. is of great importance for the planning, for it shows the connection between the energy sector and all other social activities. Here we have to balance supply and demand of energy. The balance of final energy has the form shown in page 62.A.

3. The elaboration of the plan for the development of the energy sector.

3.1. From the balance of national economy we get a number of figures showing to us in which order of magnitude and in which proportions (roughly) the development of the energy sector during the period of the perspective plan (e.g 15 years) will take place. Thus, we have as starting points the following (for each year of the plan period):

- a) The volume (in terms of value) of the main group of products "energy products" subdivided into the groups of products,
- b) the "balances of sources and funds" of these main group of products and "groups of products",
- c) the volume of production of the "energy sector"
- d) the investment fund and the development of the stocks of fixed capital, for the sector and the branches,
- e) the demand for investment goods and other products (productive consumption)
- f) the demand of manpower
- g) the figures (productivity of labour), (output/capital ratio). (capital intensity per worker, and (net) product (= national income produced in the branch or in a factory)/ output ratio).

From the analysis of the development of the energy sector in the past, up to the year 0 we have got all figures and balance sheets mentioned in para 2. From our experience we know the concrete situation in this sector; and as also in each mine or factory of importance. Furthermore, we must have knowledge about the economic characterization of the various procedures of production and technical levels in the different branches. This knowledge we need

not only about the levels of technique, used within the country concerned but with regard to the more developed countries as well, and we shall need also such information about levels of technique which are as yet in the stage of operational experiment (e.g. atomic power stations) so far as it is feasible to use this kind of procedure in the plan period. This economic characterization comprises (on the basis of a new building plant of an optimal size, or for plants of different sizes) the after mentioned figures:

- a) P , CP , E_p and
- b) the capacity and the coefficients of the optimal utilization of capacity.

[illegible]

- c) the investment cost per unit of capacity and the composition of the investment cost (equipment, construction, others) figures characterizing the investment pattern (e.g. construction volume/unit of capacity etc), period of maturity rate of depreciation;
- d) the composition of the workers needed: professions, degree of qualification; average "W" of all workers (in terms of the present valid wage rates); "average wage/productivity of labour - ratio \underline{W} ;
- e) the composition of the used up raw materials, energy and other products, in physical terms per unit of output and the composition of the value of the productive consumption (C_p): depreciation, raw materials, energy transport etc; beyond this partly: the composition of output related to the unit of raw material used up.

The knowledge of this characterization of each level technique is necessary in order to be in a position to decide in what way the development of a branch can be realised most effectively.

3.2. In the course of elaboration of the plans of the branches we have to take into consideration the following methodological problem: In regard to all items planned in physical terms it is possible that there may be a difference between the "gross output" and the "saleable output". This difference may be due to two factors viz:

- 1) Increase or decrease of stock of finished energy product
- 2) part of saleable output that may be used internally for productive purposes.

Since the value of output of a factory or branch does not include the value of the internally consumed energy product it is necessary to have this information in order to know the rate of capacity utilization.

All computations about these items planned in physical terms are related to the volume of "gross output" e.g.

Capacities;

material balances (balances of sources and funds of distribution of each of these products); in these balances the "self-consumed output" is particularly shown in order to be able to get the aggregated balances of sources and funds of the "groups of products";

Productivity of labour (gross output per worker).

All the figures characterising the economic situation of the branches are statistical averages. These averages cover all the factories. But while we know the concrete situation with regard to a few i.e. the most important units accounting for the major part of the production of the branch concerned, for the "rest" we know only the aggregate figures for all units belonging to the rest". In this way, we are also in a position to get the average values of those figures showing the relatives and comparing the figures and etc. of the whole branch with those of the whole economy and adjust them in order to acquire the necessary proportionality.

It must be borne in mind here that targets of the plan have to be calculated from year to year.

