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USSR Report

ECONOMIC AFFAIRS

(FOUO 4/82)

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CONTENTS

PLANNING AND PLAN IMPLEMENTATION

MULTISTAGE OPTIMIZATION OF DEVELOPMENTAL PLANS OF PUBLIC PRODUCTION

Moscow METODICHESKIYE UKAZANIYA K RAZRABOTKE GOSUDARSTVENNYKH PLANOV EKONOMICHESKOGO I SOTSIAL'NOGO RAZVITIYA SSSR in Russian 1980 pp 102-103

[Section from book "Methodological Instructions for Working Out of State Plans for the Economic and Social Development of the USSR" published by Gosplan USSR, Izdatel'stvo "Ekonomika"]

[Text] In order to improve the foundation of economic planning, it is necessary to conduct complex economic mathematical computations for drafts of long-range plans of economic and social development with the help of interrelated systems of economic mathematical models.

It is possible to do optimization of plans with the help of a multistage (multilevel) system of models. The bottom (base) level for the computations is provided by sectorial optimization models developed in accordance with a methodology of optimization of development and location of production presented in the section "Planning of Industrial Production" of the present "Methodological Instructions." The intersectorial optimization model, including the intersectorial balance of production and production distribution in the national economy serves as the top (consolidated) level.

Models of different levels are are intercoordinated as to manufactured product mix and expended resources. Product and resource designation used in making sectorial calculations must permit the simple aggregation of indicators and expenditures according to the nomenclature [nomenklatura] of the intersectorial balance. The general listing of products and sectors on the basis of which sectorial optimization calculations would have to be conducted are coordinated with the nomenclature of the intersectorial balance.

Sectorial calculations are organized and performed in accordance with the methodology of optimization computations of the development and location of production. Consolidated optimization developments are conducted on the basis of the results of alternative sectorial optimization calculations.

Optimization calculations are conducted at all levels utilizing alternatives on the basis of criteria of optimality with changing parameters (indicators).

In sectorial calculations, a determination of the sector's production demands using a minimum of full adduced expenditures is the basic way to formulate the problem. Calculations should be made for different values of need and norm of effectiveness of capital investment. No less than two variants of need are examined: minimum and maximum and also no less than two values of the norm of effectiveness: minimum (15 percent) and maximum (25 percent). A total of no fewer than four alternatives of the optimized plan is calculated.

On the national-economic level, alternative optimization calculations are performed for the maximum of the end product in the given structure with limitations on the total volume of capital investment and labor resources. The proportions of the end product and the limits of capital investment and labor resources in this connection are changed within the limits of the real possibilities of the national economy in the planned period. A final decision on the plan of development of public production is made on the basis of an analysis and comparison of all computed optimized versions.

Optimized calculations and their coordination are carried out in accordance with the adopted stages of development of long-range plans of economic and social development.

In five-year planning, optimization calculations are performed for the last year of the planned period and in long-term planning--for the last year of each five-year period.

As a result of preplan calculations on the national-economic level, the top and bottom levels of proposed outputs of production ("brackets") are determined for all sectors (in the nomenclature of the intersectorial balance). Guided by these "brackets," sectorial administrative and planning organs develop hypotheses of need for their products in a more detailed (sectorial) products list for the territory of the country.

At the stage of basic guidelines for the long-range plan, alternative sectorial optimization computations are performed (in no less than four versions). The results are discussed and corrected at ministries responsible for the development of sectors and at sectorial departments of Gosplan USSR.

In its final form, each version of the optimized sectorial plan must contain the following data: volume of production output (in the nomenclature of the sectorial balance); volume of capital investment; size of labor resources.

The data for all the versions are turned over to the Consolidated Department of Long-Range Planning as well as to other consolidated and sectorial departments of Gosplan USSR.

At the national-economic level, the results of the alternative sectorial optimization calculations serve as initial data for the intersectorial optimization model. Each sector is presented in it by means of calculated alternatives of its development. Limitations relating to labor resources and capital investment and conditions of the intersectorial balance are introduced into the model.

Calculations are performed for the maximal end product in given alternative versions of its structure. The comparison and analysis of the developed drafts in combination with supplementary calculations on the basis of the model make it possible to select a final version of the national-economic developmental plan.

At the stage of development of the full-scale State Plan of Economic and Social Development of the USSR, additional optimization calculations are performed. The newly computed versions of development of sectors are introduced into the intersectorial optimization model, which provides the possibility of refining consolidated calculations adopted at the stage of basic guidelines.

Through the use of the intersectorial optimization model, a balance tie-in is carried out of sectorial plans of development and location of industry through the redistribution of national-economic resources among the sectors for increasing the output of the end product.

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INVESTMENT, PRICES, BUDGET AND FINANCE

IMPROVING THE MECHANISM FOR PLANNED MANAGEMENT OF PRICES

Moscow VOPROSY EKONOMIKI in Russian No 1, Jan 82 pp 91-100

[Article by A. Yezhov]

[Text] In the context of advanced socialist society, as was observed at the 26th CPSU Congress, there are important problems in the field of planned price determination. The products list and assortment of products are increasing rapidly, the number of prices is growing as a consequence, and flows of price data are swelling rapidly. There is a considerable speeding up of the rate at which the processes take place with governed changes in the products list and assortment of products, fashion, the balance between supply and demand, factors related to the internal consistency of the price system, and the correspondence of that system to its objective fate. All of this makes it necessary to discover new methods, procedures and equipment for processing the rapidly growing flows of economic information concerning prices, methods that guarantee an improvement in the present method of managing prices.

It is an extremely complicated task and one of great importance to set and maintain prices reflecting real economic processes. But, as experience has shown, the present mechanism for price management still does not always guarantee that scientifically sound prices are set and maintained. It is a very cumbersome mechanism, and the process of price revision moves rather slowly and involves large expenditures of labor and money.[1] Ways of further improving the mechanism of price management have been defined by the 26th CPSU Congress, by the decree of the CPSU Central Committee and USSR Council of Ministers entitled "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality," and by the All-Union Conference on Pricing Affairs (Moscow, April 1980).. For instance, the "Basic Directions for the Economic and Social Development of the USSR Over the Period of 1981-1985 and Up to the Year 1990" note: "To improve the setting of prices in the sectors of the economy as an important instrument in planned management. To strengthen the effect of wholesale prices as an incentive for improvement of the quality of products, for speeding up the organization of production of highly efficient new technology and replacing outdated technology, for more optimum use of production resources and for reduction of products production cost. To strengthen state price discipline."

One of the promising directions for performing the tasks which have been set is to apply the methods of mathematical economics and electronic computers in the setting of prices; they open up broad opportunities for improving the management of prices of products in various sectors of the economy. Constructive experience has already been gained in the use of computers in price setting within the framework of the first and second phases of the automatic price data processing system (ASOI tsen).

Comprehensive use of computers in pricing for setting prices, price review and for monitoring observance of state price discipline faces scientists with new tasks and makes it necessary to do further work on the foundations of pricing theory and methodology. An important theoretical question, one which also has great practical importance, is the question of the criteria in the planned management of prices which the entities setting prices might use to judge whether they need to be revised. By the criteria of planned management of prices we mean integrated indicators that representatively reflect change in the set of objective factors that lie both on the side of the value basis of the price and also in the field of the price proper, and which signal the need to review the prices in effect and also indicate the direction in which they should be changed.

It is important to distinguish the objective foundations (content) of the criteria for planned management of prices from the forms they take. By the objective foundations of these criteria we mean the set of economic relations which "unify" the price with its value basis and which influence the need for review of the prices in effect. A study of the set of relations between the value basis of the price and the price itself presupposes in turn that we distinguish between the terms "the price's relative independence" and "the price's stability interval," which are close, but not identical, and reflect economic processes in the formation of prices which differ in their depth and breadth.

