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PLANNING OF INDUSTRIAL PRODUCTION IN THE USSR

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I. The main target of industrial planning is to strengthen the Socialist economy industrial base with a view to meet more completely the Soviet people's requirements, proportional development and improvement the structure of collective production, increase of its technical level and quality of products.

Important economic, social as well as scientific and technical problems are solved in the plan of developing the industry, which takes up a central place in the national economic planning (two thirds of the national product). Referred to their number are as follows:

- improvement of the production structure by means of advancing development of those industrial spheres which determine scientific and technical progress and efficient development of national economy (engineering, including the creation of perfect machine systems for reequipment of the national economic sectors on the basis of the supreme technology, chemical industry);
- optimum coordination of rates and proportions of production means (group "A") and consumed goods (group "B"), minding simultaneously still more and more complete meeting of the population's requirements;
- improvement of locating industries and regional economic connections on the basis of further speedy mastering of

natural resources;

- creation and introduction of principally new types of working tools, materials, technological processes.

2. Plan of industrial production as a complete programme of developing industries, includes tasks on the output production volumes, utilization of scientific and technical achievements in production; capital construction; labour and personnel; profits of the production cost-price, finances and credits; material and technical provision.

This lecture considers the main questions of developing a Plan of Industrial Production.

For the national economy as a whole the Plan of Industrial Production is compiled by the USSR State Planning Committee (The USSR Gosplan) at a preliminary stage proceeding from general economic and balance estimates of the USSR Gosplan departments, and further on the basis of proposals from country's Ministries and agencies. In full scope the Plan is elaborated for separate sectors by a Ministry-producer as well as for the Union Republics and economic regions.

Sectoral planning is effected by the Ministries in conformity with the classification of the national economic sectors and industrial spheres elaborated by the USSR Gosplan together with USSR Central Statistical Authority. That classification consists of I8 sectors (including the electric power) and I40 sub-sectors.

The USSR Gosplan departments are considering draft plans with participation of the Ministries, agencies and the Union Republics, State Committees for Science and Technology, Construction, Material and Technical Provision, and trade

unions. A procedure of elaborating and approving plans on industry corresponds to a general system of planning stipulated in the Lecture on organizing the USSR Planning.

3. A scope of producing the industrial output is defined in the Plan proceeding from estimates of the national economy requirements which are ordinarily done according to a reduced form of material balance (without distribution of ~~material balances~~ resources among the consumers).

Requirements in the produce of a sector is defined by the following formula:

$$P = Q^{\circ} N_o \cdot K_1 + S_t + \Delta Z + E - I$$

where:

Q - is an indicator reflecting a dependence of the sectoral production volume upon the development of other sectors and factors. For instance, for the construction materials industry this factor, viz.: construction-erection works; for engineering it will be subdivided into the produce intended for meeting new projects' requirements and replacement of equipment at operating units as well as the construction works connected with the above. A detailed estimate of requirements depends on a stage during which that estimate is carried on.

N_o - consumption rate during the base period;

K_1 - change of the rate in the base period;

S_t - consumption of the products manufactured inside the sector;

ΔZ - increase of stocks at the producing sector and other special expenditures, viz.: defense, etc.;

E - export

I - import

Indicators of the Industrial Production Plan are elaborated in physical and monetary terms, physical indicators being initial for defining the monetary ones.

To determine the planned scopes of production a unified nomenclature of the produce is applied. It consists of a list of products and units of their measuring. The nomenclature of the most important products approved in the plan by the USSR Council of Ministers and the USSR Gosplan comprises about 3 thou. items; with due account to the one planned by the Ministries and agencies it exceeds 40 thou. items.

The inclusion of the produce into the nomenclature of the national economic plan is defined by the following criteria:

- a role of the given produce in further development of the country's industrial potential and strengthening of its defensive capacity;

- a significance of the produce for heightening of the nation's living standard;

- a role of the produce for developing the external economic relations.

A unit of measuring the produce reflects as a rule the physical volume of production and its consuming properties.

The consuming properties of the produce are accounted for either by combination of double indicators, e.g.: excavators are planned by a quantity (in pcs.) and a bucket capacity (in cu.m.), or conventionally physical indicators are used for this

purpose. For instance, fuel-power resources are calculated in conventional fuel, metal-in steel of No. 3 grade, mineral fertilizer-in conventional units according to the contents of useful essence. The application of such measuring units is particularly important for coordinating the production scopes with the requirements in the output of production and technical design for evaluating the produce quality.

