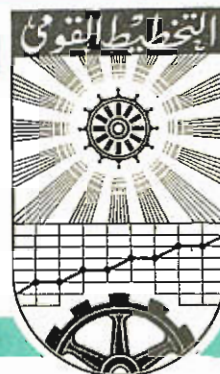


# UNITED ARAB REPUBLIC

## THE INSTITUTE OF NATIONAL PLANNING



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SYSTEM  
OF ECONOMIC PLANS, INDICATORS  
AND NORMS.

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## I N T R O D U C T I O N

Transition to the planned economy is the natural result of social development. Material incentives of planned economic development appear on the basis of the high production forces level and thanks to the transformation of private ownership of the basic means of production into public ownership.

Development of social production under any social system requires certain proportionality, i.e. certain consistency among various branches and economic spheres. Planned, but not spontaneous introduction of proportionality is internally characteristic of the society in which the economic basis is provided by the state ownership. Under these circumstances definite proportions between different economic branches, between productive and unproductive spheres, between production and consumption, distribution and circulation are to be established consciously and in the planned form, i.e. planned economic management means constant proportionality of the national economy consciously maintained by the society.

Proportional economic development presupposes observance of certain relationships in distribution of means of production and manpower among economic branches. These relationships are of objective nature. They take shape depending on concrete historical, political and economic conditions. Under their establishment it is necessary to proceed from the international situation and the attained production level taking into consideration the targets which the society confronts at this or other stage of economic and cultural development.

Planned management of an economy presupposes united actions of all the workers of the society and provision for the appropriate proportionality in economic development of all the branches integrally connected by social division of labour. Therefore planning of the national economy is one of the most significant manifestations of economico-organizational state function. Provision for uninterrupted rapid development and production perfection with use made of up-to-date experience, progress of science and technology is the principal objective of planning the national economy. The state policy aimed at ensuring planned proportional development in conformity with the requirements of the developing society is carried out in the process of planning. The national-economic plan represents a system of interrelated targets, in the field of developing the economy and culture, consciously realizable by the state. In accordance with these requirements planning-economic organs make efforts to provide for the appropriate consistency among all aspects of productive progress and the fulfilment of the plan.

## I. SYSTEM OF NATIONAL ECONOMIC PLANS.

Planned management requires the combination of development plans for the national economy and their separate parts. In the over-all state development plan it is impossible to reflect concretely and in sufficient detail all the economic phenomena occurring in particular spheres, branches, administrations, enterprises and territories. Enterprise plans are generalized and coordinated following the administrative line. Every higher respective administration unit coordinates and generalizes plans of the enterprises and institutions under their authority.

## SECTIONS OF THE STATE DEVELOPMENT PLAN

The state development plan targets combine the whole complicated process of expanded reproduction and find their reflection in a great number of indicators. To make the plan an

important means of economic management, its targets must be grouped according to the principle of economic homogeneity within respective sections. This plan targets grouping into sections cannot be arbitrary. It is stipulated by the plan content and the nature of the reproduction process itself.

Decisive part in the process of reproduction belongs to production. That is why the first state development plan sections are devoted to major branches of social production. To these refer plans of the industry, agriculture, forestry, transportation and communication.

The "Industrial Plan" section determines the targets for manufacturing major industrial goods in physical terms, for the development of new technique, specialization, cooperation, combining in industry.

The targets on industrial output in money terms are also set.

The section "Plan for Agriculture and Forestry" determines the amount of state purchases of agricultural products, projects the output of crops and animal produce, gives balance estimates of basic gross agricultural production resources, sets the targets for mechanization, irrigation and establishes indicators for forestry development.

The section "Transportation and Communication Plan" contains the targets for freight and passenger traffic services, for the utilization of the rolling transportation stock and the development of its technical base, besides, the targets for communication development.

The three above sections, taken together, are generally called the production programme of the national economic plan.

The state development plan section "Plan for Capital Investments" determines the targets for putting productive capacities and fixed capital into operation, for the capital investment volumes, their structure and direction. Project-research work is carried out and the programme of building-assembling work and mechanization of construction is established within this section.

The "Plan for Geological Surveys" reflects the scope and composition of geological prospecting and sets the targets for the increase of natural resources having been newly found.

The state development plan section "Labour and Personnel" contains the targets for labour productivity in industry, agriculture and construction, the plan indicates the amount of workers and employees planned for the national economic branches, determines, on the average, wages and salaries, the fund of wages and salaries, the plan decisions on qualified personnel training.

Costs of production and circulation also find their reflection in the state development plan. This summary section is very important. It contains indicators for production costs, costs of freight traffic and building-assembling work and also for costs in trade turnover and in state purchases.

Thus, not only the process of production and capital construction is determined by the plan, but the plan also regulates planned distribution and utilization of manpower, sets the input norms of social labour for production and commodity circulation.

The section of material and cultural standards of population holds an important position in the state development plan. This includes the commodity turnover plan, cultural construction plan, plan of public utilities and health services. The plan for cultural construction contains the targets for the development of

education, science and culture and the plan for public health services - the indicators of medical aid rendered to population.

The state development plan contains also estimates of manufacturing social product and the national income estimates, estimates of the movement of fixed assets within national economic branches, estimates for the balance of incomes and outlays of population, for the balance of financial resources and their utilization.

The plan also provides summary indicators for the population living standard level to be made higher; the estimates of actual incomes of population and the social consumption fund estimates.

Besides, the state budget is compiled together with credit plan and other financial plans, plans for material technical supplies and for foreign trade.<sup>\*)</sup>

Plans are mapped for different time periods. Some are compiled for a longer period and called long-term or perspective plans, others - for a shorter period and called current plans.

Two main types of long-term plans (projections) are utilized in the practice of planning the national economy - general, which cover several five-year periods and five year plans.

General long-term projections reflect strategic problems of economic development and determine the ways to solve them. These projections provide orientation for economic development during a long period of time and make it possible to utilize more efficiently material, labour and financial resources. Long-term projections, however, can determine only the most general targets and only with known extent of iteration, therefore five year plans are compiled on a level with them.