The price's relative independence refers to the relative independence of its movement from the value basis. The deviations of the price from value which occur in this result from the fact that the price, as a form of value, is subject to the effect of such specific factors as, say, the relation between supply and demand, fashion, etc. The price's relative independence has objectively imposed limits which depend on the extent to which the planned price has developed as an economic form. The limits of the price's relative independence also depend on the kind of price involved. For example, these limits are considerably narrower for wholesale prices than for retail prices. The reason for this is that the retail price experiences to a greater degree than the wholesale price the influence of factors which lie outside the value basis, since the product is brought through the retail price mechanism to the "final" consumer and by virtue of that fact experiences more the effect of the conditions of consumption than the conditions of production, by contrast with the wholesale price. Further, depending on what sphere in the process of reproduction the price serves, it will be influenced to a greater or lesser degree by the value basis. If the price "serves" productive consumption, it experiences a considerably greater influence of its value basis than does the price which is "serving" personal consumption (for example, the retail price).

This occurs because the wholesale price (as an "intermediate" price between producers and final consumers) is less influenced by the conditions of consumption and nonvalue factors (demand, fashion, etc.).

The price's stability interval characterizes the time limits of the price's relative independence of its value basis and is a measure of the price's "autonomy." The price's stability interval is an intermediate link in the ascending (from abstract to concrete) chain of cognition "value--price." It characterizes the degree to which the concrete (the price) reflects the more abstract (the value). The greater the magnitude of the price's stability interval, the more rarely corrections need to be made in the prices in effect. And conversely, as this interval shrinks, the objective need arises to review them more often.

The size of the price's stability interval, which is a function of its relative independence (self-sufficiency), is determined by the relations between the value and the price. The more highly developed these relations, the smaller the magnitude of the price's stability interval. This is explained by the circumstances which follow. As the money form of value the price must in the final analysis reflect its value content. A more highly developed content (other conditions being equal) presupposes that it is reflected more straightforwardly in this or that form. The state of the price's value basis is determined, to be specific, by the extent to which directly social relations are developed in it. As directly social relations become stronger, encompassing the "lower stages" of the essence of the price's value basis and of the price itself as a category of directly social production in the socialist stage of development, it increasingly takes on the traits of a planned valuation (for the time being still in the value form) of the expenditures of social labor. The magnitude of the price's stability interval decreases as a result. Since the process of development of directly social relations is irreversible, the process of reduction of the price's stability interval, which brings about the need to review the prices in effect more frequently, is also irreversible.

By the forms of the criteria we have been examining we mean the set of indicators which furnish evidence that a revision of prices has become unavoidable. In the economics literature such forms are provisionally placed in two groups: qualitative and quantitative.[2] The first group includes: updating of the product list,[3] a change in the price's structural scheme (mathematical model); production of a higher-quality product which is in demand; an increase in the output of a product which is not selling out at the present prices; revision of standards, etc. The criteria in the first group do not take into account all the basic factors in price formation. Their use is not always advisable; this especially applies to products whose prices are calculated on a computer. In addition, these criteria are not accurate enough. The second group is made up of sectorwide profitability rates of a product of the same kind.

The qualitative and quantitative criteria are closely interrelated, and the need to revise or preserve the prices in effect is governed by the set of them. The criteria in the second group are more general; a change in the criteria in the first group ultimately causes a change in the criteria of the second group and is registered by them. The practical application of criteria

in the second group is also limited, since they do not take into account a number of important objective factors (for example, the degree of satisfaction of society's need for the product, the balance between supply and demand, etc.).

The criteria in the first and second groups have played a constructive role in improving prices. They are being used successfully even at the present time. But new objective indicators are needed when the computer is used in pricing and as the processes of price management gradually "go electronic." To be specific, development of a universal summary criterion of the planned management of prices is very promising. This summary criterion, as a synthetic indicator, should if possible be one that considerably facilitates the work of bodies setting prices at all levels, one which prepares more favorable soil for use of up-to-date computers in pricing, one which makes it possible to standardize the system of managing the prices of products of the various sectors of the economy, and one which improves the quality of price monitoring. At the same time, this criterion has to reflect the entire cycle of reproduction, which determines the formation of planned prices. What is needed first of all in developing such a criterion is to determine the basic factors in formation of the price's objective basis and the laws which are operative in forming its magnitude.

The bases of the planned price are the socially necessary expenditures of labor (ONZT), which in the context of commodity-money relations take on the form of value. The ONZT and value are reflected in the socially necessary work time (ONRV). K. Marx remarked that "the work time socially necessary is that required to produce an article under the normal conditions of production, and with the average degree of skill and intensity prevalent at the time."[4] The socially normal conditions of production (of reproduction) are determined by a number of dynamic factors and are mobile themselves therefore. The variable character of the socially normal conditions of reproduction imparts dynamic behavior to the magnitude of the ONRV. But not all economists acknowledge this. Consequently, they treat the socially normal conditions of reproduction as stable conditions which do not depend on consumption. That accounts for the static nature of conceptions of the quantitative determinacy of the ONRV. For instance, some economists believe that the ONRV comes about as an average quantity, while others regard it as a weighted average. Still others suppose that the ONRV tends toward the maximum actual level, yet others toward the minimum actual level, yet another group that it tends toward a normative level established in advance, and so on.

The question of the factors in formation of the ONRV is also treated in different ways. For instance, some scientists point above all to the dependence of the ONRV on the level of technology and manpower, denying the role of social need and social utility in the mechanism of their formation. Other economists, recognizing that social need as a definite role in the process of forming the ONRV, denies social utility as a factor in this process. A third group, on the contrary, recognizes social utility as a factor in the ONRV and denies that the social need is such a factor. There are also scientists who take into account the definite role of each of these factors in the mechanism for formation of the ONRV, but who represent it in different ways.

The idea of factor analysis of the ONRV occurred to the founders of Marxism. In "Kapital" K. Marx repeatedly touched upon the questions of the vigorous influence of the factors of social need and the social utility of labor (work time) on the process of forming the ONRV.[5] This was pointed out by F. Engels as well.[6] Their writings contain an abundant methodological legacy that helps to elucidate many present-day problems in price formation.

A. Mendel'son was one of the first economists to note the need for further development of the ideas of K. Marx and F. Engels in the field of factor analysis of the category ONRV. He paid particular attention to the fact that K. Marx and F. Engels attributed an active role to social need in the labor theory of value.[7] Later V. P. D'yachenko attempted to demonstrate the role of various factors in the mechanism of forming the ONRV under socialism. On the basis of the classic works of Marxism and Leninism, he furnished the basis for the active effect of social need on their formation under the conditions of public ownership of the means of production.[8] In particular, V. P. D'yachenko examined how the degree of saturation of social need makes it possible to discover the socially normal conditions of reproduction, which quantitatively determine the ONRV.

But researchers into the category of the ONRV were unable to explain how every factor in the ONRV "fits" into the labor theory of value. Yet the latter circumstance has fundamental importance. The principle of monism, which holds that social labor is the basis of value (ONZT, ONRV), is a fundamental point in the labor theory of value. All the other factors have to be derived from labor as its constituent element.

The production of use values presupposes expenditures of work time, which are a function of the personal and material factors of production, since any work process requires the presence of the subjects of labor (that is, the people engaged in producing the use values needed by society) and means of production. The unity of the personal and material factors, which ensure the normal flow of the work process, is an indispensable condition for formation of the ONRV. This characterizes the ONRV from the standpoint of production itself and expresses the social possibility of expenditures of work time (labor).

The production of use values is always purposive; consequently, expenditures of labor and work time are always purposive. The labor process is determined by the basic economic law of socialism, which orients producers expending work time toward satisfaction of social needs. Aggregate social needs correspond to total expenditures of work time, and individual needs, as integral components of the aggregate social needs, correspond to individual expenditures of work time. But in and of itself the need (aggregate, individual) is neutral to the expenditures of labor, and only the degree of its satisfaction is indicative of their need. Consequently, the level of satisfaction (saturation) of the social need characterizes the ONRV from the standpoint of consumption proper and represents the social necessity of expenditures of work time (labor).

