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USSR Report

ECONOMIC AFFAIRS

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SOCIO-ECONOMIC IMPACT OF NEW TECHNOLOGY EXAMINED

Moscow VOPROSY EKONOMIKI in Russian No 12, Dec 79 pp 24-34

[Article by Yu. Zykov: "The Socio-Economic Effect of New Technology on the National Economy"]

[Text] The socio-economic impact of new technology on the national economy shows what contribution its creation and utilization make to the attainment of the ultimate goal of socialist production--the fullest satisfaction of the needs of all members of society. Therefore, the selection of effective ways of creating and applying new technology must be based on this indicator. In the determination of its content, we must proceed from the fact that the economy of the USSR constitutes a single national-economic complex which encompasses all links of social production, distribution, and exchange in the territory of the country.[1]

One of the most important directions of improving the overall planning work, as noted in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving the Planning and Strengthening the Influence of the Economic Mechanism on the Increase in the Efficiency of Production and the Quality of Work," is the selection of the most effective ways of attaining high final national-economic results. The national income is the basic source for the satisfaction of the constantly growing material and spiritual, social and personal demands of the population. However, not only its production but also its consumption require expenditures of social labor. The services of such branches of the nonproduction sphere as culture and art, education, health care, physical culture and sports, and municipal and everyday services involve large and evergrowing expenditures of labor. Large are the expenditures of labor in the process of consumption of the national income in science and the administration of the state, everyday life and in the activity regarding the preservation of the environment. The reduction of that kind of expenditure for a given useful real-material result is one of the most important tasks as far as the national economy is concerned. The socio-economic impact must take into account the economy of social labor not only in production but also in the nonproductive sphere of the national economy.

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The majority of scholars see the importance of the economic effect of new technology in the economy of expenditures derived from it only in material production. A broader approach is contained in the works of those economists who see the importance of the economic effect of new technology (capital investments) in the growth of national income called forth by its application in material production, as well as in the non-productive sphere of the national economy and in the everyday life of the population. New technology can secure the growth of the national income as the result of the indirect influence on its increase, for example, through the development of science, the increase in the qualifications of workers, the improvement of the everyday life of the population and as a consequence through the increase in the productive force of labor in material production.[2]

The economy of expenditures of social labor in the non-productive sphere and in material production has a diverse content. Economy in the expenditures in material production leads directly to an increase in the national income, therefore the economic impact constitutes the main part of the economy in social labor to be determined in the calculations of the socio-economic impact (since the latter takes into account both kinds of economies) and must be distinguished separately in these calculations. Consequently, the category of the socio-economic impact of new technology must not replace the category of its economic impact and must be contrasted with the latter.

In calculations of the socio-economic effect of new technology a large number of questions must be included by comparison with the calculations of its economic impact. Therefore, the content of the concept of the real-material result, which is usually used in calculations of the comparative economic efficiency of new technology, must be expanded. Let us consider the structure of the result of the creation and utilization of new technology, which we call its socio-economic result. As a means of satisfying the social and personal needs of the population, it is a social result and is subdivided into positive (useful) and negative socio-economic results.

The positive results, in their turn, are divided into basic and supplementary results. They represent the economic and social results which are the goal of the creation and utilization of new technology.[3] The latter include obligatory normative social and economic demands (expressed in rules, norms, instructions, standards) to which production and the utilization of new technology must correspond. Supplementary results represent positive social and economic results of production in the utilization of new technology, which are obtained by comparison with the application of technology turned out earlier for the attainment of basic results and by comparison with supplementary measures guaranteeing conformity of the creation and application of the technology turned out earlier to the obligatory standard requirements.

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The real-material socio-economic result of the production and use, for example, of a new diesel-fueled truck (of the vehicle type "KamAZ" [Kamskiy Automobile Plant]) include: 1) the basic result, consisting of the securing of the transportation of cargoes in the national economy with the observance of higher standards in regard to the conditions of work in production as well as in the use of the new vehicle (by comparison with such standards observed in the production and use of the vehicle produced earlier), but also in the observance of standards with regard to the influence on the natural environment (the content of carbon monoxide in the exhaust gases of the motor, the level of radio interference, and so on); 2) the supplementary result, which is reflected in the substantially lower carbon monoxide content in the exhaust gases of the motor by comparison with the standards for the gasoline motor of the engine produced earlier (which facilitates the solution of the problem of the preservation of the air basin of cities against carbon monoxide pollution), in the improvement of working conditions for the driver by comparison with the mandatory approved standards, and so on; 3) the negative result, which manifests itself in the increased content (although within the limits of the established norms) of the carbon deposits in the exhaust gases of the motor as the result of the very use of diesel fuel.

The necessity of calculating the supplementary results of the creation and utilization of new technology is dictated by the following circumstances. First of all, the mandatory social and economic demands presented for the output of a given new technology cannot always be developed prior the solution of the question of the efficiency of the manufacture of this technology. Then the level of those demands must be substantiated proceeding from the efficiency of this technology. Secondly, the standard demands fix only the limits within which the parameters contained in the demands must be found. The immediate goal of the creation of many kinds of technology consists in improving the significance of such parameters. This necessitates additional expenditures, which prove to be unjustified if the achievement of supplementary results of the creation and utilization of new technology is not taken into account. Thirdly, a number of aspects of the process of the creation and utilization of new technology are not always encompassed by a system of mandatory standard requirements. In particular, negative consequences of the manufacture and use of new technology are possible with its conformity to such requirements.

The orientation of the production of new technology toward the achievement of supplementary results makes it possible to solve important tasks of cleaning up the environment, improving the conditions of work, and others. Therefore the supplementary results are such only in relation to the primary goals of the creation of new technology--the obtainment of basic results, thanks to which a social order for the technology. In the process of its creation, the supplementary results as a means of satisfying the needs of the population are not less important than the needs with

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regard to its functional properties, become necessary side by side with the basic ones.

In the presently-operative methodological recommendations regarding the determination of the economic impact of new technology only the results of its utilization are examined which conform to its direct functional purpose, and no methods are given for assessing the effectiveness of expenditures for the obtainment of supplementary results. These expenditures are large and continue to grow rapidly. In paragraph 9 of the Methodology for the Determination of the Economic Impact of New Technology it is noted that in comparing variants of technology it is necessary to obtain comparability with regard to all results, economic as well as social. However, this requirement, in our view, is insufficiently considered in the calculation formulae of the Methodology.

In the literature the socio-economic impact of new technology on the national economy is understood to mean, first of all, an increase in the positive real-material socio-economic result, attained by virtue of its production and utilization, and, secondly, the economy in expenditures of social labor in material production and in the non-productive sphere of the national economy obtained in the process of this production and utilization.[4] The socio-economic impact of new technology can be measured, consequently, by the sum total of indicators, a vector whose components are the natural indicators of the social and economic results of the production and utilization of new technology, and also the indicator of the economy of expenditures of social labor obtained throughout the national economy (with the apportionment of the economy of expenditures in material production as the economic impact of new technology).

In essence, the economic impact of new technology is also an analogous vector, which includes a useful real-material result and the economy of expenditures for obtaining it with the aid of the new technology. The basic difference between the socio-economic and the economic impact, as has already been mentioned, consists in the fact that the limits of the real-material result in the determination of the former is much broader and it means it can reflect the role of new technology in the realization of the basic goal of socialist production to a greater degree.