The production plan includes only the qualitative products that meet the technical requirements stipulated in the State standards and technical specifications. The enterprise management bears the administrative and economic responsibility including the penal responsibility for introduction of non-qualitative products in the plan and their systematic output.

For the past years the USSR has been carrying on the certification of products for three categories:

- top category that meets the highest domestic and foreign achievements. These products are given the Mark of Quality;
- first category which quality meets the modern requirements and satisfies the needs of national economy, population and export;
- second category which quality shall be improved in connecti on with the growing requirements.

With respect to the said category the plan shall envisage its improvement or discard.

There is envisaged a systematic recertification of products and revision of standard and technical specifications in force that stipulate the quality of products.

The following indicators are used in the plan:

- increase of products share with respect to the top category of quality;

- number of second-category articles to be discarded;

- number of revised standards and technical specifications.

The summarizing document to be made out for major types of products includes technical sheets that stipulate the indicators characterizing reliability, durability, level of standardization and unification of articles and compare their parameters with the highest world standards.

While planning the improvement of products quality used are relevant forecasts for a long-term perspective that are based on the analysis of tendencies of scientific and technical progress and changes in the requirements of natural economy and population.

5.The planning of production programme is directed to the perfection of public labour arrangements,development of combined specialization and cooperation of industrial production.

The planning of combination is aimed at providing for complex processing of raw materials or use of fuel,reduction of losses and wastes. It is particularly important for iron and steel industry,chemical and wood-processing industry,oil refining, food and light industries.

The level of combining is characterized by the following indicators: cost of production,obtained from a unit of raw materials and a degree of extracting useful components out of ores.

As a summarizing indicator the specific weight of the produce is used at combined enterprises in total output of the given produce evaluated in monetary or physical terms.

The production combining is coordinated as a rule with its concentration and specialization.

First and foremost the specialization is carried on in the sectors where there is a large nomenclature of production and the technological process is characterized by many operations. The sectors are as follows: engineering, building materials, chemical and light industry, wood-working.

There are subject, component and technological forms of specialization.

The indicators of specialization are as follows:

- share of production that is specialized on manufacture of individual types of machinery and equipment, component, packs and units;
- number and share of specialized shops and enterprises in the total number of enterprises, shops that manufacture the given type of products;
- share of specialized equipment in the general pool of equipment;
- share and number of standardized and unified components and packs in the total volume of its production.

The economic efficiency of specialization on economizing the current expenditure is determined by the following formula:

$$E = [(C_1+T_1) - (C_2+T_2)] \cdot B$$

where:

C_1 and C_2 - cost price of products unit prior to and after specialization;

T_1 and T_2 - transport expenditure per unit of products prior to and after specialization;

B - annual output of products after specialization.

Moreover, economizing of capital expenditure and change in labour productivity and profitability level.

The specialization plan is supplemented with the cooperation plan of enterprises in the form of supplying the products of input-output application including castings, forgings and dies, etc.

Particular attention is paid herewith to establishment of long-term direct production relations among the sectors, enterprises and economic regions.

The cooperation plan in the form of supplies of certain products is worked out for the products of input-output application and interministerial use based on the material balances.

The mutual relations between the consumers and the suppliers are regulated by the contracts.

6. The summarizing indicator of products output volume is the sold industrial products which cost includes finished articles to be supplied and payable in the planned period as well as semifinished products of domestic production and works and services of industrial character to be executed and rendered by the given enterprise.

The major part of products sold is the commodity products that, as the products sold, is estimated at the existing prices and the prices stipulated in the plan.

The change in production volume is determined by the indicator of gross products that are estimated at constant prices. The constant prices are used for a longer period of 5-6 years and over that facilitates to carry on the comparison

of sectorial products growth rates for a long-term period.

While estimating the gross products particular attention is paid to correctness of determining the average-group prices and their change with due account to expansion of varieties, increase in output of new high-quality articles.

7. To substantiate a possible volume of products the estimates of use of productive capacities are carried on, the said estimates facilitate to reveal possibilities of products output increase at the running enterprises and substantiate the required commissioning of new capacities in the planned period.

The production capacity of enterprise is a maximum possible output of products that reflects the introduction of progressive technology for improving the arrangement of production and labour.

The production capacity is quantitatively estimated by the capacity of key equipment for the given enterprise. The fund of operation time of the said equipment is estimated with due account of maximum use of equipment by time after deduction of the time required for maintenance and repairs.

Upon expiration of mastering time the production capacity will exceed the designed capacity due to carrying on the arrangements that reflect the constant process of improvement of production technology and organization.