Work time, which ensures satisfaction of social needs, figures at the same time as socially useful work time. The utility of work time (labor) is social

in nature and depends above all on which needs it is aimed at satisfying. Work time aimed at satisfying more important social needs will possess greater utility. Thus deciding the question of which actual expenditures of labor will be recognized as necessary by society and which will not will also depend on the greater or lesser utility of work time (degree of utility of work time). The degree of utility of work time characterizes the ONRV from the standpoint of the unity of production and consumption and represents the social significance of work time.

All these factors operate as one and as a group determine the process whereby the ONRV is formed. At the same time, each of them plays a strictly defined role in this process. Social labor lies at the basis of the ONRV. In quantitative terms the ONRV will depend on which enterprises in the sector have the conditions of reproduction which society recognizes as necessary. It is social need, which determines the group of enterprises manufacturing the bulk of the products of the sector (within the limits of the given need) that makes it possible to establish the socially necessary conditions of reproduction.

The social need also makes it possible to determine precisely which enterprises of the sector operating under the socially normal conditions (the given enterprises differ in their individual expenditures of work time) have individual work time that coincides with the socially necessary work time. For instance, when the social need is saturated, the magnitude of the ONRV will be formed as the weighted average of individual expenditures of work time at enterprises operating under the socially normal conditions. When the social need for the product has not been saturated, the socially normal conditions of reproduction will gravitate toward worse conditions and correspondingly the ONRV will gravitate toward the maximum individual work time among the enterprises operating under the socially normal conditions, and when it is oversaturated, it will gravitate toward the minimum work time among such enterprises.[9]

Let us analyze a structural model of the wholesale price, which has not undergone serious changes since the twenties and at present takes this form:

Diagram 1

Product's production cost	Enterprise's profit	Turnover tax	Sales Markup: Expenses of the sales organization	Sales Markup: Profit of the sales organization
Enterprise wholesale price				
Industry wholesale price				

The model of the wholesale price includes a number of factors which can be broken down into two groups: variable and provisionally constant. The factors in the first group exert a vigorous influence on the price's stability interval and therefore determine the limits of the relative independence of the price and its dynamic behavior. They include the value of the expended means of production (c) imparted to the finished product and a sizable portion of the newly created value, specifically that value created by the necessary

labor (b) and a portion of the surplus labor (m_v), which is expressed in the basic and supplemental wage. The factors in the second group are either rigidly fixed in the price (for example, the turnover tax as a modified form of a portion of the value of the surplus product) or are subject to slight fluctuations as a function of changes in the factors in the first group (for example, the portion of the value of the surplus product, expressed in the form of transfers to economic incentive funds or the unassigned remainder of profit).

The factors in the first group are identically reflected in the value and in the production cost.[10] The production cost takes up a sizable share (more than 70 percent) of the wholesale price and has a tendency to increase. An analysis of the structure of an industrial product's production cost (see Table 1) shows that the factors in the first group account for the major "portion."

Table 1. Structure of the Production Cost of Industrial Output in 1980 (in current prices; relative to the total of all production costs, in percentage)

Factor	Industrial Sector as a Whole	Machinebuilding and Metal Manufacturing	Light Industry
Raw materials and basic supplies	62.4	58.8	85.5
Auxiliary supplies	4.3	3.6	2.6
Fuel	3.4	1.1	0.3
Power	2.5	1.9	0.7
Depreciation	7.7	6.6	1.6
Wages and social insurance deductions	14.8	22.5	8.5
Miscellaneous	4.9	5.5	0.8

It follows from the table that the share of c (a factor in the first group) is 80.3 percent in the structure of the production cost of the entire industrial output. In light industry it exceeds 90 percent. The production cost is a sufficiently objective and reliable point of reference in setting and revising prices. But as greater demands are made concerning their soundness, it has become necessary to improve the processes of its determination. The relevant measures were drafted at the All-Union Conference on Pricing Affairs (April 1980). "In order to improve the economic soundness of prices and net output standards and so that they correctly reflect the socially necessary expenditures in a product's production, it is recommended that ministries and departments improve their recordkeeping and official calculation of production cost, tighten up their classification of costs and improve the methods of distributing indirect costs among products."[11]

Experience in the setting of prices makes it possible to frame the conclusion that one of the most important indicators of the need to revise existing prices and to set new ones is profitability.[12] But a change in profitability is in large part determined by a change in the production cost. The dependence of the price on various factors characterizing its stability interval is

manifested basically as a tendency and must be taken into account by the summary criterion for planned management of prices. It was discovered in the attempt to substantiate the sector profitability indicator, determined according to Formula (1), as such a sole criterion that this indicator does not take into account a number of factors that lie outside the bounds of production proper:

$$R = (P/F) \cdot 100 \text{ percent}, \qquad (1)$$

in which R--profitability of the product of the n-th sector, P--profit, F--value of fixed productive capital and working capital subject to allowances of enterprises in the n-th sector participating in production of the product.

Just like the value, the price is a category of reproduction, and the price's stability interval is characterized by factors lying both in the field of production and also in the field of consumption. Formula (1) needs to be perfected to "capture" the relevant factors. For this formula to be capable of use as a model of the summary criterion in planned management of prices, it has to take into account the socially necessary production cost in the determination of profit. By the socially necessary production cost we mean that production cost which characterizes the use value produced under the given socially normal conditions of reproduction and at an average level of skill and intensity of labor.

Formation of the socially necessary production cost is analogous to formation of the ONRV previously examined. Once again the socially normal conditions of reproduction, which will always occur at enterprises manufacturing the bulk (in the general case more than 50 percent) of the given product, are fundamental. In this case the socially normal conditions of reproduction can be concretely stated on the basis of the social demand and, more precisely, from the degree of saturation of social demand.[13] If the social demand is satisfied without a remainder (demand equal to supply), the socially normal conditions of reproduction will correspond to enterprises where the individual expenditures of labor coincide with the weighted average expenditures for the product of the sector. If the social demand is not fully saturated, the socially normal conditions of reproduction would "shift" toward enterprises where the expenditures of labor (production cost) are higher than the average for the sector. When the social demand is oversaturated, a "shift" occurs in the direction of the expenditures (production cost) which are lower than the average.

As a function of the real conditions of reproduction of the given product, then, we should insert in the numerator of Formula (1) that magnitude of the production cost which will correspond to the product produced under the socially normal conditions of reproduction, that is, the socially necessary production cost. The formula of the sector profitability indicator, when modified in this way, can in our view be applied in practice as a model of the summary criterion for planned management of wholesale prices. In this case it is possible to stand free of the effect of fashion and the social factor on the wholesale price, since they have a negligible influence on wholesale prices.

We will explain the operation of the model of the summary criterion for planned management of prices with a hypothetical example.

Table 2. Dependence of the Wholesale Price on the Summary Criterion

Commodity Price (rubles), Ts	Profit of Enterprises in Sector (millions of rubles), P	Value of Fixed Productive Capital and Working Capital Subject to Allowances (millions of rubles), S
Ts_1	10	80
	8	
	6	
Ts_2	20	80
	16	
	12	
Ts_3	30	80
	24	
	18	

Socially Necessary Production Cost of Product as a Function of Economic Conditions (millions of rubles), S		Profitability, R = P/F (percentage)	Change of Price: a) Upward (+); b) Downward (-); c) No Change (0)
[Ts_1]	a 40	12.5	0(+)
	b 70	10.0	0(+)
	c120	7.5	+
[Ts_2]	a 40	25.0	0
	b 70	20.0	0
	c120	15.0	0
[Ts_3]	a 40	37.5	0(-)
	b 70	30.0	0(-)
	c120	22.5	0

Let us suppose that at a price equal to Ts_2 the profit of enterprises in the sector is 16 million rubles, the value of fixed productive capital and working capital subject to allowances used in production of that product is 80 million rubles. We assume that the commodity's unit production cost at enterprises manufacturing the bulk of the output is 40 rubles (minimum), 70 rubles (average) and 120 rubles (maximum). We will determine these magnitudes on the scale of the sector by multiplying each one by the number of commodities produced by the sector, which is equal to 1 million units. As a function of the level of satisfaction of social demand (social need) for the commodities, we insert in the numerator of the formula of the summary criterion the corresponding value of the socially necessary production cost (we obtain the corresponding profit and the magnitude of the summary criterion).