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\*) The system of plans for the national economy is observed in brief, schematically in the given work, only as an introduction to the following sections and works.

In five year plans the targets of long-term projections are made more concrete and accurate considering the way of its fulfilment.

The five year plan break-down into one year periods contributes to its greater concreteness and efficiency.

Annual five year plan decisions are made more accurate and concrete every year. This is done through amendments and additions to the annual targets of the five year plan with account being taken of the way it was previously fulfilled.

Thus ~~is reached the~~ organic coordination of long-term projections and current plans.

## II. SYSTEM OF INDICATORS FOR THE STATE DEVELOPMENT PLAN.

Plan targets must be maximum concrete to play their part successfully. Therefore the expression of plan targets in a system of indicators is the necessary requisite for the planned work.

The system of indicators must fall in line with the following requirements:

- so far as this or other plan indicator cannot characterize every aspect of complicated economic phenomena, a differentiated system of indicators becomes necessary;
- it is also necessary to have unification between plan indicators and accountancy indicators, which are applied to characterize one and the same economic phenomena at all economic organs;
- the plan indicators system should not be extremely cumbersome;

- plan indicators must provide for moral and material interest from the part of workers, when establishing for them higher plan indicators so that they can be successfully fulfilled and overfulfilled.

According to their economic purpose plan indicators are subdivided into quantitative and qualitative.

Quantitative indicators characterize the quantitative aspect of phenomena, e.g. the amount of extracted coal, petroleum, volume of gross output in industry, number of freight loads and passengers, etc.

Quantitative indicators are contained in all the state development plan aspects and are of great importance in planning. Qualitative indicators are utilized to characterize the qualitative aspect of economic phenomena and processes. They are divided into technical-economic and economic.

Technical economic indicators are applied to show the extent of efficiency while utilizing separate kinds of means and objects of labour and also the efficiency of consuming the work time. To these are referred the indicators of consuming the raw materials, materials and fuel per unit of output, equipment productivity, production space and productive capacities and per units of separate types of labour means. (the coefficient of utilizing the useful capacity of a blast furnace, steel output per one  $M^2$  of production space of an open furnace's hearth, the coefficient of utilizing equipment, etc.)

Economic indicators characterize the extent to which production is economical and well organized. These are the indicators of labour productivity, profitability, production costs, etc.

Qualitative and quantitative indicators are closely inter-related and depend on each other.

Indicators are subdivided into physical and value or money indicators according to the terms in which they are expressed.

Physical indicators express certain physical properties of use value (weight, length, breadth, etc.).

The application of the law of value provides the basis for value (money) indicators, which express in money terms the amount of inputs of social labour embodied in the product. Physical indicators are of great significance in planning the national economy. With their aid the appropriate relationships are established in the development of related productions (ore extraction and metal smelting, output of electric power and fuel etc.).

Physical indicators which express physical volumes do not depend on price fluctuations. They the most concretely define the targets for the output of production, e.g. to melt so many tons of metal, or manufacture so many pairs of shoes, etc. The sphere of the physical indicators' application, however, is confined to the framework of homogeneous products. It is impossible with their aid to show the whole industrial output or even of a single enterprise of it is engaged in manufacturing heterogeneous produce. Without value indicators it is impossible to fix the relationships between different subdivisions of social production, between production, accumulation and consumption.

Value indicators are utilized to plan capital investments, accumulation, national income, labour productivity, production, etc.

To improve physical and value indicators is one of the most significant tasks of planning.

Indicators, according to the way they are fixed and utilized, are subdivided into approved and calculated.

The approved indicators comprise those which are included into the approved state development plan. The most significant economic phenomena are expressed by them.

The calculated indicators are utilized to substantiate the indicators which are to be approved.

For instance, the plan contains as the approved indicators, those of the output of cast-iron and steel, coal and petroleum extraction, the output of other vitally important products. To substantiate these targets (indicators) in the process of plan elaboration the indicators of production capacities of the corresponding industrial branches are calculated in virtue of the fact that the plan of this or other output depends, to a considerable extent, on the productive capacity of the branch. The number of calculated indicators is greater than of those which are approved.

Thus, the state economic development planning makes use of not only one indicator to substantiate the respective estimates in a comprehensive economic way, but a system of interrelated indicators which in combination make it possible to determine properly the dynamics of state economic development.

The combination of indicators, characterizing the condition and regular features of the phenomenon under study and its development together with the interrelationships of its different aspects, forms the system of indicators.

Plan and statistical indicators can refer to the national economy as a whole or to its particular parts (branches, enterprises). In this connection they distinguish the national economic indicators, which comprise all the branches, the branch indicators, referring to a certain branch of the national economy (the volume of industrial output, agricultural output, construction and engineering output, etc.) and also the indicators for an individual enterprise.

The national economic indicators combine the indicator of the gross social product, embracing the output of all production branches, the indicator of national wealth, which sums up the whole volume of national wealth, etc.

The system of indicators consists of a great number of different in their content indicators. These are the indicators characterizing the volume of material production, circulation and distribution of output; these are the total sum of accumulation, capital investments, the total sum of consumption, training of personnel, material and financial reserves.

As an example, the inventory of major indicators for the elaboration of the Draft State Development five-year Plan of the USSR is given in the appendix.

In the course of economic development of the society the system of indicators varies. Some indicators disappear and give way to new ones. Thus, in 1965, in the USSR, the economic reform took place and influenced also the system of indicators with a view to improve planning and industrial management.

Thus, properly elaborated system of indicators for the state development plan is of paramount importance for concrete estimation and substantiation of different aspects of the national economic development.

### III. NORMATIVE BASIS IN PLANNING.

#### 1) System of Norms and their Significance.

The creation of a harmonious system of scientifically sound norms is of special significance for state development planning. By the norm we mean the socially necessary inputs of man and materialized labour per unit of output or work. Norms provide the basis for planning the inputs of man and materialized labour.