3.3. The plan for the development of each branch consists of five parts:

- a) the estimation of the demand and fixation of the target of production.
- b) the estimation of the development of capacity and the choice of the level of technique including the calculation of investment,
- c) the analysis of the raw material situation regarding the supply of raw materials, energy, investment goods etc.,
- d) the calculation of the supply of manpower and development of the average wage,
- e) the analysis of the location and the regional distribution of the branch in relation with transport costs, new settlements of and for workers etc.

3.4. Estimation of the demand in the case of the energy sector means that we have to calculate the demand of final energy, i.e. we have to calculate the figures, belonging to the items 5 to 9 of the "balance of final energy".

From the balance of national economy we get the values of energy consumption in all branches out side the energy sector, possibly broken down into groups of products, if we have sufficient experience and concrete knowledge about the alteration of the composition of energy consumption. But we need the demand in physical terms, subdivided into all sorts of energy products we have in our balance of final energy. In order to get this we use the methods shown in section 2.3 (on the basis of the energy consumption for branch or on the basis of output). It is not possible at this stage of work to base this calculation on the energy consumption for the most important products of the other branches, because all plans of branches will be elaborated simultaneously. Later on we shall have to correct the demand of energy, when the

assortment (composition) of that part of the volume of each branch which is represented by the products planned in physical terms is fixed. By addition of the demand represented by the items 3 to 9 of the balance of final energy we get the "total fund" of each sort of energy products.

Starting with the production of the year 0 and in comparison with our "plan of natural resources" we find out which kinds of energy products we shall have to import; from our general experience of the past years (already available in the balance of national economy) we have to try to get an estimation of the order of magnitude of the export of each kind of energy products. Later on when we consider the development of capacities and techniques in connection with the investment fund available for the branch and regarding which economic benefit (from the point of view of the whole national economy) we are also able to get, if we increase the investment fund and decrease the import, we will have to correct this statement. Thus, we get the production of final energy (which means, that part of the total volume of each energy product leaving the energy sector secondary energy as well as primary energy).

The next step is to analyse the relations between the branches of the energy sector. But this presupposes that we take into consideration the development of technique in each branch in order to find out the changes in the co-efficients of the used-up raw material, because it affects the demand for energy products at the stage of production (e.g. briquette for coking, or soft coal electricity etc.) In accordance with the investment fund for each branch we can achieve an approximation of these coefficients which would be sufficient for our

purpose. At the end of this process we will get the "gross production" of each energy product and the balances of secondary and primary energy as well. Now we are in a position to see, whether our natural resources are adequate to meet the demand resulting from the projected development of the whole national economy. From the point of view of the possibilities of technical development in the branches, we have a better starting point to decide more precisely which kinds of energy production we have to develop and we get a clearer idea of our import requirements. Here we are also able to weight whether it is useful to replace to a certain extent the utilization of one kind of energy by another which may be of greater efficiency (e.g. gas instead of coal), in the various branches and households. Such an investigation has always to be made with respect to investment. Having thus got a certain clarity about the direction of the principal development of the energy sector we have now to look for the ways of implementing the plan by means of the requisite investment.

3.5. Now we have all "balances of energy" with such a degree of accuracy that we can proceed to inquire how to meet the problem of expanding capacities. While assessing the demand and production in the various branches and stages of production we have already considered the question of improvements of the techniques of production. Here we have to examine the ways of utilising these new techniques.

At first we must learn, what amount of internal reserves can be mobilized in the existing plant by better organisation of the labour, perhaps more shifts, better utilisation of capacities, by reducing the frequency of repairs of the machines or by the removal of bottlenecks in order to get an optimal utilization. Of course, this

may require a small initial investment. Then we should know that amount of new capacities we have to create; we get this amount by dividing the production by the co-efficient of optimal utilization of the capacities. Having got this we have to decide in which way to cover this requisite increase of capacities, by reconstruction (modernisation) of the existing plants or by constructing new plants. To reconstruct an existing plant is often cheaper, because it is sometimes possible to use the old buildings and only to change the equipment. To decide this it is necessary that in (or for) each plant of importance there should be a "plan of reconstruction" revised from time to time. (These plans we have to know in order to be in the position to decide this question). The rest of growth of capacities has to be covered by new construction. For this purpose we need "type-projects" of plants of the branches, and if there are various levels of techniques, then for different sizes of plants these projects as well. These projects are rough technicoeconomic calculations showing the technical pattern of the process of production and all figures above mentioned in

para 3.1 (at the end of that para).