For the determination of the economy of expenditures attending the obtainment of the socio-economic result with the creation and utilization of new technology, we propose the following formula:

$$Э_t = (C_б^t + E_н^t K_б^t) + \sum_{j=1}^{J} (C_{пj}^t + E_н^t K_{пj}^t) + \sum_{i=1}^{I} (C_{пi}^t + E_н^t K_{пi}^t) - \\ - (C_н^t + E_н^t K_н^t) - \sum_{к=1}^{K} (C_{ок}^t + E_н^t K_{ок}^t), \quad (1)$$

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where C^t_{∂}, K^t_{∂} are current expenditures and resources being used, necessary in the t-th year for the attainment, with the aid of the technology to be replaced, of the part of the basic results of the application of the new technology which corresponds to its functional purpose: $C^t_{\text{д}j}$, $K^t_{\text{д}j}$ are the current expenditures and utilized resources for the realization of supplementary measures that are necessary in the production and application of the technology being replaced for the observance of the mandatory requirements of the j-type available in the t-th year: $C_{ni}{}^t$, $K_{ni}{}^t$ are current expenditures and utilized resources necessary in the condition of production and the application of the technology being replaced for the attainment, in the t-th year, of supplementary results of type i (being compared with the supplementary results of production and utilization of new technology); C^t_H, K^t_H are the current expenditures and utilized resources for the obtainment of the entire positive (basic and supplementary) result in the t-th year with the aid of the new technology; C^t_{ok}, K^t_{ok} are the current expenditures and resources necessary for rendering harmless or reimbursing for damage of type k, from the negative result found within the limits of the mandatory requirements, which is obtained in connection with the production and utilization of the new technology; E^t_H is the standard coefficient of efficiency of the resources being used in the t-th year. A summation is necessary according to indices j, i, k in formula (1) since the production and utilization of technology involve the most diverse kinds of social and economic results.

The magnitude of the stated economy of expenditures for the calculation period T will be equal to:

$$\Theta_T = \sum_{t=1}^{T} \alpha_t \Theta_t, \qquad (2)$$

where Θ_t is the annual socio-economic impact, determined in accordance with formula (1); α_t is the coefficient of reduction of the economy attained at various times to the beginning of the calculation period.

The socio-economic impact of new technology must be determined from the entire volume of its output, taking into account, moreover, the differentially enlarged spheres of the production and utilization of the given technology. The calculation period must correspond to the space of time on the basis of which the plan is composed or the prognosis of the basic result of the production and utilization of the new technology is developed, and the time of its output is taken so as to obtain the stated result in the course of the calculation period.

Formula (1) is analogous to a formula of the difference of the quoted expenditures for the attainment of a given useful real-material result with the aid of the technology being replaced and the new technology--a formula widely being used in the determination of the economic impact of new technology and capital investments. At the same time, it has certain differences which are determined by the fact that the economy of social labor

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being calculated in the determination of the socio-economic impact encompasses more processes, which take place in the national economy. Thus, the socio-economic result must be comparable to the variants of expenditures being compared (the variant to be replaced and the new variant) for the satisfaction of the need being considered with regard to both quantitative and qualitative characteristics. Moreover, the comparability here cannot be distinguished from the well-known rule of "the identity of the useful result according to comparable variants", which is being applied in the determination of the economic impact.

The comparability of results in the calculation of the economic impact of new technology signifies that "the plan variants being compared must fulfill identical national economic tasks, i. e., cover identical tasks with regard to: a) volume, b) composition, c) place and d) time of demand and e) serve the same goals of economic policy with regard to character, volume, place and time."[5] In the determination of the socio-economic impact of new technology of the stated comparability of the results with regard to the variants being compared, its utilization is frequently impossible even theoretically. Thus, the execution of the same work with the aid of a machine tool with program control instead of 2-3 ordinary ones not only lowers expenditures (produces an economic impact), but also changes the content of the labor of the workers, makes it more attractive. It is apparent that here it is impossible to attain full comparability of the variants with regard to the work of the machine tool operators.

Practically any new technology in the above-mentioned sense is not fully comparable to the technology being replaced in regard to content of labor in the process of its production and utilization, in regard to its impact on the natural environment or the daily life of the population. If even in this case it is possible to carry out special measures providing for the greater comparability of the technology being replaced and the new technology, in the calculation of the socio-economic impact such comparability is inexpedient since the variants of the new technology and the technology being replaced that are being compared, in our view, must be fully comparable only in regard to basic results.

The elimination of heavy physical work is one of the important social goals of our society. At the same time, society still does not have at its disposal resources that are sufficient for the full and immediate elimination of such work. Therefore, the resources apportioned by society from national-economic positions for the attainment of the stated goal must be utilized so as to guarantee, at their given level, the elimination of a maximum number of job positions with physically heavy conditions of work.

Let us suppose now that the new technological line at the enterprise is twice as productive as the one being replaced and, moreover, heavy physical labor is eliminated. In addition, let us assume that it is possible to improve the technological line in such a way that, with the preserva-

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tion of former productivity, this line excludes heavy physical labor. The application of two improved interchangeable technological lines will be fully comparable with the utilization of a new one. It is entirely possible that, if the expenditures for the improvement of interchangeable technology have an impact on other enterprises, this will lead to the elimination of a much greater number of positions of heavy physical labor. In this case, their realization in a given enterprise for the improvement of the technology being replaced is deliberately inexpedient. Therefore, the expenditures for the application of two improved interchangeable technological lines in our example on the whole are also not socially necessary and cannot be compared with the expenditures for new technology, regardless of the full comparability of the real-material results in terms of the variants of technology being considered.

Unfortunately, comparisons of that kind are found in the substantiation of the efficiency of new technology. In particular, the method is widespread whereby expenditures for the materials, components, units and machinery of new technology, which improve the conditions of work upon its utilization, the preservation of the natural environment, the everyday life of the population, and so on, are added to the expenditures for the production of the base technology. Even the deliberately inexpedient increase of these expenditures does not lower the magnitude of the impact of new technology calculated in this way. What is more, it often turns out that the greater such expenditures the greater the calculated impact independent of the real useful result of the application of the technology.[6] If, in so doing, the unfinished design and technological work during its creation is written off to the components of the new technology being considered in connection with the conditionalities of the allocation of those of them which secure precisely the stated improvements in the conditions of work, and so on, a broad possibility opens up for justifying the output of even of deliberately inefficient technology. This method is substantiated by references to the necessity of observing the identity of the useful real-material result with regard to the variants of technology being compared.

One of the ways of reducing inexpedient expenditures for the attainment of certain social results and for securing them with a minimum of expenditures of social labor, in our view, may be the development of special national-economic standards of expenditures. These standards must determine the limits of the specific expenditures for the realization of such social goals as the elimination of heavy physical, professionally harmful, unattractive work, the improvement of the health of the population (in a section of certain directions), the reduction of time for the expectation of services, the lowering of the content of harmful substances in the atmosphere (by kinds of substances), the increase in the free time of the population, and so on. Moreover, it must be emphasized that we are talking about standard expenditures per unit of accomplishment of a corresponding goal (per elimination of one job position with heavy physical work in the national economy, the reduction of the expectation of service by one minute, and so on), since for many enumerated direc-

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tions there are standards which regulate the real-material characteristics of the impact of production on the life activity of the individual.