They contribute to the proportionality of production development in conformity with the requirements of economic laws and with account taken of the objective conditions of the given branch or enterprise. The availability of progressive norms is the most important requisite for planned economic management. The substantiation of the plan and its indicators is determined by the substantiation and progressiveness of the corresponding technical-economic norms which require sound scientific substantiation and the reflection through their medium of the progressive production experience. The analysis of productive activities, revelation of new reserves are most fully put into practice on the basis of revealed causes of deviations from norms. The development of science and technology, improvement of the labour and production organization, rise in the cultural and professional standards of workers causes respective changes in the productive processes and their elements. Therefore norms must be systematically revised.

Norms are the most important instrument to determine plan requirements of the national economy for material, labour and financial resources. The coordination of the state development plan by different sections and indicators rests on the elaboration of economic norms for the utilization of material, labour and financial resources.

The norms utilized in planning can be divided into 4 groups:

1. norms of labour, material, raw material, fuel, electric power inputs per unit of output or work;
2. norms for the utilization of machinery, equipment and production space;
3. norms for the efficiency of productive activities;
4. consumption norms for manufactured goods and food stuffs.

The norms of the first group, which determine the amount of this or that input resource for the output, are measured by minutes, hours, items, kilogrammes, tons, metres, litres, etc. Planned calculations of the requirement for all the resources necessary in order to fulfil national plans are made on their basis. The second group comprises the norms which limit the equipment functioning, the utilization of production space. These are, for instance, the norms for depreciation allowances, working shifts, output capacity, capital intensivity of output. The norms characterizing the efficiency of branch and enterprise activities (functioning) refer to the third group. E.g. profitability, production cost etc. These norms are mainly given in value terms.

The fourth group represents the norms of personal and productive consumption of foodstuffs and manufactured goods. The consumption norms for population are determined by the inventory of products and services necessary for all-round physical and intellectual development of MAN with account of the level of real incomes of population.

Norms are elaborated and fixed within 3 scopes:

- the norms for plants, enterprises, workshops (establishments);
- the branch norms, utilized within the limits of a branch;
- the inter-branch norms (national-economic), applied in various branches of the national economy.

So far as the problems of norms are connected with the problems of planned inter-branch balance construction and inter-branch relationship investigations, the given work treats only of the problems of labour norms and in greater detail - of the questions of norms for material resources.

## 2) Norms for Labour Inputs.

Labour norms is a measuring instrument of labour inputs to do certain amount of work, the volume of work being taken as a unit of measure. It includes norms of time per unit of output, norms of services and the number of workers.

Labour norms play an important part in planning and organization of production. One cannot do without norms to estimate the quantity of the required manpower, payments for labour, the output volume.

Experimental-statistical and analytical norms for labour exist at enterprises. Experimental-statistical norms are fixed on the basis of the accountancy data for former periods or else on the basis of the norm-fixer's (foreman) personal experience.

The norms, fixed by way of the analytical-estimation method proceeding from progressive technique, technology, organization of labour and the innovator's experience in production are technically substantiated.

The priority application of analytical norms is economically expedient, as they stimulate the worker's aspiration to raise his professional skill, labour productivity, to utilize more fully working hours. Whereas the experimental-statistical norms frequently appear to be lower, having great reserves. They are easily exceeded, over fulfilled, do not contribute to the appropriate labour productivity and the necessary stimulus to raise professional skill.

The norms for time, output and services (maintenance) are fixed at enterprises.

The norm for time (time rate) is the time fixed to produce one unit of output or perform a production operation (in hours, minutes, etc.).

The norm for output (output standard) is the necessary number of articles made, or operation performed per working shift or hour by the worker. The output norm per shift equals to the length of the work shift divided by the norm for time. If, for example, the time norm to produce one article is 12 min. then the output norm per 7 hh. shift must be 35 articles ( $420:12$ ).

At the auxiliary work, where no concrete output (products) is produced and it is impossible to determine the norm for output, the norms for services (maintenance) are fixed. They are fixed taking into account the utmost utilization of the working day, the possibility to combine several professions. These norms determine how many equipment units or which section of production are to be attended to (maintained) by the workers, e.g. the maintenance norm of an adjuster is 20 metal-cutting lathes.

Norms are calculated as follows:

Any kind of work is divided into operations, and every operation - into its component working methods, labour movements. For instance, in engineering, the operation of cutting the butt-end of a component article for some machine on a metal-cutting lathe consists of the following elements: taking the component part and putting it into the jaw-chuck, fixing the article in the jaw-chuck, switching on the lathe, bringing the cutter to it, cutting the butt-end, putting the cutter aside, stopping the lathe, getting the article out of the jaw-chuck and putting it into a box.

All the efficient time consumed to perform the operation is included into the norm. The norming time consists of several components parts. First of all preparatory - concluding time is

distinguished which is fixed for a group of homogeneous articles, and piece time - the time for processing or manufacturing one article.

Preparatory-concluding time is such, which is consumed by the worker to get acquainted with the task and draft, to receive materials, instruments, devices, to adjust the working place and equipment, to fix and remove the instruments, to hand in ready products (manufactured articles), the instruments and devices.

Piece-time consists of several components parts: principal and auxilliary operating time, the time of looking after the place of work and instruments, and the time of intervals for rest.

Principal time is such which is consumed directly on changing the form and size of the processed article (by means of forging, cutting, drilling), its structure and properties (by means of thermal or chemical treatment), changing its outlook (by means of painting, polishing).

Auxilliary time is that which is consumed to perform some work of auxilliary nature - fixing and taking off the processed article, measuring, handling the equipment, etc.

Principal and auxilliary time taken together make up operating time.

Part of working hours is consumed on adjusting the equipment, exchange of instruments, sharpening the instruments, oiling the machinery. This is the time of looking after the place of work and instruments.

The time of intervals for rest is included into the norm only at hard work, in mines, at a conveyor or production line, under high temperature, etc.

Principal time at machining works is fixed by way of calculations (number of revolutions of the spindle, depth of cutting, the velocity of processing, etc.), all other norming elements are determined by observation methods.

To fix the time norm for an operation it is necessary to determine rational rates of operating equipment and the appropriate amount of time to be consumed.