The development of capacities we fix in "balances of capacities", like the following form (see page , 7A).

Now we have to calculate the investment necessities for the development of each branch. For this purpose we get from the balance of capacities in relation to the technique chosen and the decision about creating the capacity by reconstruction or new building plants (using the above mentioned figures of investment cost per unit of capacity and using the plans of reconstruction) the amount of investment for these two kinds of investment. Other kind are the "simple replacement" (replacement of single machines and accessories worn out or destroyed,

Balance of Capacity

Product: Briquette	Physical unit '000	Total capacity in the whole nat.economy	Capacities in the branches ...
1. Capacity at the beginning of the year		10000	
2. Co-efficient of (average)utili- sation in p.c.		85	
3. Loss of capacity during the year		400	
(a) in connection with replacement (reconstruction) 1st Apr.		400	
(b) Others		-	
4. Proportional value of this loss related to the whole year		300	
5. Coefficient of (average) utilisation in p.c.		85	
6. Increase of capacity during the year		1000	
(a) by new built plants 1st Oct.		500	
(b) by replacement (reconstruction) 1st July		500	
(c) by changing the number of shifts		-	
(d) Others		-	
7. Proportional value of this increase related to the whole year		375	
8. Co-efficient of (average) utilization in p.c.		95	
9. Capacity at the end of the year		10600	
10. Co-efficient of (average) utilisation in p.c.		85.0	
11. Average value of this capacity related to the whole year		10075	
12. Coefficient (average) of utilization in p.c.		85.9	
13. Output during the year		8500	

As a rule the coe-efficient of (average) utilisation of the remaining capacities (given at the beginning of the year) is improving. by the identical ones) and "general repairs". From the experience of the latter years we have to calculate the share of general repairs from the amount of depreciation. It depends mainly upon the rate of actual depreciation (vide Chapter II, Section 3.1) which shows the (average) wear and tear of the stock of fixed capital. Furthermore we have to take into consideration, the period of maturity of the new investment i.e., the difference of time between the beginning of the construction and its end at which moment the capacity (the plant) begins to produce (this latter moment is fixed in the balance of capacity).

Lastly we have to calculate the amount of "current repairs" in accordance with the results of our investigation concerning the development of the "rate of current repairs".

A special problem is to find out the development of the annual rate of depreciation". For this purpose it is necessary to have knowledge about the average life of the new building plants and their rates of depreciation. The most important figure is the amount of "Net investment", having got this figure we are able to compare it with the figure got from the balance of national economy, so that we can see, if our "plan" is feasible.

3.7 The analysis of the supply of raw material, energy products investment goods etc. is based on the structural figures shown in section 2.3 ("b"), and other figures, showing the composition of the used up Cp (productive consumption), shown at the end of section 3.1 ("d"), the demand of investment goods we get from the "balance of fixed capital stocks", in terms of value in "groups of products" in order to get the demand of equipment goods in physical terms we need the "type-project" of the most important new buildings and the plans for reconstructing. The "rest" of the branch we have to estimate in accordance with the tendencies in the past.

3.8 We have now to consider the plan of the development of man-power and wages

From the balance of national economy we know the development of the figure " π productivity of labour". From the projected development of the level of technique, capacities and investment we have got a more precise knowledge of the increase of the productivity of labour too. Now we may check up the earlier figures and correct them if necessary. We are now also in a position to see whether our new figures fit in with the frame of the development shown by the balance of national economy or whether there are too great differences. The figure π productivity of labour gives to us only the total number of labourers, technicians etc. needed. The absolute demand of manpower is bigger than the difference e.g. between two succeeding years, because there are workers, becoming 60 (women) or 65 (men) years old and leaving the factories etc., and there are other fluctuations. In order to get the total number of new manpower we use a "balance of manpower" in the following form:

<u>Balance of manpower</u>			
Branch	in man-year"/man		
	Total	<u>Professions</u>	
		Locksmiths	Electro engineers
1. Workmen at the beginning of the year	5000		
2. Retirement during the year, total	200		
a) becoming 60/65 years	180		
b) becoming invalid	10		
c) others	10		
3. Proportional amount of this retirement related to the whole year(1.7)	100		

	Total	Professions	
		Locksmiths	Electro engineers
4. Addition(=demand)during the year, total +	600		
a) from professional education	500		
b) from technical education	80		
c) from scientific education	20		
d) other	-		
5. Proportional number of this addition related to the whole year(1.9)+	200		
6. Workmen at the end of the year	5400		
7. Average number of workmen available during the year	5100		
8. Increase of workmen (average of the year under contemplation - average of the year before	-		
9. Productivity of labour	-		
10. Production	-		

In order to calculate the items "a" and "b" of 2 we need a table showing the composition of the workmen of all kinds in terms of age-groups (from year to year or in groups of "5 years", and "tables of invalidity". The composition of profession we have to calculate from the development of each of these factories we know in accordance with the technical level chosen (vide para 3,5), and from the trends of the "rest of the branch".

The development of the figure "w"(average wage) we get from the alteration of the composition of workmen in the branch, starting on the fixed or changing wage rates on each profession, when there are increasing wage rates with increasing age and similar factors. Later on, after having prepared

the plans for all branches we have to implement the increase of wage rates in accordance with the wage policy in general. But this would require a survey of the compositions of total number of workmen in the whole national economy in profession etc. because the wages are different between the various professions.

- 3.9 A special investigation is required about the regional distribution of the plants belonging to a branch. The location of a plant depends (if we don't care for strategic points of view) mainly on the principle, that there must be an optimal combination between the costs of transport in getting raw material etc. and those to bring the products of the branch to the place of their consumption from the point of view of the whole national economy. As a rule, branches using up very voluminous raw materials (like soft coal, ore, and other non-ore minerals) are to be located near the mining industry; on the other hand branches producing consumer goods are mostly to be located near the centres of the consumers. But in each case it is worth making a special inquiry to find out what may be the best way of solving this problem.

Besides this principle of the minimum of transport costs we have to take into account the development of human settlements and the given distribution (location) of skilled manpower who sometimes are with difficulty induced to move from their present dwelling places to another one. But the last mentioned reason is not acceptable in the case of heavy industry, but only in branches requiring less material and much and high skilled labour.

To solve this problem we use a map, showing

- a) the distribution of natural resources, respectively of the factories mainly yielding the raw materials, energy etc., over the country
- b) the distribution of the centres of the consumers, using the products of the branch,
- c) the present distribution of skilled manpower needed in the branch.
- d) the given transport facilities.

In larger countries it is advisable to subdivide the country into regional (economic regions, not administrative, which are to develop in an economically harmonious way) in order to investigate the main connection of supply between these regions (regional balances).

On the basis of this map and the calculations connected with the transport of the goods we are able to decide preliminarily about the location of new plants or the expansion of existing plants respectively.

Beyond this general approach there is in the branches producing electricity and gas a special problem to solve: the construction of networks for the transport of both these products (grid system)

4. After all the special investigation done we are in a position to ^{decide} _x about the most economic way of achieving the particular rate of growth. The rate of (annual) decrease in the cost of production is the most synthetic expression of the degree of the growth of economy of a certain product.

5. The long term plan targets got by this procedure are not the definitive ones, because:

a) they are not coordinated with the plans of all other sectors and branches concerning

- i) the "material balances"(equalisation of supply and demand)
- ii) the wage policy and the distribution of manpower,
- iii) the balance of foreign trade, and

b) they are also not coordinated concerning the economic proportions, ruling the development of the whole national economy (accumulation and consumption, faster development of means of production than consumer goods) which we have to do by the balance of national economy.

From this coordination will arise here and there the necessity to correct figures which leads sometimes to the complete revision of a plan.

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