The estimates take into account the designed capacity with respect to new enterprises that operate but not yet achieved the production equal to the designed capacity. The sum of capacities of individual enterprises makes out the production capacity of a sector for output of products of a given type.

The output of products from capacities for each year of the planned period is determined on the basis of average annual estimated capacity and the planned coefficient of its use.

The existing average annual capacity is determined on the basis of time periods of its functioning per annum. For instance, the enterprise has a designed capacity of 100 units and starts to function in the first quarter, i.e. it operates three quarters a year, therefore its average annual capacity is equal to

$$100 \times \frac{3}{4} = 75$$

For the five-year plan when the specific commencing time of functionning or stoppage of enterprise activities has not been clearly fixed, the coefficient 0.35 is used, this coefficient has been previously estimated on the basis of analysis of actual data for industry as a whole.

The plan coefficient of existing average annual capacity takes into account any improvement of conditions for the enterprise operation in the stipulated period proceeding from reduction of equipment idle time:

a) due to various reasons (lack of raw materials, fuel, skilled manpower, etc.);

b) improvement in arrangement of production and labour, reduction of working time losses;

c) improvement in joint coordinated work of enterprise shops;

d) fuller mastering of new capacities.

The planning of production capacities use is based on the detailed analysis of system that characterizes the feasibility indicators. They include first and foremost a degree of equipment use, output of products from the key equipment or output from one sq.m. of production space, output per one machine, etc.

The equipment use by time: shift factor of equipment operation, its operating conditions, working time losses for the base period and their possible elimination; smooth operation of enterprise by time (beginning and end of a month).

Losses of products due to drawbacks in the materials supply.

As a result of analysis determined is a quantitative level, reached and possible, of capacities use as well as the arrangements to be carried on.

The change of capacity in the plan period is given with respect to three sections:

1. At enterprises running as on the beginning of plan period;
2. To be commissioned within the plan period;
3. total (1+2=3).

The first section determines an increase in capacities, the said increase is achieved mostly due to organizational and technical arrangements.

The organizational and technical arrangements include: intensification of production processes (introduction of higher speeds, voltage, pressure, temperature, etc.), modernization and replacement of obsolete equipment, installation of additional equipment at existing production areas, improvement of quality

of raw materials and basic materials and other arrangements that reflect the impact of technological progress, cooperation development and production specialization, introduction of scientific organization of labour and production.

The USSR industry plans an annual increase of capacity from 3% to 5% due to the said factor.

The succession of estimates of production capacities:

a) determination of capacity at the beginning of a year. The data are taken for the base year from the previously composed plan or by its assessment or from the actual statistical data;

b) increase in capacity due to the above organizational and technical arrangements;

c) expansion of capacity of newly commissioned enterprises in the planned year taking into account that they will operate within a year.

The general commissioning of capacity is based on the estimates that the capacity increases and will function within a year;

d) failure of capacity is given from the estimates that the capacity decreases within a year.

The average annual capacity shows what capacity functions at an average per annum proceeding from the stipulated time of implementation of all arrangements. It is estimated according to the following formula:

$$M_s = M_o + M_T K_1 + M_w K_2 - M_L K_3$$

where:

M_o - capacity at the beginning of a year;

M_T - increase in capacity due to organizational and technical arrangements;

M_w - putting capacity out of operation;

K_1, K_2, K_3 - coefficients that indicate participation of capacities at an average on the process of production.

The coefficient of capacity use of running enterprises (K_i) is determined with due account to its increase as against the achieved one for the base period.

The output of products (P) is determined

$$P = M_s K_i$$

While analysing the operation of enterprises for the past period the coefficient of capacity use shows the results of productive activities.

$$K_i = \frac{P}{M_3}$$

When Section I has been estimated, Section II shall be estimated as well. Section III is estimated as the total of Section I and Section II. (See: numerical conventional example-Appendix No.1)

The estimates of production capacities use shall be the basic substantiation of production capacities balance that may be given in the following formalized shape:

$$M_{\Pi} = M_o + M_M + M_P \pm M_{\Pi} - M_B$$

where:

M_{Π} - production capacity at the end of planned period;

M_o - production capacity at the beginning of planned period;

M_M - increase in capacity due to organizational and technical arrangements;

M_p - increase in capacity due to new construction, expansion and r reconstruction of enterprise;

M_n - increase (+),decrease (-) in connection with any change of nomenclature and varieties of products to be output;

M_B - decrease of capacity due to its failure.