Labour norms are distinctive according to the degree of their aggregation. Those which characterize individual working elements (actions, methods of work) refer to differentiated norms. Other norms, estimated in respect to complexes of elements are called aggregated.

According to the sphere of allocation labour norms can be : general industrial, which are applied at the enterprises of different branches producing homogeneous output or performing identical work; branch norms applied at the enterprises of one branch of industry; local norms - applied within one or a group of homogeneous enterprises.

So far as the norms are fixed proceeding from concrete circumstances, it is necessary to amend, revise them systematically with account taken of technological provision, improvement of production and labour organization, rationalization of some operations, the achievements of technology and innovators.

### 3. NORMS FOR THE UTILIZATION OF MATERIAL RESOURCES.

The norming for the utilization of material resources is the establishment of planned measures for the utilization of raw materials, fuel, materials, electric power to produce output or perform a certain volume of work. It comprises the elaboration of input norms for material resources, their approval and organizational measures to provide for the realization of the norms.

The norm for the utilization of material resources is an important requisite of planning production, distributing and consuming material resources. It is a means to fix proper proportions while distributing means of production among the national economic branches. The requirements of enterprises, establishments, branches for material resources are determined on the basis of their norms of inputs. Such norms provide the basis for elaborating material balances and plans for output distribution, they are utilized in the activities of material technical supply authorities.

Norms for the utilization of materials contribute to implementing new-technique, mastering progressive technological processes, reducing production costs and improving financial transactions of enterprises. They stimulate the workers to reveal internal reserves of production, new sources of economizing material resources.

a) Classification of Input Norms for Material Resources.

The input norms for material resources applied in industry are classified in the following directions:

- a) according to the purpose of materials in the process of production the norms are subdivided into the norms for the utilization of raw-materials and basic materials and the norms for the utilization of auxiliary materials.

The proportion character of materials in the creation of a ready product determines the peculiarities in the methods of elaborating both the groups of norms. From the standpoint of economic science fuel and electric power also refer to auxiliary materials but in view of their great significance

for the national economy and specific features of the methods for their estimation, the norms for their utilization are singled out into individual groups;

- b) according to the time of functioning the input norms for material resources are subdivided into long-term (perspective) norms which are to be reached in a number of years;  
annual (quarterly) norms, which determine the input of materials per unit of output for the year (quarter) on the average;

Operative-technical norms, functioning under the current organizational-technical circumstances of production and utilized for the elaboration of operative plans.

- c) according to the extent of generalizing in norms the productive circumstances of consuming materials they distinguish individual norms which fix the input of materials for a certain type of output under concrete organizational-technological circumstances of the given enterprise,  
and group norms (combined), limiting the amount of input material resources to produce the same type (kind) of output within enterprises, ministries and their subordinated specialized departments and the national economy as a whole.
- d) according to the extent of detail of the object the norm for which is being given, they distinguish the norms per one component part, ready article and per one component complex.

e) according to the extent of detail of the normed materials the norms are subdivided into the summary norms, which are elaborated according to the aggregated nomenclature of materials and utilized for the purpose of drawing up annual applications;

and the specified norms, are elaborated according to the detailed (specified) nomenclature of materials and utilized to determine the requirements for every concrete type, sort or size of materials.

The choice of a measuring instrument for the expenditure of material resources, i.e. the choice of an object, at which the consumption of material is aimed, is an essential question when elaborating norms. Finished products are the input measuring instrument for raw and basic materials, for instance, the consumption of iron ore and coke is rated per 1 ton of cast-iron, the consumption of rolled ferrous metals is rated in order to manufacture particular lathes, engines, cranes, etc. .

Auxilliary materials, directly participating in the basic technological process and which are part of a ready product can also be rated (rationed) per unit of ready output, for instance - the consumption of fuel per 1 ton of melted metal, the consumption of paint per 1 motor car, etc. .

For most of auxilliary materials, however, this measuring instrument is unacceptable and it is necessary, therefore, to find a specific indicator for the purpose.

Thus, for the auxilliary materials which are necessary when the instruments of labour are operated, the most suitable measuring instrument is a time unit for the functioning of the equipment; for instance, the expenditure of lubricating oil is rated (normed) per one hour of a lathe's functioning. The auxilliary materials consumed on different kinds of repairs are rated

per some concrete volume of repair work or per some arbitrary unit of the repairing complicity. (the degree of the repair work's complicity)

b) Methods of Setting Norms for the Utilization of Material Resources.

Three principal methods are applied in the practice of setting norms for the utilization of material resources: analytical-calculation method, accountancy-statistical method and experimental.

Analytical-calculation (or technical-analytical) method is the most progressive and scientifically sound. The essence of it consists in the fact that the elaboration of norms is carried out on the basis of careful analysis of the production conditions under which materials are consumed and of the technical computations for the amount material inputs to manufacture products. Norms for the utilization of material resources are elaborated on the basis of technical computations, drafts and technological maps. Under their elaboration the possibilities of making fuller use of material resources on the basis of technological achievements and the experience of innovators are taken into consideration. The elaboration of organizational and technical measures to economize materials, their economic efficiency and time limits for their implementation are put into practice on this basis. All this enables us to calculate and evaluate the level of progressive norms for the utilization of materials during the planned period.

Accountancy-statistical method consists in the fact that the norms are fixed on the basis of accountancy data about the actual utilization of materials during former periods. This method makes it legal within the norms the existence during the accountancy period of losses and over-expenditures of materials

and transfers them to the planned period, the fact which secures hereby imperfect methods of production organization and irrational utilization of material resources.

Experimental method of setting norms lies in the establishment of norms by way of conducting experiments on the utilization of particular materials.

Depending on the circumstances under which the experiments are conducted the method under study is subdivided into the experimental-laboratory method and the production-experimental method.

Experimental method is applied in cases when other means of setting norms do not secure the appropriate accuracy of the norms under elaboration or appear to be extremely complicated.