Suppose that demand for the commodities is fully satisfied; then under the conditions which correspond to Variant 2 (Ts_2) in Table 2, and at a socially necessary production cost of 70 million rubles (weighted average), the profitability of the sector's product is 20 percent (base level). If on those same

premises the social demand (need) is "oversaturated" or "not fully saturated," this will give evidence of a change in the socially normal conditions for reproduction of the product, and consequently, of a change in the magnitude of the socially necessary production cost. Then we insert into the numerator of the formula for the criterion the minimum (40 million rubles) or maximum (120 million rubles) magnitude of the production cost, respectively. There will then be a change in the magnitude of the criterion, which will be equal to 25 or 15 percent, respectively.

Now let us suppose that because of altered conditions of production in the sector (while the price for the given product has remained unchanged) there has been a rise in the socially necessary production cost, and the profit of enterprises in the sector has dropped to 8 million rubles. Then the magnitude of the criterion drops to half and goes to 10 percent. But if under those same conditions there is a change in the level of saturation of social demand, the magnitude of the criterion will be equal to 7.5 percent, which will make it necessary to revise prices of this product (since the change in the magnitude of the criterion exceeded 50 percent of the base level). In this case the price should be raised. An analogous situation would be typical of Variant 3, only in this case (3a, 3b) the price would have to be lowered.

Thus the summary criterion for planned management of prices can be represented in the form of a standardized indicator of profitability whose level is calculated as a function of the level of satisfaction of social demand (need) for a given product from the corresponding magnitude of the socially necessary production cost at enterprises in the sector manufacturing the bulk of the given product and operating under socially normal conditions. Use of this criterion will make it possible to reflect more fully in prices a change in the set of price-forming factors lying both in the plane of production proper and also in the plane of consumption. This will in turn promote more effective use of the system of wholesale prices as an economic lever for increasing the efficiency of the socialist economy.[14]

The proposal for revision of prices in effect when this is economically advisable for groups of products does not contradict the principle that prices should be revised once every 5 years, which is provided for in the decree of the CPSU Central Committee and USSR Council of Ministers dated 12 July 1979. In outlining the basic ways of improving the price mechanism the decree, first, is oriented toward the need to make planned prices more flexible as an important factor in strengthening their role as an incentive.[15] Second, it reflects the difficulties involved in organizing and conducting price revisions by the traditional methods. Third, it also records the fact that planning agencies are not always prompt in taking into account price changes that occur within the period covered by the 5-year plan.

Use of the summary criterion for planned management of prices within a subsystem of the automatic price data processing system will be conducive to improvement of price setting as an important instrument for planned management in accordance with the decisions of the 26th CPSU Congress.

FOOTNOTES

1. For instance, the 1967 price reform was in preparation for about 5 years, and sizable funds were spent to prepare it and carry it out. A huge army of engineers, technicians, economists, scientists and administrative personnel were employed in preparing it. The newly introduced prices have played a constructive role, but they "became outdated" rather quickly; that is, they ceased to reflect the conditions of reproduction with sufficient accuracy. This was manifested in the diversity of product profitability and in the decline of the incentive role of prices, and it made it necessary for subsequent partial changes to be made in them. Yet often when such a revision was taking place, the economic conditions of a product's production and sale changed to such a degree that the new prices worked out, even before they took effect, "became out of date" and there was no point in introducing them. Revisions of the prices of particular commodities, as experience has shown, have consequently "overflowed" to become general revisions. The use of stepped prices is limited, since they operate "blindly"--it is very difficult for them to take into account possible changes in the economic conditions of a product's production and sale. New methods need to be developed for the planned management of prices.

2. K. N. Plotnikov and A. S. Gusarov, "Sovremennyye problemy teorii i praktiki tsenoobrazovaniya pri sotsializme" [Current Problems in the Theory and Practice of Price Formation Under Socialism], Izdatel'stvo "Nauka," 1971, p 477.

3. According to data of the USSR State Committee for Prices, a rise in the relative share of new products to 25-35 percent makes it necessary to revise the prices in effect.

4. K. Marx and F. Engels, "Soch." [Works], Vol 23, p 47.

5. K. Marx and F. Engels, "Soch.," Vol 23, p 177; Vol 25, Part I, pp 199, 202, 203; Vol 25, Part II, p 186, etc.

6. K. Marx and F. Engels, "Soch.," Vol 20, p 321; Vol 21, p 191, etc.

7. A. Mendel'son, "The Concept of the 'Socially Necessary Labor' as an Element in Marx' Theory of Value," POD ZNAMENEM MARKSIZMA, No 7-8, 1922, pp 155-157; A. Mendel'son, "On the Question of Different Versions in Treatment of the Concept 'Socially Necessary Labor,'" POD ZNAMENEM MARKSIZMA, No 4-5, 1923, pp 230-244.

8. "Nauchnyye osnovy planovogo tsenoobrazovaniya" [Scientific Foundations of Planned Price Formation], Izdatel'stvo "Nauka," 1968, pp 13-39.

9. For more detail, see A. N. Yezhov, "Patterns of Formation of the Socially Necessary Expenditures of Labor Under Socialism," IZVESTIYA AKADEMII NAUK SSSR. SERIYA EKONOMICHESKAYA, No 1, 1981, pp 66-80.

10. The variable factors are represented in c, v and in part in m in the form of the supplemental wage (bonus), which is added to v. The remainder is expressed in the provisionally constant factors. The product's production cost, just like its value, includes the component (c + v). Moreover, a negligible portion of the wage (v) is deducted for social insurance, and it therefore pertains to the factors in the second group. But in the further analysis we can neglect this factor, since in quantitative terms these deductions are negligible and apply equally to the value and the production cost. In addition, the production cost includes one other portion m, which is manifested in the form of deductions for social insurance, but it figures in the form of factors in the second group. We should note that in quantitative terms the individual elements c, v and part of m, represented in the value and in the production cost, may coincide (the special case), but they may differ slightly.

11. "Rekomendatsii Vsesoyuznogo soveshchaniya po voprosam tsenoobrazovaniya, sostoyavshegosya 7-8 aprelya 1980 g." [Recommendations of the All-Union Conference on Pricing Affairs, Held 7-8 April 1980], Preiskurantizdat, 1980, p 5.

12. If the change in profitability (in the general case) exceeds 50-100 percent, it becomes objectively necessary to revise the prices in effect (see K. N. Plotnikov and A. S. Gusarov, "Sovremennyye problemy teorii i praktiki tsenoobrazovaniya pri sotsializme," p 478).

13. If the levels of the essence (ONZT) and the content (value) of the objective basis of the price correspond to the social need of one of the most important factors in determining the socially normal conditions of a product's reproduction, the level of the form (production cost) will correspond to the social demand, which here takes the form of the social need. But not every demand will figure as a factor in determining the socially normal conditions of reproduction which quantitatively determine the socially necessary production cost, but only that social demand which quantitatively expresses the social need. The social demand, which deviates quantitatively from the social need it expresses, will figure as a factor of the price to the extent that this deviation occurs.

14. In carrying out the proposed approach, attention should be paid that automation affects not only the process of price management, but indeed all processes related to drafting and adjusting multiannual and current plans for development of the country's national economy, in which possible changes of prices within the 5-year period will be taken into account by means of indices of price changes over the medium-term period. Constructive experience in the use of these indices has already been gained in the 9th and 10th Five-Year Plans.