Annual reports on change in production capacities are made according to the above formula. The statistical bodies summarize the said data with respect to analogous products to be output by various Ministries and agencies of the country. The said statistical data are one of the important documents to be used at elaboration of production plan.

8. The peculiarity of forming the sectoral plan of industrial production is an iteration of its elaboration. In the progress of plan formation the production volumes are coordinated with respect to material,labour and financial resources to be provided,problems of rational distribution of productive forces in the country's economic regions are considered,more effective ways of improvement of intersectoral relations are determined. Therefore, the most effective alternative of sector development is found as a result of gradual optimization.

The national economic plan reflects truly the major existing intersectoral relations that determine qualitative and quantitative sides of sectors development in physical and

aggregate monetary terms. Physical relations act hereby as primary ones and monetary relations - as derivative. Some estimates include monetary indicators to be used as the scales for measuring the physical volumes products, i.e. it concerns again a change of various physical relations.

The basic principles of planning of intersectoral relations use the laws of socialist society development. The succession of intersectoral plan formation is given in the diagram (See Appendix No. 2).

The central problem of industrial development is to determine its sectoral structure for the plan period.

In this respect while forming the strategy of industrial development the sectors of industry and the sectors of material production are groupped in the complexes with due account to their functions and place in the material production, intersectoral relations and interchangeability of products.

The most important complex is a complex of sectors that produce structural materials (iron and steel industry, chemical industry with respect to plastics and chemical fibres, building materials). These are the sectors which articles are the basis of products. While determining the trend of industrial development the said complex as well as the fuel and power complex are the decisive ones.

The fuel and power complex includes electrical power, petrogas, coal and other sectors that provide fuel and power resources to the national economy.

The enginaering industry is a separate complex that provides for reimbursement of fixed assets and expanded reproduction.

The construction and building industry are formulated in a building complex. The transport and communications being a basis of infrastructure are the important complex in material production as well.

The trade, material and technical supply and procurements are formulated in a separate complex that depends fully on industrial development,agroindustrial complex and consumer goods complex.

The agroindustrial complex includes agriculture and food industry.

The consumer goods complex combines light industry,engineering and chemical industry to the extent of consumer goods production.

Proceeding from the data on sector possibilities obtained at sectoral estimates the sector structure is formed bearing upon the material balances of major products. Thus, the fuel and power complex considers firstly the total requirement in the conventional fuel and then the possible structural of electric power, coal,petroleum,gas and other fuel resources in physical indicators. Distinguished hereby are the major trends of resources use: furnace oil fuel, engine energy.

To form an effective structure the receipt of each type of resource with respect to the major technological methods of its production is considered. For instance, electric power generated by the hydraulic power stations, thermal and nuclear power stations. While determining the volumes of products output

we strive for top-priority development of the most economical production methods at the present stage of technical progress development with a view of increasing social efficiency.

9. To reach a balance of complexes products the following basic methods are used:

a) most full use of internal resources of materials consumption due to decrease of consumption rates. The impact of technological progress is strengthened and organizational arrangements for rational use of resources and their interchangeability are worked out;

b) change in the export-import balance of sectors based on the proposals of foreign trade organizations;

c) increase of production volumes due to rising a coefficient of production capacity use and, if it is not possible, relevant decrease of stipulated plan volumes of production.

The foreign trade organizations that submit their proposals to the USSR Gosplan department concerned determine the preliminary volumes of imports when the production volume is not known. There are considered hereby world market requirements, forecast of any change in world prices and available offers. The following requirements are attached to the said proposals:

a) improvement of foreign traden efficiency, i.e. maintenance of active balance;

b) keeping minimum of achieved import level of commodities to be not produced in the country that are raw materials for industry.

For competitive commodities to be produced in the country the import shall be carried on as a rule, provided an increase in

production of these commodities for the planned period requires considerable capital investments that go beyond the limits of a sector, or the quality of commodities surpasses greatly the quality of domestic production commodities. As usual, the said cases are thoroughly considered and the section of new technology shall contain relevant arrangements for improvement of goods quality.

10. Technics of elaborating the mutually agreed plan decisions are a multistage and consecutive process. This process uses usually, as a rule, direct relations referred to in the diagram as well as reverse procedure of estimates (in our planning we apply a term as reverse relations).

To work out the detailed direct plan estimates it is required to have wide-range actual information and,in particular,rated one. Application of by-factor estimates created conditions for introduction of economic and mathematical methods. The said conditions promoted to create different principles for use of econometric methods in the Soviet economic science. The principles to be different by contents,although to be similar outwardly by mathematical apparatus to the principled used in the West.