Norms for the utilization of material resources should not be too high or too low. The higher norms lead to over-expenditures or to the superfluous stocks of material values, which immobilizes state reserves. Such norms give way to negligence and self-consolation, put an obstacle on the way of reasonable economizing materials. The lower norms are also harmful. They can entail the shortage of material resources. But in the course of improving the technology of production norms for the utilization of materials are revised and made lower on a sound basis.

The significant sources of reducing norms for the utilization of material resources are: weight decrease of the machinery items coupled with the rise in their productivity, implementation of progressive technology, application of economic substitutes, maximum utilization of waste materials.

Norms are fixed in respect to some concrete equipment or a technological process. The norm generally comprises: firstly the net consumption of materials (raw materials) which are physically part of finished products, secondly, the planned losses of materials connected with the technology of processing products.

Norm for the consumption = Net Weight of the + Losses and waste  
of materials products of materials.

For the greater part of materials the structure of the norm is identical and can be expressed by the following formula:

$$N_c = W_{NET} + \sum (S_1 - S_{u_1}) + \sum (S_2 + S_{u_2}),$$

where  $W_{NET}$  is the net consumption of material ,

$\sum (S_1 - S_{u_1})$  - the sum of technological wastes and losses with the deduction of those which are utilized again,

and  $\sum (S_2 - S_{u_2})$  - other organizational - technical wastes with the deduction of those which are utilized again.

The quantity of useful or net consumption of materials depends on the design of the product, on the quality of the materials applied and is determined by the net weight of the manufactured product, by the actual consumption of fuel or electric power leaving out of account any wastes or losses.

The useful consumption of material resources to produce output is determined by theoretical formulas or by way of direct measuring, weighing. For example, to find the net weight of a steel rod, the following formula is made use of:

$W_{NET} = P^2 \cdot l \cdot y$  , where

$W_{NET}$  - is the net weight of the steel rod,

$P^2$  - the section area of the rod,

$l$  - the length of the rod,

$y$  - the specific weight of metal.

Reduction of the amount of the useful material consumption is reached by way of making the design of a product more perfect, by way of utilizing more economical materials, substitutes.

The composition and quantity of technological wastes and losses are stipulated by the character of the technological process, by the peculiarities of equipment, by the quality of initial materials.

For instance, the technological wastes and losses of some metal processed by cutting comprise the wastes of clutching and cutting metal into workpieces, shaving wastes of metal, etc. The quantity of such wastes and losses must continually decrease owing to enhancing the efficiency of technological processes, etc.

The organizational - technical wastes and losses (those caused by admittance while processing metal, and due to incoincidence in the size of the workpiece and the component part manufactured from it) are practically inevitable.

The calculation of the net weight for a manufactured article, as well as of the wastes stipulated technologically is made first of all in respect to the component parts of the article manufactured. Afterwards, according to the net weight sum of the component parts, the net weight of the manufactured article is determined. The initial documents for it are the designs of component parts, cutting plans, technological documents, etc. The net weight, is, as a rule, predominant in the rough weight of a component

part and invariable under the given design. The weight of technologically stipulated wastes and losses is determined as the difference between the weight of the initial workpiece and the net weight of the manufactured article. The dimensions of the workpiece are also fixed according to the technical draft, the cross section of the finished component part being defined at first, to which the appropriate admittance for processing is added. The product of the length of the workpiece by its section makes the rough weight of the workpiece.

The ratio of the value (magnitude) of useful consumption (net weight) to the norm for consumption is called the planned coefficient for the utilization of material. It is calculated according to the following formula:

$$K_{up} = \frac{W_{NET}}{N}, \text{ where}$$

$K_{up}$  - is the planned coefficient for the utilization of material,

$N$  - the norm of consumption,

$W_{NET}$  - the amount of useful consumption.

For example, if the net weight of a component part is 20 kg. and the norm for the consumption of material for this component part is 30 kg., then the planned coefficient for the utilization of metal for this component part will be

$$K_{up} = \frac{20}{30} = 0,66.$$

It means that 34 per cent of the metal while manufacturing the component part according to the projected technological process will be wasted (will be lost).

The actual coefficient for the utilization of material is the ratio of a component part's (article's) net weight to the actual consumption of material, i.e.

$$K_{ua} = \frac{W_{NET}}{C_a}$$

Thus, the elaboration of input norms for the consumption of basic materials by the manufactured article consists of the following stages:

a) the elaboration of the norm for the consumption of materials to produce every component part of the article (good) manufactured;

b) check up and systematization of the elaborated norm for every components part by types, grades, sizes of materials (compilation of specified lists or registers for every components part - the norms for the consumption of materials on the manufactures article).

c) compilation of individual summary norms for consumption on the basis of specified norms for components parts;

d) determination of the average-weighted norms for the consumption of materials for those types of manufactured articles to produce which the material resources are taken according to the average norms. This is done on the basis of individual norms and the number of manufactured articles according to the plan.

e) observation of the results of revising the norms for the consumption of materials and determination of the percent for reducing the norms versus the current year within the enterprise as a whole.

Designers' specifications, drafts for the manufactured articles and their component parts, drafts for mouldings, forgings, punchings and the technical requirements of their production, technical circumstances for producing and delivering the manufactured articles - all these are the primary documents which should be followed when elaborating norms for the utilization of materials per each article manufactured.

c) Organization of the Work on Setting Norms for the Utilization of Material Resources.

Greater part of norms are elaborated directly at enterprises. Chief engineers, technologists, chief electric power engineers and other chief specialists are made responsible for the work of setting the norms for the utilization of material resources at enterprises.

Organizational and methodical supervision of the work on setting norms and economizing the raw materials and materials necessary for basic production is effected by the bureau for material norms which is under the authority of the Chief Engineer or Technologist of the enterprise.

Organizational and methodical supervision the work on setting norms for consumption and economizing material resources within the auxilliary, attending units of enterprises is effected through bureaus, groups or engineers on setting norms:

a) through those of the Chief Mechanical Engineer's Department on setting the norms for consumption and economizing the material resources for repairing-operation needs,

b) through those of the Chief Electric Power Engineer's Department - on setting the norms for and economizing the fuel and electric power resources;

c) through the Instrument Making Department, - on setting the norms for consuming and economizing the materials for instruments, punches and devices.