15. We examined the flexibility of prices in the context of optimum combination of the stability and mobility of planned prices. Price stability is an important advantage of socialism. At the same time stability has objectively conditioned limits which are rather mobile. Beyond those limits the planned price begins to lose its advantages and is turned into a brake inhibiting production.

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INTRODUCTION OF NEW TECHNOLOGY

TARGET PROGRAMMING URGED FOR SCIENTIFIC-TECHNICAL PROGRESS

Moscow VOPROSY EKONOMIKI in Russian No 11, Nov 81 pp 3-14

[Article by N. Fedorenko, member of the academy, and D. L'vov: "Economic Strategy and Scientific-Technical Progress"]

[Text] The planned process of applying the advances of science and technology to the economy requires improvement of the entire system whereby the economy is managed and consistent implementation of the party's economic strategy. Scientific-technical progress has a leading place in carrying out that strategy and is a powerful means of increasing the efficiency of social production and of accomplishing the transition of industry, agriculture, construction and other sectors to predominantly intensive methods of conducting economic activity.

The need for widespread application of scientific-technical advances to production is determined in the present stage by the conditions of reproduction that have come about. The limited nature of the raw materials, supplies and manpower which society possesses to pursue its socioeconomic goals is being felt more and more; ever greater resources are being drawn into development of the nonproduction sphere. It is also necessary to take into account investment of capital in reconstruction of enterprises whose products are extremely necessary to the national economy as well as in other projects of the unified national economic complex.

The only way out of the situation that has taken shape is to increase the effective yield from the minerals and other raw materials mined and to seek out additional potential for raising labor productivity that will offset the drop in the growth rates of the able-bodied population. That is why speeding up scientific-technical progress is still one of the most important tasks in managing the national economy during the 11th Five-Year Plan and in the immediate future thereafter.

A mighty production and scientific-technical potential has been built in our country so that basic research can be conducted along all the lines of science and technology. Every year about 4,000 new models of machines, equipment, pieces of apparatus and instruments are put into production in the national economy. Approximately the same number of inventions and efficiency proposals are used in production. In 1979 alone performance of measures

related to new technology in the industrial sector made 592,000 workers available, and the resulting economic benefit amounted to 4,479 million rubles. The sum total of the savings from using inventions and efficiency proposals in 1979 was 6.3 billion rubles.

Yet an analysis of the conditions for applying scientific-technical advances indicates shortcomings in this field which are holding back technical progress and the rates of development of production. The output-capital ratio in the industrial sector was 17.5 percent lower in 1978 than it was in 1970.* The average annual growth rate of the productivity of social labor was 5 percent between 1966 and 1979, as against 7.9 percent over the period 1951-1965.** The rates of reduction of production cost have been slowing down in a number of sectors of the economy. According to available calculations, every percentage point of growth of the national income during the 9th and to some extent the 10th Five-Year Plans required a 1.4-percent growth of productive capital, a 1.2-percent growth of physical inputs and a 0.2-percent growth of labor input.

There are several reasons for such a contradictory situation. Let us dwell on some of them. Scientific-technical development is usually approached from the standpoint of the established practice of current planning of production on the basis of the level already attained. Autonomous planning of the development of science and technology predominate is not sufficiently linked to the ultimate socioeconomic results.

Shortcomings in the organization of capital investments and capital construction, especially the lengthy periods of time (on the order of 8-12 years) for erecting new enterprises, sharply reduce the real return from scientific-technical progress. Not uncommonly a progressive design of a new construction project, one that meets the highest requirements of the world level, by the time construction is completed and rated capacity is fully attained is already "passe" when it begins to function. In renewing the fixed capital of the national economy by nearly 50 percent in a period of 8-10 years, we still are not raising the efficiency of capital investments. It is precisely here, in our opinion, that the principal cause is to be found for the inadequate return from scientific-technical progress.

So far a unified system of criteria has still not been built up for evaluating the efficiency of economic measures and alternative versions of new technology. The economic interests of developers, producers and consumers of new technology are often at cross purposes. The existing organizational forms for management of scientific-technical progress are not always appropriate to the specific nature of the processes taking place.

Improvement of the economic mechanism for managing scientific-technical progress is a complex problem with many levels and will yield the expected ults only under the conditions of unswerving implementation of a consistent se

* V. Krasovskiy, "Economic Potential: The Unused Portion and the Return," VOPROSY EKONOMIKI, No 2, 1981, p 92.
** B. Plyshevskiy, "Production Efficiency and the Price," VOPROSY EKONOMIKI, No 2, 1981, p 19.

synchronized measures to implement the principles governing the conduct of economic activity which were set forth by the 26th CPSU Congress, as a body and in their relationship to one another.

Strengthening the Orientation of Plans for Scientific-Technical Development Toward Specific Objectives

The planning of science and technology embraces two directions: the first is related to the partial improvements of designs of machines, the creation of new modifications of instruments and equipment, the improvement of the qualitative parameters of a product, and so on; the second includes the transition to fundamentally new technological systems, qualitatively new generations of machines, and new models and types of products.

The first direction in scientific-technical progress is predominant in project planning practice: traditional technology long ago mastered is partially improved and manufactured in larger quantities; equipment which has become widespread in other countries is purchased. There is no doubt that the potential for economy to be achieved along this line of scientific-technical progress is still far from exhausted. The emergence of new and more powerful models of turbines, tractors, diesel engines, machine tools and other types of machines and equipment considerably reduces the product's materials intensiveness and capital intensiveness and raises labor productivity. But it must be taken into account that this yields a benefit only in the first years of the improvement of the traditional technology. In the subsequent stages it drops, and when a certain limit is reached, use of traditional technological principles not uncommonly results in an outright loss.*

This situation can be illustrated with the example of the increasing size of steam turbines and the rise of their parameters. The transition from turbines with a capacity of 50,000 kw and steam parameters of 90 atmospheres and 530° C to turbines with a capacity of 500,000-800,000 kw and steam parameters of 240 atmospheres and 580° C makes it possible to decrease the consumption of standard fuel on the order of 80 grams per kilowatt-hour of electric power. But this rise of fuel economy, as an analysis has shown, occurs extremely unevenly. Of the 80 grams of fuel saved, 72 grams, or 90 percent, are achieved in the transition to turbines with a capacity of 300,000 kw, and only 10 percent through the transition to larger turbines (500,000 and 800,000 kw). The economy from raising the steam parameters also has a tendency to dwindle, and this results from the existence of a definite technological limit on the rise of the efficiency of thermal machines. At the same time the cost of the larger unit increases in inverse proportion to the fuel economy achieved.** Obviously a further rise in the efficiency of generating electric power can be achieved not by increasing the unit capacities of the machines now in operation, but by making the transition to a fundamentally new technology for

* T. Khachaturov, member of the academy, and D. L'vov, "Speeding Up Scientific-Technical Progress and Raising the Efficiency of Social Production," VOPROSY EKONOMIKI, No 8, 1966, p 13.

** M. A. Vilenskiy, "Po leninskomu puti sploshnoy elektrifikatsii" [On Lenin's Road to Complete Electrification], Izdatel'stvo "Nauka," 1969, pp 67-68.

direct energy conversion and to apparatus that is qualitatively new when compared to the design of present-day thermal turbines.

When only the first direction of scientific-technical progress is used, the rise in costs and prices of new technology created on the principle of modernization begins to exceed the increase in the effective benefit--productivity, capacity, and so on. For instance, for one of the recent models of a grain combine this ratio was 1.4:1, for a new tomato-picking combine it was 1.8:1, for new models of 25-ton trucks it was 1.6:1, and for a universal lathe 2:1. The price per unit capacity of power transformers has risen 29 percent, that of steam turbines 22 percent, and so on.

Finally, there is a certain potential for economy that can be used even within the limits of the first direction of scientific-technical progress, since its size is such that it cannot be altogether exhausted during one or two 5-year periods. But at the same time this line of technical progress cannot be regarded as the strategic line, since the possibilities for further improvement of a major portion of traditional equipment and technology are limited.