Such national-economic standards make it possible to determine the socially necessary expenditures for the attainment of supplementary results. The summary magnitude of such expenditures with regard to all types of supplementary results constitutes the third term of formula (1). Therefore, according to formula (1), that part of the expenditures for new technology which is directed toward the obtainment of a supplementary result is compared with the socially necessary expenditures for its achievement. Consequently, the possibility emerges in every concrete case to compare individual expenditures for supplementary socio-economic results with the socially necessary expenditures--which signifies the determination of the efficiency of their implementation.

The comparability of the real-material results with regard to the variants of the creation and utilization of the base and the new technology being compared in such an approach signifies that the identity of these results in regard to volume, quality, place and time (as this is required in calculations of the efficiency of new technology) will be observed only within the limits of the achievement of basic results. As far as obtaining supplementary results is concerned, here there does not have to be such identity in the general case (even if it can be attained technologically). For this part of the entire useful result, the comparability of the variants of technology being compared will signify the following. The creation and utilization of the new technology instead of the technology produced earlier secure such supplementary results as may be obtained also in the other spheres of the national economy on the basis of expenditures of social labor, calculated in conformity with national-economic standards of expenditures according to directions which correspond to the structure of the supplementary result being considered. Thus, as a rule, the identity of the place of the obtainment of supplementary real-material results of the production and application of the variants of technology being compared is absent in the calculations of the socio-economic efficiency of the new technology.

In our view, the proposed standards of expenditures may be calculated in a first approximation as average expenditures, and in some cases as closing expenditures throughout the national economy for the liberation of a unit of heavy physical, unattractive, professionally harmful labor according to its types, for the improvement (per unit of measurement) of the state of the natural environment according to components of pollution depending on the degree of contamination, for the reduction per unit of time of the expectation of service to the population in terms of enlarged types, and so on.[7]

For practical calculations of the socio-economic impact of new technology, analogous sectorial standards and even (in regard to specific types of supplementary results) standards for individual types of technology may

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be used. Later on, with the accumulation of experience in the development of the standards being considered in the sectors, the expansion of their number, the élaboration of a precise classification according to types of socio-economic results and the development of a methodology for their calculation, we can proceed to determine them on the national-economic level.

The difference in the method of measuring the economy of expenditures in the composition of the socio-economic impact of new technology according to formula (1) from the method presently being used to determine its economic impact consists in the fact that, besides expenditures for the attainment of supplementary results, this formula takes into account expenditures for the neutralization or reimbursement of negative consequences (which are within the limits of the mandatory standard social and economic requirements) of the production and application of new technology. These expenditures, like in the case considered above, are necessary for the reduction of the variant being replaced and the new variant of satisfying the demands in comparable form. Moreover, the comparability of the stated variants with regard to negative results, as above, does not signify the identity of negative real-material results of the creation and utilization of the technology being replaced and of new technology (according to the place of their origin).

Let us note that the obtaining of positive as well as negative results of the creation and utilization of new technology is considered by us in comparison with the obtaining of the results of production and application of the technology being replaced (taking into account the additional measures for this production and its application). If the production and application of the technology being replaced involve negative results, which are eliminated (prevented) thanks to the creation and utilization of new technology, this elimination (prevention) is considered by us as one of the positive results of such creation and utilization, and the socially necessary expenditures for the elimination (prevention) of the stated negative consequences enter into the composition of the term

$\sum_{i=1}^{I} (C_{ni}^{t} + E_{H}^{t} K_{ni}^{t})$ of formula (1). If some negative results are equally inherent in the production and application of the base and the new technology, then, naturally, their presence will not influence the extent of the economy of social labor obtained thanks to the creation and utilization of new technology, and that is why expenditures for their elimination are in no way reflected in the formula (1). In the composition of the negative results of the creation and utilization of new technology taken into account in this formula, only those are included which would be absent (or would be present to a smaller degree) in the case of the production and application of the base technology taking into account the implementation of additional measures.

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We shall examine the basic difference in the calculations of the socio-economic and economic effects of new technology by way of an example (figures conditional). A new grain harvesting combine, by comparison with the combine being replaced, is characterized by higher labor productivity and durability. The combine being replaced meets all standard requirements contained in the standards for its production and also in the instructions and rules regulating the conditions of work of the combine operator. However, on the new combine assemblies are installed whose purpose it is to improve the working conditions of the combine operator in conformity with new, more rigid requirements presented by the users. These demands on technology (an improved cabin, protective shields for the transmission of the thresher, painting and other aesthetic elements) do not noticeably influence the labor productivity of the combine operator. The cost of the mentioned assemblies is 700 rubles per combine. It goes into the quoted expenditures of its production. Moreover, by virtue of design improvements the level of noise and vibration in the new combine is lowered.

The initial data for the calculation: the quoted expenditures for the production of a unit of the combine to be replaced and the new combine are, respectively, 4,170 and 6,500 rubles; the volume of work produced by the combine to be replaced and the new combine is 0.47 and 0.59 hectare per hour; renovation deductions--0.050 and 0.042 1/year; annual operational expenses of the combine being replaced and the new combine (without taking renovation into account) in the calculation per volume of work produced by the new combine are 2,084 and 2,038 rubles per hectare; the annual output of the new combine is 20,000 units.

The economic impact from the utilization of the new combine for the entire term of its service, calculated according to formula (4) of the Methodology for the Determination of the Economic Efficiency of New Technology, now in effect, turned out to be negative, it is equal to minus 20 million rubles.[8] If the new combine were not provided with assemblies improving the working conditions of the combine operators, i. e., its production would cost 700 rubles less with the same technical advantages, the losses would be reduced to 5.9 million rubles. Thus, the expenditures for the improvement of the working conditions of the combine operator went down even without that negative economic effect.

However, the improvement of the working conditions of the combine operator is an important task of society. In the calculations being considered, no consideration was given to the social result of the use of the new combine, the working conditions on which are considerably better than on the one being replaced. Therefore, in the determination of the national-economic impact the total picture of its efficiency will be a different one.

First of all, from formula (1) it follows that the previous calculation must be changed, having added 700 rubles to the expenditures cited for the production of every new combine, since they represent mandatory expendi-

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tures with regard to the demands of the users, even if the output of the machine being replaced would be continued. With such a corrective of the calculations, the losses would be reduced to 1.6 million rubles (instead of 20 million rubles). Let us observe that the stated method of bringing the technology being replaced and the new technology to a comparable form with regard to the social results of its utilization conforms to the general provisions of the Methodology (paragraph 9) presently in effect, but did not find reflection in its calculation formulae.

Secondly, the use of the second combine involves less noise and vibration. At the present time, the above-mentioned national-economic standards of expenditures for lowering noise and vibration for one unit of their measurement have not been worked out; for this reason we assume conditionally that the scale of standard expenditures which correspond to the reduction in noise and vibration attained by the new combine equals 40 rubles per year. This amounts to 208 rubles per machine, i. e., $(208 = \frac{40}{0.042 + 0.15})$. From formula (1) it follows that these 208 rubles must be added to the economy of the user in yearly operational expenses.[9] Then we obtain that the economy of labor for the period of service of the new combine, calculated as an element of the national-economic impact, is equal to 2.6 million rubles. Moreover, the national-economic socio-economic impact of the new combine is also expressed in a number of natural indicators which characterize the improvement of both the grain harvesting work and the working conditions during the creation and utilization of the combine. Therefore, the production of such a new combine is efficient.

The isolation of the economic impact of new technology from its socio-economic impact is a complicated problem. However, such an isolation is necessary for the solution of a number of questions of the control of the socio-economic efficiency of scientific-technical progress. Frequently this isolation is impossible by direct calculation on the basis of the determination of expenditures for special assemblies, units, components, and other materials necessary for the attainment of only the supplementary result, within the composition of expenditures for new technology. In this case, that part of the expenditures may be isolated approximately by proceeding from the proportion of expenditures for the attainment of supplementary results, calculated according to their corresponding standards, to all expenditures of the base variant.