The structure of the Bureau (Group) for material norms at the enterprise depends on the type of production (over-all, serial, minor-serial, individual), the capacity and profile of the enterprise, the volume and nomenclature of the materials utilized.

Norms for consumption at the enterprises combine the whole complex of raw materials and materials, fuel and electric power which are consumed within the workshops (establishments). Therefore

all the units and workshops of the enterprise participate in the work on setting norms and present to the respective normative units all the appropriate data.

The elaboration of norms for the utilization of material resources is a component part of the compulsory volume of the work within the corresponding technical units and workshops (establishments) of the enterprise designed for getting ready the production process, the Chief Technologist's Department, the Chief Designer's Department, the Chief Electric Power Engineer's Department, etc.).

The targets of higher organizations for the average reduction of the corresponding materials' consumption during the planned year are taken into account while establishing norms for the consumption of materials in production.

The elaborated norms for the utilization of material resources after they are observed by a special commission consisting of the chiefs of the establishments (workshops) and departments concerned (the chief engineer, technologist or designer being the chairman) are afterwards approved by the governing authorities of the enterprise. The norms which are to be approved by higher authoritative bodies represent, in this case, an exception. In accordance with the adopted inventory of the norms which are to be approved by the higher authoritative bodies the governing personnel of the corresponding enterprises submit the norms for the utilization of materials with all the necessary substitutions.

The setting of norms for the utilization of material resources besides the enterprises is also carried out by higher planning organizations at the ministries; their subordinated specialized departments where for this purpose there are special groups, departments for norms.

But as distinct from the enterprises the setting of norms at higher authoritative organizations is made according to the aggregated (grouped) nomenclature reflecting specific features of this or that productive branch.

So far as the state development plan indicators generally combine products of the same type, e.g. "metal cutting lathes", etc. then the group norms bear the nature of aggregated norms for the consumption of material resources.

For example, the norm for the consumption of rolled ferrous metal to produce metal cutting lathes combines all the individual norms, which characterize the consumption of concrete types of rolled ferrous metals to produce particular lathes.

The elaboration of aggregated norms is made on the basis of averaging the scientifically sound technological norms. However, the magnitude of such an economic norm and its change depends not only on the technological norms, but also on the concrete structure of the products which are incorporated into the aggregated norm, and relationships of their material inputs.

For instance, the calculation of rolled steel relative consumption in automobile production is made as follows:

(the figures are arbitrary)

Denomination Of Automobiles	Actual Consumption Per One Vehicle	Output in Thousand	Absolute Con- sumption of Rolled Steel in Automobile Production (thousand tons)
<u>Lorries:</u>			
GAZ-51	1622	295,4	475,9
GAZ-63	1924	81,3	148,3
GAZ-93	2210	9,3	20,6
ZIL-164	2455	116,0	284,8
ZIL-157	3600	6,6	23,8
ZIL-151	3308	7,2	23,8
ZIL-585	3030	70,0	212,1
KAZ	2700	12,0	32,4
MAZ	4300	8,2	35,3
JAZ	8500	7,0	59,6
OTHERS	2055	36,2	74,4
<u>TOTAL</u>	21149	647,2	1391,0
<u>Cars:</u>			
VOLGA	1280	55,6	71,2
POBEDA	1100	8,8	9,6
MOSKVITCH	950	27,0	25,7
GAZ-69	1070	48,8	52,2
OTHERS	1639	2,6	4,3
<u>TOTAL</u>	1141	142,8	163,0
<u>Buses:</u>	2892	29,4	85,0
GRAND TOTAL INCLUD- ING BUSES	2000	819,4	1639,0

a) average consumption of rolled steel for lorries amounts to:

$$\frac{1391}{647,2} = 2,15 \text{ ton}$$

b) average consumption of rolled steel for cars amounts to:

$$\frac{163}{142,8} = 1,15 \text{ ton}$$

c) average consumption of rolled steel for the automobiles as a whole:

$$\frac{1639}{819,4} = 2 \text{ ton}$$

It is obvious that if in this calculations we change not only the norm for rolled steel consumption per unit of output, but also the output nomenclature of the inventory, then the average norm (the norm made at an average) will considerably change. Therefore it is necessary to elaborate the classification for the national economic norms, fix a certain inventory of branches and products according to which the planned norms are to be elaborated, and to keep account of how they are fulfilled.

The estimation of the planned norms for consumption can be made both by direct calculation and by methods of correcting the base norms.

The elaboration of planned norms in this case can be made according to the following stages:

- a) determination of the norms' level for the base period;
- b) study of the factors, essentially influencing the magnitude of norms;
- c) estimation of the major factors' influence on the magnitude of norms for the planned period.

To determine the level of planned aggregated norms it is necessary to take into account such factors as:

- the change in the structure of output (for instance, in the variety of rolled metal);
- the shifts in relationship of different technological methods for production (for instance, the substitute of metal cutting for punching or forging);
- the shifts in the structure of consumed interchangeable materials;
- the implementation of new types of materials (e.g. substitute of aluminium for copper);
- the shifts in the allocation of production;
- the implementation of the economizing regime at enterprises.

For the purpose of taking into account the influence of the technical-economic parameters' change on the level of the planned norm it is necessary to present it as the function from the technical-economic indicators, which most essentially influence the magnitude of Norms.

For this purpose it is necessary, first of all, to elicit the main technical-economic indicators determining the level of the norm, and to fix the functional relation between the factors and the norm's magnitude.

When establishing functional relations it is advisable to widely utilize correlation methods, methods of constructing empirical functions, the method of constructing homogrammes which makes it possible to swiftly determine the influence of this or other factor's change over the magnitude of the norm.

The magnitude of the summary norm for the products of mining industry and agriculture are also differentiated by separate economic territories in view of which fact the level of general coefficients of direct inputs for these industries depends on the allocation of production.

The planning bodies, ministries and their subordinated departments as well as other higher authorities in respect to the enterprises fix the inventories and time-limits for submitting the norms to be approved and forward them at the appropriate time to the organizations under their authority.