The basic potential for economy lies in organic combination of both the first and second lines of scientific-technical progress. From the moment it is put into production in industry and replaces the old technology, the new technology augments the overall potential for efficiency in pursuing the first line of progress. In this respect it possesses a kind of dual potential. It is a question of a prior orientation toward creation of fundamentally new equipment and processes and then subsequently improving them over a certain period of time. The second direction opens up possibilities for comprehensive intensification of production, which is accompanied by a substantial rise of labor productivity, economy of physical resources, improved use of productive capital and a rise of the economic benefit to the national economy.

If both lines of scientific-technical progress are to be pursued, the system for planned guidance of the process of creating scientific-technical advances and their use in production is in need of further improvement. This will bring about a redistribution of resources, a change in the sectoral structure of the economy, and the performance of new measures to improve the economic mechanism for management of production. It evidently will take one or two 5-year periods to carry out this kind of restructuring of planning. In any case, the real economic benefit from it will be obtained beyond the limits of the 11th Five-Year Plan. But this is a strategic gain, one that grows in its scale in economic consequences. It cannot be compared at all to the current saving that is achieved by increasing the size of the production run of existing technology, a saving that dwindles as time passes.

That is why even today we should define the possible outlines of changes in the economy and also evaluate the socioeconomic consequences and necessary conditions of carrying out the state's long-range technical policy. The first step on that road should be developing a qualitatively new conception of long-range socioeconomic and scientific-technical development. For instance, when one of the versions of the long-range development of the economy over a 20-year period was being worked out, a 2.5-fold increase in the size of the

national income used for consumption and accumulation was projected. Certain changes were also outlined in the composition of the final product related to redistribution of resources to the advantage of the nonproduction sphere: for example, an increase in the share of fixed nonproductive capital to 37 percent of the total amount of fixed capital, while the share of workers employed in the nonproduction sphere rose from 26 to 36.3 percent. Over the 20 years under consideration the volume of resources used for consumption was to increase 2.7-fold.

Such high growth rates of the final social product and the associated structural changes cannot be achieved solely on the basis of the first line of scientific-technical progress. In large part they in fact dictate use of the second direction. That is why the next step in carrying out technical policy should be to select and substantiate fundamentally new technological procedures. This problem can be solved within the framework of the comprehensive program for scientific-technical progress provided that the methodological basis for working it out is expanded, that qualitatively new elements are included in it to guarantee the objective economic justification of the development strategies which are chosen. It is a question of building a model of scientific-technical progress aggregated at the level of the national economy and of including it in all forecasting calculations.

The ultimate goals of long-range socioeconomic development and the projected size and composition of the final social product should be taken as the points of departure in substantiating the requirements that must be met by the technical methods of achieving them. Each of the possible technical methods must guarantee a growth of the final product of the given magnitude, but with differing inputs of labor, physical resources and productive capital, that is, they would be characterized by their particular indicators of efficiency: labor intensiveness, capital intensiveness and materials intensiveness from the standpoint of the national economy. The future level of the specific indicators depends on the one hand on the existing (forecast) dynamic behavior of resources and changes in the material and technical base of production, while on the other it depends on the possible discrepancy between the conditions to be ensured by those methods and the final need of the national economy. The degree of that discrepancy figures as a form of society's social assignment concerning the development of science and technology (the second direction of scientific-technical progress). In essence the social assignment results from the fact that performance of a portion of the tasks of long-range development is not guaranteed by the scientific and technical spadework already done. But by no means does this signify that that spadework exhausts all the possibilities for science and technology that exist. Reliance on the spadework that exists is determined to a considerable extent by the inertial nature of the technical policy of the sectors of the economy. As experience has shown, major developments not uncommonly prove to be outside the limits of that policy, and their practical realization is held back because of the lack of backing for what might be called the rear experimental echelons of academic science.

An equally important impetus for the development of new ideas and for defining possible ways of realizing them in practice would be to present to "big science" requirements imposed on the level of indicators of labor intensiveness,

capital intensiveness and materials intensiveness from the standpoint of the national economy insofar as that level is not assured by the scientific-technical spadework. Unless that level is attained, no way can be found to full realization of the socioeconomic goals. It has to be taken into account that an interrelationship exists between the objectives and the means of realizing them. The goals do not emerge in and of themselves, but under the impact of a large number of factors, among which a substantial role is played by the existing level of social technology and by a reckoning of the potential which science realistically possesses. Changes in the system of goal-oriented development exert in turn an influence on the technological methods in the sectors of the economy, speed up or slow down the output of resources, and so on. The existence of this interrelationship between objectives and means does not vacate the general proposition of the purposive orientation of scientific-technical progress.

As a practical matter it follows from that proposition that the initial component of the long-range plan for development of science and technology must be not the spadework development that already exists, but promising alternatives for changing specific indicators of efficiency (labor intensiveness from the standpoint of the national economy or productivity, capital intensiveness or the output-capital ratio, and the materials intensiveness of the social product), which furnish the economy access to achieving the socioeconomic goals and which meet the forecast restrictions on resources. But the whole point is that the dynamic behavior of those indicators is not as a rule all in the same direction. Improvement of one indicator of social technology is usually accompanied by a worsening of some other indicator. For instance, productivity might rise, and the output-capital ratio drop, or the latter's increase could in turn be accompanied by a rise in materials intensiveness, and so on. What is needed, then, is a kind of economic resultant, which would indicate how the summary indicator of production efficiency would behave given a particular dynamic behavior of the indicator of social technology. Total expenditures of labor (live and embodied) required to achieve a given production result are naturally taken as such a resultant. But appropriate weighting factors are necessary to the transition from specific efficiency indicators to a summary indicator or to their economic resultant.

There are various methods for this kind of weighting. For example, it has been proposed that inputs of past labor be converted to live labor by means of appropriate work equivalents. A method of imputed costs has become widespread in our project planning practice in which the rate of efficiency of capital investments figures as the coefficient for reducing heterogeneous cost elements (current and capital) to a common denominator. In the theory of optimum planning a modified form of imputed costs is in use which relies on so-called objectively conditioned assessments of heterogeneous economic resources.

Without entering into an analysis of methods of imputing costs, we will note what they have in common--heterogeneous cost elements are reduced to a common denominator, for which purpose total labor expenditures are used. To determine the latter it is expedient to use rates of efficiency in the employment

of resources (labor resources, capital investments, etc.) which can be obtained from the structure of relevant macroeconomic models.*

Specific indicators of efficiency are converted by means of these rates to a single summary indicator--the benefit of scientific-technical progress to the national economy. In general form this indicator represents the growth of the economy of resources over two comparable periods (one year compared to another taken as the base, or the first year of the 5-year plan compared to the last, and so on). The economy itself achieved in a particular year of the planning frame is determined by the difference in the net output and imputed inputs of resources (labor investments in fixed productive capital). The peculiarity of this indicator is that the economy of resources related to use of the version for retooling production that is under consideration is compared to the economy which would be obtained if the planned magnitude of the final output were produced under conditions of an unchanged technical base, that is, if the level of the specific indicators of the efficiency of utilization of economic resources did not change. We regard the indicator of the economic benefit to the national economy, then, as a summary indicator of scientific-technical progress.

Wherever the benefit is higher, other conditions being equal, the level of scientific-technical progress is also higher. If the level of the specific indicators does not change, the benefit of scientific-technical progress will be zero; that is, there is in fact no progress in economic terms. But this does not mean, of course, that scientific-technical progress ceases to exist as a process of refinement of knowledge and of its materialization in the form of improved implements and subjects of labor and improved forms for organization and management of production. In this case we are talking about economically progressive new technology that reduces inputs of resources for a given volume of production. It is this task that scientific-technical progress is expected to perform for social production as a whole, for its sectors, or for major regional industrial complexes. And it does not count here that certain measures in the creation and use of new technology for a specialized or some other particular purpose may not yield a direct economic benefit.

Society cannot allow a drop in the ultimate efficiency as a whole for the sum total of measures pertaining to new technology. This means that the requirements imposed on the bulk of the new technology realized in the national economy must be higher so that the economic benefit obtained from it appreciably exceeds the losses from use of specialized equipment which does not yield a direct economic return. These higher requirements are reflected in the standard rates of efficiency of utilization of economic resources, which are uniform for all sectors of the national economy, in the sectoral differentiation of the indicators of social technology, in the differing rates of development of sectors which determine that sectoral structure of the economy which is best from the standpoint of the criterion selected (maximum benefit of scientific-technical progress).

* S. M. Movshovich and Yu. V. Ovsiyenko, "On Definitions and Use of the Rate of Efficiency of Capital Investments," EKONOMIKA I MATEMATICHESKIYE METODY, Vol XIII, No 4, 1977.

When the problem is stated in this way, at the level of a model the iterative procedure can be performed to select the best variant of social technology, including a unit devoted to expert evaluation in order to settle questions pertaining to possible reconciliation of the indicators of goal-oriented development should they improve by comparison with the social standards, norms and indicators of economic efficiency. The indicators and norms of the efficient utilization of productive resources in the best alternative are taken as the reference figures or the social assignment for development of science and technology in the relevant sectors of the economy. Their level and rate of development determine proportions in the distribution of resources among the sectors of the economy. So, in assigning values to them in the plan, we are thereby determining as well the total volume of appropriations required to achieve the goals that have been set on the new organizational and technical foundation. Within the limits of those appropriations it would seem advisable to create an all-union fund for scientific-technical progress. The special-purpose orientation of that fund presupposes unity in carrying out technical and investment policy and a splicing of the plan for scientific-technical development with the capital construction plan.

The transition to goal-oriented development of science and technology also necessitates a new approach to methods in drafting long-range and medium-term normative planning documents in the form of a summarization of target programs for scientific-technical progress. In such a scheme the following mechanism might be adopted in composing them. Once they receive the reference figures, the sectors would draft alternative versions of programs for scientific-technical and organizational development of production, indicating deadlines, the volume of capital investments, their distribution in time and among participants, and also the volume of other resources which are in short supply. Each such program should ultimately guarantee the creation of integral technological systems encompassing an entire production process and based on an interrelated system of machines.

The justification of the alternative versions of the programs would take into account the requirements of the target-program method in such a way that the assignments concerning the volume and mix of products and services produced by the sector would take the form of fixed resultant figures. The efficiency criterion would be the minimum standard costs for attainment of the final figures, in which the relevant standard efficiencies in utilization of productive resources are taken as constraints. The indicators of the sector's capital intensiveness and labor intensiveness, determined by the reference figures, would reflect only the lower boundary for the sectors. This means that if a version can be proposed which within the limits of the given constraints ensures lower labor intensiveness and capital intensiveness (than was envisaged by the reference figures and also by other possible alternative versions of the programs), then preference must be given to that version.

The figures of the best version must be subjected to analysis from the standpoint of the interrelationship it ensures between sectoral and regional production tasks and also with respect to their fit with its other indicators (important from the standpoint of the sector). Once the different versions of the sector's programs have been worked up, the best of them are submitted to

the directive planning authorities--USSR Gosplan and the State Committee for Science and Technology, which analyze, reconcile and balance the sectoral programs for scientific-technical development with respect to resources, stages and deadlines. Intersector target programs of scientific-technical progress are consequently composed, and their summary comprises the national-economic level of the plan for development of science and technology. This allows for iteration in working out the program section: in case of a clash with respect to resources or deadlines, the sectors receive corrected reference figures. This continues until complete internal consistency is obtained with respect to resources, deadlines and the physical mix, in accordance with the system of socioeconomic goals of the long-range plan.

The resources required to carry out the program section of the plan for development of science and technology must be reconciled with the resources of the all-union fund for scientific-technical progress. If balance with respect to physical resources and personnel is to be maintained within that fund, it is obviously advisable to work out those resources in a breakdown by sectors and also a breakdown by regional industrial complexes. From the very outset, then, each sector and major regional industrial complex is assigned that portion of the resources of the all-union fund which can be used for development of that sector or complex in the context of the interests of the national economy. It is that portion which figures as the first restriction in selection of the best alternative version of the program for scientific-technical development of the sector or regional industrial complex.

The transition to target-program methods of planning scientific-technical progress makes it possible to solve still another urgent problem with the appropriate method. This is the comprehensive development of systems of machines that cut across sectors and guarantee that an entire production cycle, including not only the basic processes, but also auxiliary processes, is placed on a new technical basis. To that end it is advisable to plan creation of systems of interrelated machines for integral technological processes than the creation of individual machines or types of equipment. In this case assignments for new technology will at best have an impact on the performance indicators of the enterprise applying that technology. Of course, every finished set of machines that is developed must be introduced at an industrial facility. It is only under production conditions that it is possible to determine what gain in productivity, specific investments, the output-capital ratio, consumption of materials and energy, and so on, will come from use of the new complex of machines or the system of those machines and that one can make a comprehensive evaluation of the ultimate efficiency of the new technology.

Improvement of Economic Methods of Managing Scientific-Technical Progress

The prerequisites have now come about for the shaping and further improvement of the economic mechanism for managing scientific-technical progress as the basis for performing long-range socioeconomic tasks. Experience has been acquired and summarized in carrying out complex and large-scale scientific-technical programs, and many progressive conceptions for improvement of the economic mechanism of management have been discovered and defined. Experiments

have been conducted and serious steps have been taken toward a radical improvement of the economic management of the economy as a whole.

But the reorientation of the economic mechanism in the direction of scientific-technical progress is an extremely complicated task. Its accomplishment calls for a set of interrelated measures to be carried out in stages. In carrying out the CPSU's economic strategy each of these stages is a link determining the directions of the state's economic and technical policy in the corresponding time interval. Carrying out the measures envisaged by the decree of the CPSU Central Committee and USSR Council of Ministers entitled "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" is an important link in that chain.

Now the task is stated this way: The economic mechanism in all its parts must function according to uniform methodological principles of increasing ultimate production efficiency from the standpoint of the national economy. Performance of that task will require creation of certain conditions, the first of which are these: correlating the plan for development of science and technology with the capital construction plan, making the transition to normative methods of resource allocation, strengthening the relationship between prices and the plan, orienting all levels of management toward increasing the effectiveness of scientific-technical progress, making the transition to an incentive system based on the final results for the national economy, gradually broadening the forms of financing that have been adopted, and guaranteeing a balanced linkage between financial plans and production plans. We will examine some of these conditions.

Correlating the Plan for Development of Science and Technology With the Capital Construction Plan. The scientific-technical progress which will determine the technical level of production and its material and technical base in 10-15 years is taking material form in the capital investments being carried out today. Unless the correct orientation of capital investments is ensured, and the entire investment process bent to the task of raising production efficiency, it will be hardly possible to expect an appreciable improvement of the final indicators of economic growth in the future.

At present 70 percent of capital investments are assigned to reconstruction and retooling of production. At the same time the share of output that meets the requirements of the superior quality category is still disproportionately low. The plan for development of science and technology has to become the initial base of the capital construction plan. The bulk of capital investments should be set aside to carry out scientific-technical programs as the vehicles of new scientific-technical developments. The total volume of those investments might even serve as the principal source for formation of the all-union fund for scientific-technical progress. It would be best to use the resources of that fund to work on the most important scientific-technical problems, to carry out target scientific-technical programs, to create integral technological systems and to apply especially important and efficient inventions and engineering developments.