The last case shows that the economic impact of new technology must precisely be isolated (and sometimes provisionally because of necessity) from its socio-economic impact, which cannot be obtained by the summary of the economic impact and the separately calculated impact of the achievement of social results. This is especially clear in the separation of the economic impact from the socio-economic impact of the technology, the basic result of the creation and utilization of which in many respects is social (in the narrow sense of this word). Here the economy of expenditures cal-

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culated according to formula (1) may be more than the economic impact of new technology even within the limits of the basic result (for example, by virtue of the economy of social labor in the non-productive sphere of the national economy, which does not involve the growth of the national income).

The calculation of the economy of expenditures of social labor, which is generated in the obtainment of the socio-economic result, is not the only task of the determination of the socio-economic impact of new technology. No less important and much more difficult is the problem of the substantiation of the growth of the socio-economic result expressed by the real-material indicators, which is attained thanks to the utilization of new technology. This problem, in our view, cannot be solved by means of the application of a system of numbers which directly covary and rank the different social utilities.[10] Only the close coordination of the selection of the variants of new technology with the entire process of planning the development of the national economy promote its solution. In the process of such planning it is necessary to consider only those variants of the creation and utilization of new technology which guarantee the given growth of the socio-economic impact with the maximum economy of expenditures of social labor. Therefore, as in the selection of the variants of new technology by the magnitude of its economic impact, the task arises of such a selection by the extent of the economy of expenditures which enters into the composition of its socio-economic impact. Let us examine the interrelationship of these two tasks.

The basic features of the measurement of the economic impact of new technology by comparison with the determination of the economy of expenditures come to the following, as results from what has been set forth: first, the economic impact is a part of the stated economy of expenditures since it does not take into account the economy of social labor, which is not reflected in the growth of the national income (for example, the economies of expenditures for the attainment of a given useful result in the non-productive sphere of the national economy), and, second, in the determination of the economy of expenditures in the composition of the socio-economic impact of new technology it is not assumed that there is complete identity of the obtainment of those socio-economic results which appear during the stage of the formation of the social order for the production of new technology as supplementary results (and then in the development of the technology become basic ones side by side with the requirements of this order).

From the first feature it follows that the maximization of the economic impact of new technology in terms of its direction coincides with the maximization of its socio-economic impact, since with the increases of that part of the economy of expenditures in the composition of the socio-economic impact which falls on the economic impact the economy of expenditures itself grows. However, there may be cases when the variant of the the new technology, while increasing its economic impact, reduces the

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economy of expenditures in the composition of its socio-economic impact. Thus, in the example of the production and utilization of the grain-harvesting combine it would be economically advantageous not to place additional assemblies and equipment on the new combine which improve the working conditions of the combine operator. But in the present case the available economy of expenditures (2.6 million rubles) disappears in the composition of the socio-economic impact of the combine. Therefore, the selection of the most efficients variants of the new technology must be undertaken according to the criterion of its socio-economic impact. The economic impact of the technology variant selected according to this criterion is an important generalizing economic indicator, which is necessary for other goals of the administration of the national economy (for example, for the measurement of the influence of the creation and utilization of the given technology on the growth of the national income).

The second feature of the measurement of the economy of expenditures in the composition of the socio-economic impact of new technology signifies that in the selection of the variants of new technology according to the criterion of its socio-economic impact additional expenditures for the improvement of the conditions and the content of labor, for the protection and sanitation of the environment, the improvement of the everyday life of the population, must be undertaken, first of all, there where the appropriate parameters assume the most unfavorable consequences.

For the selection of the variants of new technology it is illegal, in our view, to utilize the approach which, as criterion of this selection, takes --with modifications of one kind or another--the sum of the difference of the quoted expenditures for the production and utilization of the technology being replaced and the new technology and the magnitude of the so-called prevented damage from the production (use) of the new technology.[11]

With such an approach, first of all, preference is given to those kinds of technology which yield the greatest economic impact, even if it obtained at the cost of the reduction of the social impact (for example, the deterioration of the health of the individual), i. e., in the final analysis, the goal of the growth of the national income is placed higher than the basic goal of socialist society. Secondly, this approach does not provide for the comparability of the variants of new technology according to real-material results of its production and application. The use it makes of the variants of cost indicators being compared, in our view, is inadequate for securing comparability. Thirdly, many authors include in the composition of the prevented damage such characteristics as the growth of profit or pure production of enterprises as a result of lowering traumatism, the improvement of the atmosphere, and so on, which signifies the blending of the national-economic with the cost accounting approach to the selection of variants of new technology. At the same time, the carrying out of economic assessments of damage is necessary for the control of the efficiency of new technology.

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The necessity of substantiating the obtainment of a useful real-material result is dictated by the goal of the fullest satisfaction of the demands of all members of society. The impact of new technology on the national economy as a contribution to the attainment of this basic goal of socialist production, in contrast to damage assessments, may be applied directly to the selection of technology variants.

FOOTNOTES

1. See the Constitution (Basic Law) of the USSR. Politizdat, 1978, p 11.

2. See T. S. Khachaturov, "Intensifikatsiya i effektivnost' v usloviyakh razvitogo sotsializma" [Intensification and Efficiency Under Conditions of Developed Socialism], Izdatel'stvo Nauka, 1978, p 60. The understanding of the importance of the economic impact of new technology as growth of the national income, called forth by its production and application, entered into the Methodology (Basic Provisions) of the Determination of the Economic Efficiency of the Use of New Technology, Inventions and Rationalization Proposals in the National Economy. Izdatel'stvo Ekonomika, 1977, p 5.

3. On the content of the category of social and economic results of the creation and utilization of new technology, their interrelationship and classification, see L. Gatovskiy, "The Socio-Economic Efficiency of New Technology," VOPROSY EKONOMIKI, No 2, 1979. As in the indicated article, the concept "social" is treated further in the narrow sense of this word. Henceforth the formula is given which conforms to the determination of the socio-economic impact contained in the article cited.

4. See L. M. Gatovskiy, "Nauchno-tekhnicheskiy progress i ekonomika razvitogo sotsializma" [Scientific-Technical Progress and the Economics of Developed Socialism], Izdatel'stvo Nauka, 1974, p 86.

5. V. V. Novozhilov, "Methods of Covariance of the National-Economic Efficiency of Plan Variants," TRUDY LENINGRADSKOGO INDUSTRIAL'NOGO INSTITUTA, No 4, vypusk I, 1939, p 5.

6. Such consequences of calculations, which, in our view, are carried out by an incorrect method, arise in connection with the fact that the expenditures mentioned for the achievement of social goals, which are inexpedient from national-economic positions (although, possibly, also rational, taking as point of departure the magnitude of expenditures for the production of the very materials, components, assemblies, and so on, being considered), are included in the cost of the new technology and are simultaneously summarized with the expenditures for the technology put out earlier. Then, together with the latter, the calculated coefficients of productivity and durability increase in

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a certain way. We will underscore particularly that, within the limits of the calculations of economic efficiency of new technology, we regard the given methods of bringing the technology produced earlier and the new technology to comparable form as correct, when the utilization of the materials, components, assemblies, and so on, being considered in the production of the technology produced earlier is the only technologically possible alternative to the production of new technology for the attainment of the assigned basic result.