The organizational and methodical supervision over the work on setting norms for the utilization of material resources is effected within the planning bodies, ministries and their subordinated departments by the department (sector) for material norms affiliated to the technical board (department) or the branch boards.

The branch boards (departments) of ministries and their subordinated committees:

a) consider and present to the technical boards of their respective ministries the individual and group norms for the consumption of materials (with all the necessary calculations), which are to be approved by the officials at the ministries (or their subordinated departments) and, consequently, by the central planning authorities.

b) consider and approve the individual and group norms for the consumption of materials on the remaining products.

The technical board of a ministry (or its subordinated department):

a) considers and presents by due order to the officials of the ministry (or its subordinated department) and to the central planning authorities the individual and group norms for the consumption of materials which are liable to be approved by them;

b) considers and approves the individual and group norms for the consumption of materials on the remaining products (the rest of the products).

The department for material norms of the central planning authority together with the branch and balance departments considers, analyzes and presents to the higher officials the individual and grouped norms for the utilization of materials (with all the necessary calculations).

Norms for consumption are considered, as a rule, together with the organizations that presented the norms.

The approved norms for the consumption of material resources must be in due time passed over to the subordinate organizations.

Any change in the approved norms can be made if agreed with the organizations having given the approval.

The organizational improvement of setting norms for the consumption of material resources presupposes the creation of a clear-cut system of administrative bodies for norms, the creation of rational documents and unified methodological principles of estimating norms for individual types of materials, the application of mathematical methods while establishing norms for the utilization of material resources.

#### D) QUESTIONS OF SETTING NORMS FOR THE UTILIZATION OF MATERIAL RESOURCES IN CAPITAL CONSTRUCTION.

The requirement for material resources in capital construction is also determined on the basis of corresponding norms.

They distinguish two types of estimating the norms for material inputs in capital construction:

- 1) the norm for the consumption of materials per 1 mln roubles worth of building and assembling work

2) the norm for the consumption of materials per a physical volume of basic work.

The first norm is determined by dividing the general requirement for materials by the full value of building and assembling work. Such norm is applied to determine the requirement with account taken of the specific features of the branches for which the construction is carried out or else at the preliminary stage of compiling the plan.

The second type of norms is applied to determine the consumption of materials at the functioning construction sites, when the construction sites of one and the same branch are at different stages of preparedness. For example, the designing data for a certain construction unit envisage the consumption of 10 thousand ton of rolled metal. However, in view of the fact that the basic constructions of the unit have been erected earlier (8,5 thousand ton of rolled metal), then the requirement during the planned year is only 1,5 thousand tons.

In housing construction which is effected, mainly, according to standard designs, the norms for the consumption of rolled metal are elaborated both per 1 mln roubles value of building and assembling work, and per 1 thousand  $M^2$  of floor space.

To find the norm for consumption per 1 thousand  $M^2$  of floor space it is necessary to divide the general requirement for materials according to the design by the general floor space of the house. Afterwards taking into account the specific weights in constructing various types of houses one can determine the average-weighted norm. The norms for consumption in cultural construction (construction of clubs, schools, etc.) are worked out according to the same principle.

The norms for consuming materials according to the physical volumes are determined and revised with regard for the main factors of construction and first of all considering the most economic designs for buildings, the growth of mechanization, improvement of labour organization. Special importance is attached to the careful selection of standard designs for construction and of those repeatedly made use of.

#### E) QUESTIONS OF SETTING NORMS FOR PRODUCTION STOCKS OF MATERIALS.

The appropriate production stocks must be well provided for at the enterprise in order to secure uninterrupted process of production. Production stocks are composed of basic and raw-materials, auxilliary materials, fuel, the semifinished products obtained outside the enterprise, manufactured articles and component parts, instruments and other means of production. The amount of material stocks must be sufficient to provide for normal process of production.

The norms for stocks are fixed in days of supplying production with respective types of materials, and also in physical and money terms. They must fully conform with the conditions under which the given resources are consumed, produced and delivered.

According to their purpose and the order of circulation production stocks of materials are subdivided into current, insurance, preparatory and seasonal.

The current stocks secure the smooth course of production during the period between two successive deliveries of material resources.

The level of current stocks depends, chiefly, on the amount of the norm for materials to be delivered, on the volume and regularity of consuming the given materials at the enterprise..

Hence, the amount of current stocks depends firstly on the quantity of material resources consumed at an average per 24 hours and secondly, on the number of days between two successive deliveries of these resources. If, for example, the enterprise consumes at an average during 24 hours 5 tons of yarn and gets the deliveries of yarn three times a month, then the maximum current stocks of yarn for the given enterprise will be 50 ton ( $5 \times 10$  days).

The insurance stocks are created for the purpose of preventing possible interruptions in the work of the enterprise connected with shortcomings of the suppliers, natural calamities, etc. The amount of insurance stocks depends on the number of days required to arrange the urgent delivery of the given materials from the supplier. The amount of insurance stocks should not exceed the amount of current stocks.

The current and insurance stocks are, as a rule, kept in store together. Although it is permissible to make use of the insurance stocks only in exceptional cases.

The preparatory stocks are created proceeding from the time which is consumed on receiving materials, sorting them out, checking up their quality, their preparation for the process of production.

Current, insurance and preparatory stocks are all together called production stocks.

The seasonal stocks are designed to be held under seasonal production, seasonal consumption of certain materials, and also when intervals are liable to occur in the work of transport.

The seasonal stocks when they are created incorporate current, preparatory and insurance stocks.

Specific features of setting norms for stocks of individual types of raw materials and materials are concretized in specialized instructions.

Thus, the norms present an important instrument to determine planned requirements of the national economy for material, labour and financial resources. Properly organized norm setting serves as the basis for the correct planning of social reproduction's proportions in all the sections of the national economy. Planned technically substantiated norms play an important organizing and mobilizing role in the utilization of labour, material and financial resources. They represent in their way the stimulus for implementing rational organization of labour and rational utilization of material resources, progressive technique and technology of production. They are also necessary for large scale implementation of mathematical methods and computation technique into the practice of planning. That is why the planning of all the sections of social reproduction should be covered by norming as widely and fully as possible.

# APPENDIX

## Inventory

of the most significant indicators to elaborate a draft five-year State Development Plan for ... (years)...

INDICATORS	UNIT OF MEASURE	ANTICIPATED FULL FILMENT	Percent of the 5-year plan	percentage of the projected full
I Summary indicators				
Population				
(annual average amount)	MLN.			
labour resources (total)	- // -			
inclusive of				
- workers and employees	- // -			
- collective farmers	- // -			
- pupils of 16 and over taking the course of study with no participation in production	- // -			
National income utilized for consumption and accumulation	Milliards roubles			
inclusive of:				
consumption fund	- // -			
	per cent of the national income			
accumulation fund	Milliards roubles			
	per cent of the national income			
gross industrial output for the national economy	Milliards roubles			
inclusive of:				
means of production (group A)	- // -			
consumer goods (group B)	- // -			
Total volume of capital investments during the five year period	- // -			

INDICATORS	UNIT OF MEASURE	ANTICIPATED FULFILLMENT	Project of the 5 year plan	Percentage of the project of the expected fulfillment
according to the state plan including	Milliards roubles			
Fund of wages and salaries for the national economy	- // -			
II. Industry				
gross output	MLN. ROUBLES			
inclusive of:				
means of production (group A)	- // -			
consumer goods (group B)	- // -			
industrial commodity output by branches	- // -			
production of industrial output in physical terms*)				
III. Agriculture				
gross output (in comparative prices)	Milliards roubles			
The volume of production for agricultural products and raw materials: **/				
Deliveries to agriculture: mineral fertilizers; protective chemicals for growing plants	thous. of standard rounds			
tractors	thous.			
lorries	thous.			
, etc.				

\*) industries of production are enumerated according to the functioning classification.

\*\*/ types of agricultural products are given according to the functioning classification.

INDICATORS	UNIT OF MEASURE	ANTICI- PATED FULFIL- MENT	Project of the 5-Year Plan	Percent of the project of the expected fulfillment
<p>IV Transport and Communication</p> <p>freight turnover of transport total inclusive of:</p> <p>according to the types of transport</p> <p>passenger turnover - total - inclusive of:</p> <p>according to the types of transport</p> <p>Communication output volume</p>	<p>MLrds of ton - KM--</p> <p>MLrds of passenger x KM</p>			
<p>V. Capital Investments.</p> <p>Putting into operation pro- ductive capacities by way of constructing new, expanding and reconstructing old enter- prises</p> <p>Besides, the increment of pro- ductive capacities at the fun- ctioning enterprises on account of taking certain organiza- tional - technical measures (by branches and sub-branches, types of products according to the functioning classification)</p> <p>Putting into operation fixed assets (according to the estimated value in the prices of respective years)</p> <p>(by branches and sub-branches in accordance with the func- tioning classification)</p> <p>Total volume of capital in- vestments and building and assembling work.</p> <p>(by branches and sub-branches in accordance with the func- tioning classification)</p>				
<p>VI. Geological Prospecting for Natural Resources</p>				

INDICATORS	UNIT OF MEASURE	ANTICI- PATED FULFIL- MENT	Project of the 5 Year Plan	Percent. of the Project of the expected fulfilment
VII. Labour Productivity				
growth - rate of labour produc- tivity (during the five - year period):				
in industry	per cent			
in agriculture	per cent			
in construction	- // -			
in transport	- // -			
VIII Costs of Production				
Reduction of inputs per 1 rouble of commodity output of the na- tional industry	- // -			
Prime - cost reduction of major types of agricultural products	- // -			
Reduction of the prime cost of freight transportation.	- // -			
Prime - cost reduction of buil- ding and assembling work	- // -			
IX. Turnover of goods				
Retail turnover for state and cooperative trade (in compara- tive prices, in prices of res- pective years)	MLN roubles			
National income per one person	roubles			
Consumption fund per one person	roubles			
Real income. growth rates of population during the five year period:				
per one person	per cent			
per one family member of a worker or employee	- // -			
per one family member of a collective farmer	- // -			

INDICATORS	UNIT OF MEASURE	ANTICI- PATED FULFIL- MENT	Project of the 5 Year Plan	perc. of the Proj. of the expected fulfilment
Average monthly wages and salaries of workers and employees within the national economy	roubles			
Real wages and salaries	- // -			
money incomes and incomes in kind of collective farmers per one worker (hand)	- // -			
Social consumption funds	MLrd roubles			
Living floor space of townsmen (per one person)	m <sup>2</sup>			
Social institution maintenance for children of pre-school age	per cent to the number of children			
Volume of work on industrial multiple services to population:				
total	MLN roubles			
in rural areas including	- // -			
Volume of work on non-industrial multiple services to population	- // -			
in rural areas including	- // -			
number of children at state pre-school institutions	thous.			
Number of pupils at general education schools	MLN			
Number of pupils at night schools for workers and those rural areas, at extra-rural schools	MLN			
Enrolment at higher educational institutions - total	- // -			
full-time students including	- // -			
Enrolment at special secondary educational institutions - total	- // -			
Full-time students including	- // -			

INDICATORS	UNIT OF MEASURE	ANTICI- PATED FULFIL- MENT	Project of the 5-Year Plan	Percentage of the 5-Year Plan of the 5- Year Plan Fulfilled
Number of cinema - projectors at the end of the year	thous.			
Gross income of the cinema	MLN. roubles			
Book editions	MLN. arbitra- ry copies			
Single newspapers' editions	MLN. copies			
Single magazines' editions	MLN. copies			
Television maintenance of population	per cent			
Number of beds in hospitals	thous.			
XI. Foreign trade				
Volume of foreign trade turnover	MLrd roubles			
XII. Balance of money incomes and expenditures				
XIII. Major indicators of the summary financial plan				
XIV. (Inventory of balance estimates, calculated and technical economic indicators which are necessary for subs- tantiation of plan drafts)				