In this connection one cannot but touch upon the problem of resource allocation in the various stages of the unified process of creating new technology: research (including basic science as well), applied projects and application of new technology. At the present time one of the stages of the cycle has undergone the greatest development, that stage in which a disproportionately large technical backlog of innovations is being created for subsequent application. But because the plant and equipment of pilot plants is inadequate, they have been unable to cope with this flow of technical innovations being created. Not uncommonly the result is inefficient expenditure of funds for development of more and more new designs on the one hand, while on the other it is not possible to thoroughly perfect a design before it is launched into series production. That means numerous adjustments and finishing touches during the stage of initial application, which makes the experimental prototypes and first production runs more expensive. Often, moreover, troubleshooting and elimination of deficiencies in this stage are 100-fold or 1,000-fold more expensive than it would be to refine the design more thoroughly in the second stage.

Nor are the necessary rates of development being altogether guaranteed even in the first stage. Meanwhile it is here that work is being done on the most important key problems of science, whose solution is most crucial to development of technology, of the economy, of production and of science itself. In essence it is here that the long-range strategic spadework of scientific-technical progress is built up. Equipping this stage of the cycle, then, yields a sizable benefit, one which is not defined by a reduction in expenditures of labor, but by a reduction in the completion time of scientific research projects and the time for conducting scientific-technical experiments. It is apparent that the level of the amount of capital per scientist employed in science must in time approach the level of the capital-worker ratio in industry. The bulk of the resources of the all-union fund for scientific-technical progress should be committed to performing the assignments of the national economic plan for development of science and technology. But it would be wrong to think that the remainder of the capital investments would in this scheme be used without taking into account the requirements of scientific-technical progress. Were that the case, a tremendous number of measures for new technology and for improvement of organization and management would not be included in the overall mechanism for increasing production efficiency. Capital investments lying outside the programs would be used mainly to carry out such measures. This is guaranteed by the fact that the indicators and economic norms of the plan for development of science and technology run through all the other sections of the plan and are the initial basis for their composition. The norms for efficient utilization of economic resources are assigned a special role in this mechanism.

Making the Transition to Normative Methods of Resource Allocation. The demand for capital investments exceeds the real capabilities of capital construction. The principal reason for this is the disagreement between sources of financing and normative acts (used in construction and in project plans and estimates) on the one hand and the capital construction plan on the other. The volumes of financing are far greater than their real backing, the estimated cost is exceeded twofold or threefold, and construction times considerably exceed the

standard allowances. All of this causes inconsistency between the physical and value aspects of the plan. The situation can be changed essentially if the assigned rate of efficiency of investments is set forth in the plan. In this case the standard rate of efficiency will reflect the optimum balance between supply and demand for a generic resource like capital investments. At the same time this standard makes it possible to determine the scale of mechanization of laborious processes and introduction of highly productive new technological systems. In this sense the standard efficiency of capital investments is a kind of "vehicle" of technical progress. That is why the orientation toward the level of this standard signifies an orientation toward increasing the effectiveness of scientific-technical progress and toward enforcement of the balance with respect to resources and finances achieved in the plan. Pursuing the course of raising production efficiency presupposes that allocation of the relevant resources to the particular production unit unfailingly takes into account the greatest efficiency of their utilization from the standpoint of the national economy. To that end capital investments must be assigned in accordance with the standard efficiency of capital investments set forth in the plan.

The following must be correlated to the level of the standard coefficient of investment efficiency: the level of the rate of interest on credit, the charge for newly added capacities, wholesale prices, rate schedules and other economic norms which are now established independently of the plan. It is evident that the charge on assets comprising construction work unfinished beyond the assigned deadlines must be set at the same level as the standard rate of efficiency. Proceeding from there, the estimated construction cost ought to be determined so as to take into account the charge on unfinished construction.

The proposed procedure for resource allocation would in our view ensure uniform requirements as to the efficiency of their utilization regardless of sources of financing. The allocation of resources under the programs and outside them would be approached from the standpoint of the contribution which the measures make, either under the program or outside it, to the growth of the benefit of scientific-technical progress. All of this will make it possible to raise substantially the level of internal consistency of plans and to diminish the problem of the shortage of resources.

Orienting the Economic Mechanism Toward Final Results. A maximum rise of production efficiency cannot be achieved unless we know in specific terms what that growth expresses and what kind of indicators describe it. The official methods for evaluation of the efficiency of economic measures not uncommonly contain contradictory recommendations. At present for all practical purposes there do not exist even two methods documents that are altogether identical in the methods of computing the economic benefit from the standpoint of the national economy, in the system of norms used, in the list of indicators to be taken into account, and so on. The efficiency of capital investments and of new technology is evaluated in different ways, as though they were different factors unrelated to one another. The problem is compounded by the fact that yet another system of evaluations is used in cost accounting: such criteria as profit, production cost, profitability, etc.

All of this acts as a serious drag on carrying out measures to raise the level of planning work in the national economy envisaged by the decree on improvement of the economic mechanism. The economic mechanism must function in all its parts on uniform methods principles reflecting the requirements of raising the ultimate efficiency of production from the standpoint of the national economy. To that end a uniform methodology for calculating the benefit of scientific-technical progress should be applied in planning, in price setting and in economic production incentives. This indicator should figure as a start-to-finish indicator extending over all levels when decisions are being made on creation and application of new technology. But modification of the indicator of the benefit of scientific-technical progress is necessary to ensuring that calculations of the benefit to be determined at different levels can be compared and summarized.

When specific measures to apply new technology are being compared, this indicator is modified to take the form of the well-known formula of the difference between the upper limit of the price and the annual imputed costs of production of the new technology. In the special case when the product remains unchanged in its use characteristics and quality, the general formula of the benefit of performing the specific measures concerning new technology is modified to become the formula of the difference between annual imputed costs. In the more general case when there is a change not only in the quality, but also the assortment of the product manufactured, one must deal with a different type of criterion--the growth of net profit to the national economy. At the level of sectors and the national economy as a whole the indicator of the growth of normative net output figures as the criterion that implements the principle of maximizing the benefit of scientific-technical progress.

A large number of problems have to be solved to implement uniform principles of economic computations based on the benefit of scientific-technical progress. First of all a direct relation has to be established between material incentives and the final results of economic activity. This applies both to the wage and also to all forms of material incentives. This approach must ensure a decisive eradication of all forms of leveling in remuneration and the awarding of bonuses.

The question of broader use of the standard wage deserves attention in this connection. It would seem to be worthwhile to also discuss the question of introducing two levels of wages--the guaranteed wage, reflecting occupational, sectoral and social peculiarities in remuneration of labor, and one that would not be guaranteed and would be created from the portion of the economic benefit of scientific-technical progress and would figure as a supplemental wage paid specifically for the final result of production. It is important that in this procedure for forming a supplemental fund for remuneration of labor that its size depend directly on the economy of all types of economic resources: physical and labor resources and capital investments.

It is important to resolve the question of shares in the distribution of income. The standard charge on economic resources employed should be collected from the enterprise, and everything it realizes beyond that (net profit) should be divided by shares between the enterprise and the budget. Formation

of economic production incentive funds ought to be made directly and immediately dependent upon the size of the benefit (the growth of net profit).

A number of other problems also need to be solved to introduce a uniform methodology for calculating the benefit of scientific-technical progress; the following, to be specific, are indispensable: gradual reorientation in the encouragement of quality from volume indicators (the share of output in the superior-quality category) to the benefit of technical progress, which reflects the economic gain of the consumer of the new product; expansion of the rights of all-union industrial, production and scientific-production associations in determination of financial resources, in introduction of specific forms of remuneration of labor, in the distribution of resources among economic incentive funds, and in conclusion of direct long-term business contracts; formation of centralized economic incentive funds and compensation reserves within entities for administration of the programs (the size of these funds might be subject to a norm stated in the percentage of the total value of projects under the program, and the deductions to them might be made from the resources of consumers or from the state budget).

Accomplishment of these measures is bound up with overcoming a number of difficulties, and time and resources will have to be spent. But their performance is in our view an important condition for raising the efficiency of social production and for performing the fundamental task of organically combining the advances of the scientific-technical revolution with the advantages of socialism.

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