7. An extensive literature exists on the problem of the economic assessment of increasing the free time of the population. Among the numerous approaches to such an assessment one can also find an approach from the position of the determination of average expenditures for increasing the unit of free time in the national economy.

8. The economic impact, calculated in accordance with the stated method is equal to:

$$Э = (4,170 \times \frac{0.59}{0.47} \times \frac{0.050+0.15}{0.042+0.15} + \frac{2084-2038}{0.042+0.15} - 6,700) \times 2 \times 10^4 = -20 \text{ million rubles.}$$

9. Let us note what the point of the stated item is. These are expenditures for the attainment of a certain social result. In the literature it is proposed, instead of this item, to consider the so-called prevented damage from the improvement of working conditions, which is connected with the lowering of the sick rate, traumatism, and so on. (see "Metodologicheskiye voprosy opredeleniya sotsial'no-ekonomicheskoy effektivnosti novoy tekhniki" [Methodological Questions of the Determination of the Socio-Economic Efficiency of New Technology], Izdatel'stvo Nauka, 1977, pp 97, 114).

10. See, for example, "Nauchno-tekhnicheskiy progress i ekonomika sotsializma" [Scientific-Technical Progress and the Economics of Socialism], Izdatel'stvo Ekonomika, 1979, pp 149-169.

11. See, in particular, "Metodologicheskiye voprosy opredeleniya sotsial'no-ekonomicheskoy effektivnosti novoy tekhniki" [Methodological Questions of the Determination of the Socio-Economic Efficiency of New Technology], pp 97, 114, 170; O. F. Balatskiy,"Ekonomika chistogo vozdukha" [The Economics of Pure Air], Kiev, 1979, pp 214-216; B. B. Tsetlin, "Usloviya truda i organizatsiya promyshlennogo proizvodstva" [Working Conditions and the Organization of Industrial Production], Sotsekgiz, 1963, pp 266-271.

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STRICT REGULATION OF NEW EQUIPMENT MANUFACTURE URGED

Moscow VOPROSY EKONOMIKI in Russian No 12, Dec 79 pp 44-50

[Article by V. Likhtenshteyn: "Improvements in Planning the Production of New Equipment"]

[Text] Under conditions involving the orientation of production towards the final national economic results, the successful development and production of new equipment assumes further strengthening of the link between the economic accountability interests of enterprises and the interests of society. The strengthening of this link will be promoted by the resolution of the CPSU Central Committee and the USSR Council of Ministers entitled "Improvements in Planning and Increasing the Effect of the Economic Mechanism With Regard To Raising Production Efficiency and the Quality of Work," which calls for the conversion over to "planning the production of equipment on the basis of an expanded products list and in units of measurement which more fully reflect its productivity and other economic characteristics," that is, from purely cost indices for the planning of equipment to indices and evaluations which describe the social usefulness of the goods produced.

From this standpoint, it is our opinion that indices for the productivity of machines should ideally be employed when developing the planning tasks for the production of goods for enterprises engaged in the production of new equipment. The production program for a given index is computed using the method of equating the overall output of the respective types of machines to the productivity of the standard specimen -- "representative-model." Such computations of production programs for a five-year period are being carried out on an experimental basis at some plants and particularly at the Orsha Krasnyy Borets Machine Tool Plant. The dynamics of a production program for manufacturing machines over a five-year period, computed at the plant using this method, are furnished in the table on the following page.

The data in the table reveals that the planned production of machine tools prior to the end of the five-year plan will decrease by almost 25 percent,

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whereas a computation based upon the criterion of equated productivity indicates that it will increase by almost 33 1/3 percent. It is noted that during the 1976-1980 period the average labor intensiveness associated with the production of one machine tool will increase by 72.9 percent and thus the production program cannot be viewed as having been made easier.

	1976	1977	1978	1979	1980
Planned production (in % of 1976)	100	101.5	102.7	79.4	75.2
Number of machine tools computed according to the criterion of equated productivity (in % of 1976)*	100	104.4	113.6	115.2	132.5

* Twelve models of machine tools were equated to five "representative models."

The use in planning of the method of equating according to the productivity of a compared model stimulates an enterprise into manufacturing more productive equipment, with maximum use being made of all available means. This represents an advantage over the method of planning based upon the level achieved, wherein the enterprise is interested in producing more expensive equipment. In addition, an opportunity is created for concentrating the branch's resources at those projects where radical reorganization of the machine pool is truly required. At the same time, we do not consider an evaluation of plan fulfillment based upon the criterion of equated productivity to be the only method for solving all problems associated with planning technical progress in the branch or at an enterprise.

As a rule, the wholesale factory price for new models of machine tools changes in various ratios compared to the price for the machine analogs replaced. Thus a conflict may arise between an evaluation of plan fulfillment based upon the criterion of equated productivity and that obtained based upon the actual cost of the products produced. In order to eliminate this conflict, we believe that plan fulfillment must also be evaluated based upon the production of goods in arbitrary units and from a value standpoint, based upon the value of a unit of the standard specimen[1]. When such an approach is employed, the branch will be oriented in advance mainly towards maximum achievement of the principal parameter of the machines created -- their productivity. The conditions for improving those parameters of a machine which do not affect an increase in its productivity will be eliminated. Quite often, such improvements lead to increases in the production cost and price of a new machine. Finally, the orientation of production operations towards the manufacturing of highly productive and not costly machines will promote improvements in the technical level of the consumer-branches.

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At the same time, one very legitimate question is that of whether or not an evaluation of the fulfillment of planned tasks, in accordance with the criterion of equated productivity of a standard machine, will hinder improvements in the production of equipment in terms of numbers of units. However, we are of the opinion that the complexity of this problem should not be exaggerated. In keeping with our system of planned control over socialist production, this problem can be solved successfully.

In his work entitled "Outlines for Criticizing a Political Economy," F. Engels defined the place of categories of usefulness and value in the system of capitalist production relationships. In taking exception to Seya, who stated that value is measured in terms of the usefulness of an object, Engels wrote: "Value is the ratio of production expenses to usefulness. Value comes into being when the decision is made to produce a given object, that is, to have the usefulness of the object compensate for the production expenses. Only after this has been done is it possible to discuss the use of value for exchange purposes"[2]. In examining the question of the usefulness of an object in direct association with the impending process of exchange, Engels emphasized the social nature of this usefulness. It is precisely in this sense that one can interpret Engels' position that: "If the production expenses of two items are the same, then usefulness will be a decisive factor in determining their relative value"[3]. This position also applies, to a certain degree, to the socialist method of production. It is possible to agree with those economists who, based upon this position taken by Engels, believe that specific consumption properties of goods can cause price deviations from value[4].

However, it should nevertheless be borne in mind, when referring to this position, that the statement by Engels concering usefulness as the only sign in a measurement of two goods having the same production expenses applies primarily to the capitalist method of production. Under the socialist method of production, "wherein private ownership will be destroyed, there is no need for further discussion of exchange in the form in which it exists now. The practical application of the concept of value will then be even restricted further by a solution for the production problem and this is its true sphere"[5]. Under socialist conditions, the difference in the consumption properties of goods the production expenses of which are equal can affect the prices for these goods. However, this effect is never viewed as being decisive. A principal feature and one which determines the level for planned prices is the need for creating economic conditions which will promote rapid growth in labor productivity and a sharp increase in the efficiency of social production.

When developing the prices for new equipment, an increase in the economic effect to be realized from the use of that equipment should be taken into account. Thus, by creating the well known advantages for the economic stimulation of those enterprises engaged in producting the new equipment, with the aid of planned price formation, it will become possible on the whole to ensure the normal process of expanded reproduction. In this sense,

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we consider those economists to be correct who believe that "the physical bulk and structure of surplus product must meet the requirements of the next increase in production in the planned direction and that the norm for savings and profitability for each specific branch and enterprise should reflect the conditions and prerequisites for fulfillment of the production program"[6].

An important task in planning the production of high quality products is that of planning an increase in the technical level of enterprises which convert over to the production of such products. For the purpose of ensuring the comprehensive inclusion of scientific and engineering achievements in the plans for economic and social development, it is stipulated in the resolution on improvements in planning and the economic mechanism that the ministries and departments of the USSR and the councils of ministers of the union republics, in connection with their five-year plans, must develop and approve plans for raising the technical level of the branch. In particular, measures must be included in these plans for the creation, development and introduction of new and high quality products and materials, machines and equipment and progressive technology and for achieving technical improvements in production and raising the quality of output.

Insufficient completeness in the planning of measures for achieving technical progress is one of the reasons why at times the new equipment being developed is inferior to the best foreign and domestic analogs in terms of its technical and economic indices. This has been borne out by a check conducted at a number of industrial branches on several tens of sample products and technological processes, the development of which was planned for 1978. The well known gap developed between the technical level of the enterprise and the planned (in connection with the requirements for improved quality) technical level for the product being produced by the given enterprise. Meanwhile, it is precisely the merging of these levels that will create the conditions required for fulfilling the tasks concerned with raising output quality.

The most effective measure of a planned effect, one which ensures the achieving of true conformity of the technical level of an enterprise to the technical level of the high quality produce planned for production, is that of coordination of the measures aimed at preparing production for the manufacturing of this product and for raising the technical level of production by the producing enterprise. It bears mentioning that up until now the function of production preparation, as a complex of measures aimed at raising the technical level of production, has not been an object of planning. Only individual measures have been approved for the technical preparation of production for a particular product. Planning for the technical level of production must be predicated upon a plan for the technical preparation of production operations and it must serve as the basis for planning the indices for the technical level of the product being produced.

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The indices for the technical level of production for the branch or an enterprise must be developed in parallel with the plans for the technical preparation of production and be approved together with them. Towards this end, the subsection entitled "Planning the Principal Indices for the Technical-Economic Level of the Products Being Produced"[7] and also the plan for scientific and engineering development of branches and enterprises, should include indices describing the degree of readiness of enterprises to produce the new equipment. Ideally, they should reflect individual measures directed towards raising the technical level of the branch and enterprises (for example, in the technological equipping of production with new machines, in the automation of design and technological preparations for production and so forth).

The methods developed by Orgstankinprom [State Planning, Technological and Experimental Institute (for the Organization of the Machine-Tool and Tool Industry)] for evaluating the level of technological equipping of production are making it possible to determine the actual equipping of production by products and all technological processing stages, based upon a coefficient of technological equipping. The method for determining this coefficient calls for the taking into account of all types and sizes of special equipment employed in the technological process and a number of operations carried out using this equipment[8]. The mentioned coefficient can, to a certain extent, describe the degree of readiness of an enterprise to produce the new machines.

However, an improvement in the consumption properties of newly created machines, considering their diverse and individual characteristics (technical, ergonomic, aesthetic and so forth), is manifested in the final analysis in increased productivity for the new machine, compared to the productivity of the analogs replaced. The total amount of additional expenditures allocated for developing the technical-economic level of a producing-enterprise must be compared against the value reflecting the integral consumption effect realized from use of the new equipment. In terms of its economic meaning, this relationship appears as an index of specific additional expenditures (per unit of consumption effect) for the preparation of production in connection with the forthcoming production of new equipment which, in our opinion, reflects more completely the degree of readiness of an enterprise to produce the new equipment.

The use of this index for developing the technical level of production for enterprises engaged in developing and producing new equipment will create a more firm foundation for ensuring true conformity of the technical levels for production and output. In turn, the achieving of true conformity of the technical levels will serve to guarantee improvements in the quality of the products being produced. If the same item of new equipment can be produced by several enterprises, then when developing the planning tasks a preference should be shown for those where the mentioned relationship is minimal.

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In discussing the possibility of planned control over the production of enterprises during the period of developing new types of equipment, emphasis should be placed upon the fact that the effectiveness of such control with regard to completeness and quality, carried out while implementing technical progress measures, is greatly dependent upon the validity and timeliness of adoption by the branch's planning organ of a decision concerning the production program of an enterprise that has converted over to the production of new items. This decision must be anticipatory, that is, it must be adopted during the pre-production stages in the creation of the new equipment, since any (and at times repeated) changes in the production program of an enterprise lead directly, during the period given to developing the new equipment, to serious disruptions in the intra-branch and inter-branch contacts of the enterprise and thus the very idea of complex planning is discredited.

It is obvious that we must discuss the planning (with a breakdown by years) of the production volumes of enterprises, while taking into account the peculiarities and scales of production and the developmental stages for new equipment. We have in mind first of all the innovative nature of the newly produced item, series production and the specific nature of each stage in its creation, from the standpoint of including the proper labor and material resources in the production preparation process and in the development of this item. The resolution concerned with improving planning authorizes the ministries and departments to introduce changes into the annual plans of production associations (enterprises), in accordance with their suggestions, provided they realize a reduction, compared to the approved plan, in the overall quantity of items produced and in other indices, owing to the development and increased production of highly effective products of a production-technical nature or new high quality goods for the population. Such a measure will make it possible to raise the effectiveness of planning for technical progress, in conformity with the needs and requirements of production.

The opinion has been expressed in economic literature that failure to include all expenditures for the preparation and development of new equipment in the sales volume precludes the possibility of an enterprise obtaining the required labor and monetary resources[9]. Actually, the planning of measures for technical progress is still not adequately linked to the task of furnishing financial support for the processes concerned with preparing and developing production. This tends to weaken the stimulating effect generated by a plan with regard to accelerating the realization of achievements associated with scientific-technical progress.

The production of goods of the highest category of quality is to a certain degree indirectly related to the amount of resources employed for the preparation and development of the production of such goods. Thus it is obvious that an enterprise must have a complete understanding regarding future expenditures for production preparations and for developing the new

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equipment. The article entitled "Expenses for Preparing for and Developing Production" (Form 6 of the annual report) does not reflect these expenditures, since it does not include those resources obtained from the funds for the economic stimulation of technical progress. The Preparation of an estimate of expenditures for new equipment by stages of work, which includes expenses for the development and refinement of design and technical documentation and expenses associated with the carrying out of production operations, is being conducted at the present time for each item separately and not for the enterprise on the whole. However, such a compilation of the expenses for the preparation and development of new equipment is required for ensuring greater completeness in the planning of technical progress at an enterprise. It is only under these conditions that the planning organs of the branch and the enterprises will have a firm base for the development and merging of the plans for material-technical supply and the plans for labor and financial support for production.

The expenditures for preparing and developing new equipment include expenses for the development and refining of design and technological documentation and also expenses associated with the carrying out of production operations. It is apparent that the amount of expenses for preparing and developing the production of new types of equipment reflects only the current expenditures for the pre-production and production stages associated with the creation of the equipment. A portion of these expenditures is included in the production cost for the enterprise' commodity production and a portion is reimbursed from resources in the common fund for the development of science and engineering. Hence, when planning measures for the preparation of production, expenditures are not allocated for acquiring the machines, instruments and special equipment needed for the production of new equipment. They are included in the overall total of centralized and non-centralized capital investments, used for fixed productive capital (forms 2-KS and 3-KS).

At the same time, the specifics with regard to the use of these resources (for the production and mastering of new equipment) requires special purpose planning in order to meet the requirements for preparing production, not only from a natural-physical but also from a value standpoint. Such planning must be carried out for each item of new equipment and for the enterprise on the whole. This will ensure completeness in the planning of measures for achieving technical progress.

Improvements in planning the production of high quality products, from the standpoint of more complete coordination of the plans for material-technical and financial support for the preparatory processes, assumes the inclusion of a portion of the expenditures for preparing production in the sales volume of the enterprise. But such an inclusion is proper, as stipulated in the resolution, in those instances where we are speaking of the value of work of an industrial nature, work which is associated with the development and introduction of new equipment and which is carried out using resources from a common fund for the development of science and engineering.

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The practice of financing a portion of the expenditures for the preparation of production and the development of new equipment, using a common fund for the development of science and engineering that was formed on the basis of planned profits of enterprises and associations, meets the requirement for accelerating the realization of scientific-technical achievements. However, we are of the opinion that a need exists for solving the problem of equipping the economic mechanism for the formation of a common fund for the development of science and engineering with a stimulating function at the enterprise level. To a certain degree, the enterprises must be interested not only in increasing the amount of resources allocated to them from this fund, following redistribution at the branch level, but also in increasing the contributions to the fund.

The action of the plan for the timely and high quality fulfillment of work concerned with the preparation of production and the development of new equipment is carried out by coordinating all of the sections of the technical industrial financial plan of the enterprise and particularly by merging the plans for production, labor and wages, material-technical supply and also the financial plan. For a number of reasons, the preparation of production for the manufacturing of new equipment still remains an extremely difficult process from the standpoint of attracting labor and material resources[10]. This is why greater use must be made of the opportunities available for planned control over production volumes during the stage devoted to the creation of new equipment.

An expansion of the natural (standard-natural) indices for use in planning the production of machines and equipment, particularly the index for equated machine productivity, and the use of indices which describe the degree of readiness of enterprises to produce new equipment, will promote a more complete taking into account of expenditures for live labor and material resources and the establishment in the plan of a parameter for the machines or a group of parameters which will reflect their consumption properties, the most important properties from the standpoint of the interests of society. These are precisely the indices which describe satisfaction of the customer requirements based upon fulfillment of output deliveries, growth in labor productivity, reduced expenditures of material resources and an increase in profits.

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2. Marx, K. and Engels, F. Works, Vol 1, pp 552-553.

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3. Ibid, p 553.

4. See, for example, M. Lola, "Output Quality: Some Theoretical Questions," EKONOMICHESKIYE NAUKI, No 7, 1977, p 35.

5. Marx, K. and Engels, F. Works, Vol. 1, p 553.

6. Lukinov, I.I. "Vosproizvodstvo i tseny" [Reproduction and Prices]. Izdatel'stvo "Ekonomika", 1977.

7. See "Metodicheskiye ukaziniya k razrabotke gosudarstvennykh planov razvitiya harodnogo khozyaystva SSSR" [Methodological Instructions for Preparing State Plans for the Development of the National Economy of the USSR], Izdatel'stvo "Ekonomika," 1974, pp 25-26.

8. See Bitunov, V.V., Udler, Ye.M. and Yakovenko, Ye.G. "Tekhnologicheskaya osnashchennost' proizvodstva mashin" [Technological Degree of Equipping Production With Machines], Izdatel'stvo "Mashinostroyeniye," 1976, p 41.

9. See, for example, L. Busyatskaya. "Branch Planning -- At the Level of Modern Tasks," PLANOVOYE KHOZYZYSTVO, No 10, 1978, p 98; Pokrovskiy, V.A. "Povysheniye effektivnosti nauchnykh issledovaniy i razrabotok (voprosy teorii)" [Raising the Effectiveness of Scientific Studies and Developments (Theoretical Questions). Izdatel'stvo "Ekonomika", 1978, p 135.

10. In particular, the insufficiently high level of technological preparation of production is noted in literature: relatively low proportion of standard technological processes (12-14 percent of the overall number employed), shortage of readjustment machine tool devices (20 percent of the overall inventory), considerable expenditures for technological equipping, since during renovation of the equipment (up to 80 percent every 3-5 years) only 15-30 percent is physically worn out (see "Kachestvo produktsii i effektivnost' proizvodstva" [Output Quality and Production Effectiveness], Izdatel'stvo "Mashinostroyeniye," 1977, pp 115-116).

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NEW BOOK ON LONG-RANGE PLANNING REVIEWED

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[Review by V. Ivanchenko of the book "Metodologicheskiye problemy perspektivnogo planirovaniya" [Methodological Problems of Long-Range Planning] edited by V. Yu. Budaveya, Izdatel'stvo Ekonomika, 1978, 207 pages]

[Text] This monograph* is dedicated to the vital methodological problems associated with long-range planning: the creation of a system of interrelated plans, ensuring continuity and soundness for the functions of plans of varying duration, orienting planning work towards the final social requirements, ensuring proper balance in those tasks which determine progressive national economic proportions, the development of special purpose complex programs, intensifying the role played by quality indices and achieving systematic improvements in methods and in the organizational structure of control.

Three types of plans are being developed in planning practice at the present time -- long-term, five-year and annual. Taken together, they constitute a unified system of plans. The varying degree of detail and completeness embodied in individual plans within the overall system indicates that a long-term plan cannot be presented as a simple sum of five-year and annual plans. All of them are organically interrelated and periodically refined, taking into account the changing conditions of reproduction.

The authors believe that the reliability of planning indices for long-term purposes can be raised by improvements in the methods employed for forecasting and for developing complex forecasts, by more extensive use of alternative computations, through the use of dynamic inter-branch balance models and by giving greater consideration to scientific and engineering achievements. Long-term complex programs must also play a substantial role with regard to achieving the above-mentioned reliability. Such programs

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will make it possible to organize long-term prospects not only at the national economic level but also by branches, economic regions and union republics. At the same time, the program nature of the plan can be combined with raising the long-term national economic goals and tasks to the level of consolidated planning tasks, for all of the most important spheres of the economy.

A great amount of attention is focused in this book on those methodological problems associated with the various types of plans and the stages of the planning process. The following system is proposed for planning computations: initially the planning projections are developed for a long-term period, subsequently for the final year of each five-year period and still later -- for the years of the first five-year period. The feasibility of three-stage development of the long-term plan is substantiated: concept, principal trends and the draft plan. It is from this standpoint that a review is undertaken of those questions concerned with the differentiation of indices by stages in the development of the long-term prospects and also with the combining of computations. On the whole, we consider this type of approach to be correct.

The authors drew the conclusion that it would be most correct, at the end of each five-year plan, to prepare only the principal trends for national economic development for the next five years, with regard to future prospects, and to "extend" the long-term plan only once over a 15 year period. They consider the advantages of this proposal to be as follows: first of all, the possibility of the planning computations for the same five-year periods being combined is eliminated; secondly, the principle of continuous planning in developing the concept and the principal trends for the long-range plans is realized; thirdly, a sufficiently long planning horizon is ensured.

However, we are of the opinion that this position has not been validated adequately. A plan is in effect at the present time for refining and extending for 5 years the Complex Program for Scientific-Technical Progress, originally composed for 20 years, and also the Principal Trends for the Economic and Social Development of the USSR, composed for 10 years by five-year periods. The complex program and the principal trends define the long-term prospects and ensure continuity of planning. The five-year and annual plans form a stable part of the system of plans. Thus, in proposing a new system for organizing long-term planning, the authors had to analyze in detail and prove the shortcomings existing in the accepted method for developing a long-term plan and thereafter reveal the advantages of their method. If this were not done, the practical realization of their proposal would have been impossible.

In analyzing the system for composing plans, an evaluation of the social requirements was employed in the monograph as a basic feature. In the process, the role and place of the indices of effectiveness of social

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production and the NTP's [technological planning norms' are substantiated, the requirements for program development are formulated, their forestalling nature with regard to branch and territorial projections is noted and so forth. In the mentioned correct system, the stages of planning work (there are four of them) do not coincide with the stages for preparing the long-term prospects. Thus, we believe that the forms for pre-planning computations should be set forth more clearly here, since their importance increases with further development of long-term planning. This applies in particular to the Complex Program for NTP's.

The evaluations of scientific-technical, industrial-production and economic potentials, which are viewed in the book as dynamic categories, represent an important component of planning computations. The process of accumulating elements which constitute the mentioned potentials is intertwined with their use and withdrawal. The evaluations of potentials have still not been adequately standardized in planning, nor have they been formed sufficiently. In view of the fact that economic potential is a more general concept, one which includes all of the other types of potentials (scientific, scientific-technical and production), the potentials ideally should have been refined from the standpoint of classification.

The proposal by the authors concerning development of the concept of socialist intensification of production is deserving of attention. Moreover, they criticize the position that deficit resources is only the result of exhaustion of the extensive factors of growth. It is their opinion that the increasing resource limitations are associated with the intensive development and expansion of the scales of production on the new technical basis. A more complete utilization of resources and their thorough processing are a regular consequence of production intensification. Hence a conclusion is drawn concerning the need for developing a strategy for a more complete utilization of resources, based upon maximum use of scientific and engineering achievements. Scientific forecasting must play a substantial role in solving these problems. A basic plan for a system of forecasting computations is furnished in the book.

However, it bears mentioning that the problems concerned with coordinating the forecasting and planning information and also the individual forecasts among themselves (for example, social and scientific-technical) have not been developed properly in the monograph. Nor have they been solved in planning practice; thus a degree of urgency is attached to solving this task.

The essence of the new stage in the development of the special purpose-program method, as mentioned in the book, consists of gradually converting over from individual state documents on the development of programs to including them in the state plan. Typical features of the use of the special purpose-program method are manifested in intensifying the specific orientation of plans towards solving long-term socio-economic tasks, in preparing and developing long-term complex programs, developing an

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interrelated system of programs for various levels, types and scales and coordinating them with the indices of the branch, territorial and functional sections of the plan, developing a planning technology which covers the program approach in all of its stages and so forth. In this regard, the principles for developing a system of programs are substantiated in the monograph.

Experience testifies to the fact that the most complicated methodological problem is that of coordinating the programs with the state plan. The work contains items of unquestionable interest: a basic plan for developing a complex program and an overall description of the process of including program tasks in the planning computations. But the authors devoted very little time to the system of program indices, to the problem of standardizing them, to the methods for correlating them with various sections of the national economic plan or to the specifics involved in evaluations of the effectiveness of the programs. The book does not contain proposals for an optimum group of programs for the Eleventh Five-Year Plan and the future.

A great amount of space is given in the monograph to defining the trends for improving the planned balance of the national economy. The conclusion is substantiated that the computations for the balances of social product, national income, fixed capital, labor and so forth, must be carried out in a single complex. Only in this manner is it possible to achieve consistent implementation of the principle of proportionality in planning, since this orients the entire system of economic and production proportions towards the satisfaction of social requirements. Thus proportionality is defined as a system "of effective proportions which ensure the best satisfaction of social requirements."

The problem concerning computation of the principal national economic proportions from a value standpoint is raised in the book. Towards this end, it is expected that use will be made of the method of taking into account all labor expenditures involved in output production.

The authors attempted to carry out a complete study of the problem of planned control over scientific-technical progress. Many questions concerned with further improving the planning for NTP's are associated with defining more precisely the essence of the very object of control. Thus the analysis commences with an examination of the NTP and the degree to which it is reflected by the effective forms and indices of the plan, which must embrace all of the stages involved in the creation of the new equipment and its use in the national economy and also the results of scientific-technical development.

The solving of this problem assumes a more complete consideration of the social production requirements for new equipment resources. The authors believe quite correctly that this can be achieved through closer

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coordination of the plans for developing science and engineering with the plans for the technical renovation and reorganization of production. Planning for the creation and mastering of new equipment must be augmented in the state plan by important tasks for its use on a mass scale. In this instance, the unity of the cycle "science - creation of new equipment - production - use of new equipment" is ensured more completely, the prerequisites for efficient control over this cycle become stronger and the requirements of a single technical policy are applied directly to production. Importance is attached to the fact that when such an approach is employed, the plan for scientific and engineering development acquires a stronger foundation in the form of evaluations of the production requirements (on the whole and for its individual branches), both in the volumes of new equipment and in the diverse resources for ensuring its creation and mass (series) production. On this basis, recommendations are substantiated for further improving the structure and content of the plans for scientific and engineering development, for reflecting the tasks for developing machine systems and technological complexes as the principal elements of the plan and for composing complex scientific-technical programs, which encompass all of the stages involved in the realization of technical innovations.

The development in the book of the concept of a consolidated plan for the technical rearming of production is promoting the realization of a complex approach for the planned control over an NTP at the national economic level. The foundation for such a plan will be the branch long-range plans (programs) for the technical reorganization of production. But, having raised this problem, the authors should have examined the concept of new equipment resources -- not just created, but also used -- in this work. Nor did the monograph provide any information on the question concerning selection of the period for taking into account the technical innovations (models), during their mass production and use.

The authors describe in detail the system of indices for the effectiveness of scientific and engineering development. They substantiate the summary index for the effectiveness of introduction of scientific and engineering achievements in the national economy. In developing this index, use was made of the well known method based upon a comparison of the overall effect (for example, increase in national income) against the sum of the weighted resources. The appropriate proportions of the overall effect are employed as the "weights."

It is appropriate to mention here the conditionality of applying a portion of the overall effect to a particular resource included in the computation, since the mentioned effect is created only when use is made of live labor and productive capital in their organic unity. We are of the opinion that emphasis should be placed not on the fact that each resource creates a proportion of the overall effect peculiar to itself, but rather on "recording" (taking into account) them in the summary computation. In the

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particular section of the book, it would have been advisable to analyze and compare the various methods proposed in literature for computing the effectiveness of scientific-technical development (for example, the method of equated expenditures and the resource method). In their monograph, the authors failed to examine those problems concerned with coordinating the overall and partial indices of effectiveness and also the evaluations of the national economic and economic accountability effects realized from the introduction of new equipment.

On the whole however, we are of the opinion that the attempt by the authors to formulate the more important methodological positions, for the development of a complex program for improving control over the national economy, and also the methods proposed for solving an entire series of problems are deserving of considerable attention. The monograph can properly be described as a useful and creative study of definite practical value. The considerations and recommendations expressed in it will promote the further development of the methodology employed in national economic planning.

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