The distinctive feature is as follows:

- basic understandings of socialist reproduction;
- formation of initial information based on social problems faced by the society and selection of relevant criteria;
- multiform coverage of material production in physical and monetary terms.

Tested economic and mathematical methods to be applied now in the practice of socialist planning may be briefly classified as follows:

Levels of planning	National economic and input-output models, intercommodity models	Direct plan estimates with use of computers
National economic	1. Dynamic monetary input-output balance for 18 sectors	Estimates of investments. Determination of requirements in material resources for capital construction, engineering etc. Processing of plans of commodities import and export, labour and personnel, vocational training, cost price and profit (individual factors). The estimate of requirements in materials is centralized for over 89 material resources.
	2. Physical-monetary input-output balance for 260 commodities and major Ministries and agencies.	
Sectoral	Intercommodity sectoral blocks on the principle of input-output balance (chemical industry, light and food industries, building materials).	
	Optimum diagrams of development and distribution of major individual commodities, e.g. cement, vegetable oil, leather footwear, etc.	Besides, metal products for 103 fund holders, 60 sectors with nomenclature of over 3000 items for the annual plan.
Enterprises and corporations	Model of enterprise matrix plan is worked out and experimentally applied	Algorythmic plan estimates of longterm plan of enterprise, corporation

Elaboration of automized system of plan estimates

The USSR has established a network of computing centres which work is coordinated by the USSR State Computing Centre of the USSR Gosplan.

Apart from the above estimates the State Computing Centre of the USSR Gosplan carries on the comprehensive research work on methodology in collaboration with the Scientific Research Institute for Economics with the USSR Gosplan, the Scientific Research Institute for Planning and Norms with the USSR Gosplan and other Institutes of the USSR Academy of Sciences, Ministries and Agencies for establishing a system of plan automized estimates.

Appendix No. 1

Tentative estimates of production capacity use

(provisional figures)

	site code	base year	Planned years of five-year period				
			1	2	3	4	5
1. Running enterprises							
Capacity at the beginning of a year	01	1000	1030	1065	1105	1145	1185
Increase of capacity due to organizational and technical arrangements	02	50	60	70	75	80	85
Commissioning of capacity	03	-	-	-	-	-	-
Putting capacity out of operation	04	20	25	30	35	40	45
Average annual capacity (sph.I+(line2+line03 - line04)	05	1105	1168	1205	1245	1285	1325
	0,35						
Coefficient of use	06	95,9	97,6	99	99,3	99,6	99,8
Output of products (line05+ x line0,6)	0,7	1059,5	1140	1193,1	1236,1	1280,4	1322,6
II. New capacities							
Capacity at the beginning of a year	08	0	0	70	151	237,5	331,8
Commissioning of capacity	09	0	70	81	86,5	94,3	100
Average annual capacity	10	0	24,5	98,3	181,3	270,5	366,8
Total output including:	11	0	14,7	73	153	240	333,9
from capacities to be commissioned in 1st year	12	0	14,7	56	70	70	70

		1	2	3	4	5	6	7
2nd year	13	0	0	17	64,8	81	81	
3rd year	14	0	0	0	18,2	69,2	86,5	
4th year	15	0	0	0	0	19,8	75,4	
5th year	16	0	0	0	0	0	21	
Coefficient of use of average annual capacity in %%								
in 1st year	17	0	60	80	100	100	100	
2nd year	18	0	0	60	80	100	100	
3rd year	19	0	0	0	60	80	100	
4th year	20	0	0	0	0	60	80	
5th year	21	0	0	0	0	0	80	
III.Use of all capacities								
Capacity at the beginning of a year	22	1060	1156	1261	1382	1508,5	1642,8	
Increase of capacity	23	116	130	151	161,5	174,3	185	
Putting capacity out of operation	24	20	25	30	35	40	45	
Average annual capacity	25	1105	1192,5	1303,3	1426,3	1556,5	1691,8	
Output of products	26	1059,5	1154,7	1266,1	1389,1	1520,4	1656,5	
Coefficient of use of average annual capacity (in percentage)	27	95,9	96,8	97,2	97,5	97,8	97,9	

To determine the required commissioning of production capacities the procedure of estimates shall be changed. The output of products at the running capacities is deducted from the requirements in products. The obtained remainder is divided by an average coefficient of new capacities use in the plan period. The required increase of production capacities for the plan period will be the result of estimates.

Appendix No. 2

Succession of formation of sectoral plan may be shown as follows: