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SELECTED ARTICLES FROM SOVIET ECONOMICS JOURNALS IN ENGLISH TRANSLATION

PROBLEMS OF ECONOMICS is a complete, literal translation, without editorial comment, of articles selected from the following Soviet publications:

Voprosy Ekonomiki (Problems of Economics)
Planovoe Khoziaistvo (Planned Economy)
Mirovaia Ekonomika i Mezhdunarodnye Otnosheniia (World Economy and International Relations)
Ekonomicheskaia Gazeta (Economic Gazette)
Vestnik Statistiki (Journal of Statistics)
Sotsialisticheskii Trud (Socialist Labor)
Biulleten' Nauchnoi Informatsii. Trud i Zarabotnaia Plata (Bulletin of Scientific Information. Labor and Wages)
Vneshniaia Torgovlia (Foreign Trade)
Vestnik Leningradskogo Universiteta, Seriia Ekonomiki (Journal of Leningrad University, Economic Series)
Vestnik Moskovskogo Universiteta, Seriia Ekonomiki (Journal of Moscow University, Economic Series)
Nauchnye Doklady Vysshei Shkoly — Ekonomicheskie Nauki (Scientific Papers of Higher Educational Institutions, Economic Sciences)

Articles from other publications are included from time to time if they are considered of sufficient interest for translation.

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Mathematical Economics

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P. Mstislavskii

QUANTITATIVE EXPRESSION OF ECONOMIC RELATIONSHIPS AND PROCESSES

Economic laws express the most essential intrinsic relationships and dependencies between economic phenomena, the principal features and trends of economic development. In their interaction with the productive forces, the relations of production are determinate not only qualitatively but also quantitatively. Economic laws therefore express the qualitative dependencies and changes of an economy as well as quantitative relations: the proportions and dynamics of economic processes. Economic laws express the unity of the qualitative and quantitative aspects of an economy.

Economic activities such as planning, economic accounting and operative management of the economy are based on the application of economic laws. In this sphere man deals with economic quantities and diverse economic indices. The quantitative aspect of economic laws assumes tremendous practical importance in this connection. While revealing the essence of phenomena, economic laws should also serve as keys for operating with specific economic indices. Of course, unlike the laws of nature, economic laws contain no quantitative constants. Nevertheless the quantitative relationships between phenomena reflected in them are subject to comprehensive calculation and use in communist construction. Effective planning and operative management of the national economy, especially given its present scale, require extensive use of electronic computers and other elements of cybernetics. This presupposes the translation of complex economic dependencies and requirements of the economic laws of socialism into mathematical terms.

All of this testifies to the fact that quantitative expression of the economic laws of socialism is as vital theoretically and practically as revealing the qualitative essence of these laws.

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The concept of the economic regulator often figures in economic theory. The regulator is usually understood as the law which determines the quantitative aspect of economic processes. Many Soviet economists put forth the law of planned, proportional development as the law regulating the entire socialist economy. Other economists ascribe the role of regulator of the entire economy to the law of the economy of labor, and some to what essentially is the law of value and its modifications, in particular the law of price of production.

All of these attempts to define the economic regulator are not fruitful, in our view, since, on the one hand, they ignore the intrinsic interconnection of economic laws and, on the other, artificially make one of the laws all-determining and universal. Actually each economic law operates as the chief regulator with respect to a particular group of economic phenomena and processes. Thus the law of value is basic to commodity exchange relations. The law of distribution according to work regulates the payment for work. The law of growth of labor productivity operates as the main law in determining the development of technology and the organization of production. The law of planned development and the laws of reproduction regulate the proportions of the national economy. With respect to the economy as a whole, the regulator is not any separate law but a system of economic laws united by the principal economic law of socialism.

The preference given by some economists to the law of value or the law of the economy of labor in determining the regulators of the economy is to some extent attributable to the fact that these laws are quantitatively determinate and therefore are "convenient" as criteria for planning calculations. In contrast to these laws, the principal economic law of socialism and the law of planned development have been formulated in a general form which has not contained a sufficiently precise quantitative criterion for selecting the variants of plans and projects which most closely correspond to these laws. Many plan variants can be drawn up which provide for a continuous growth and improvement of production on the basis of technical progress, seek the fullest possible satisfaction of the society's needs and the rounded development of its members, and secure planned and proportioned relations among all elements of the economy and effective use of its resources. In other words, many variants of a plan

can be worked out which correspond to the requirements of the principal law of socialism and the law of planned development, but at the same time it will be impossible to decide which of the variants best conforms to the requirements of these laws.

It seems to us that such a situation results from the fact that our theoreticians neglect the quantitative determinateness of these laws. The problem can be successfully resolved, given a thorough economic analysis and generalization of the experience of the socialist economy.

The invariably high rate of economic growth and national well-being, this cardinal feature and decisive advantage of the socialist mode of production, is constantly analyzed in economic literature. The highest possible rates of development under socialism are objectively necessary in order to ensure the building of communism in the shortest possible time and to win the competition with capitalism. Practically all of the questions of growth and improvement of socialist production, the introduction of new equipment, selection of technical variants, national economic proportions, distribution of production, and other problems of socialism are solved in a way which will long secure the highest possible rate of economic growth and growth of living standards. High rates of economic growth are inseparably linked with the essence of economic development under socialism, expressed in the basic economic law of socialism, and should, in our opinion, be regarded as an inherent requirement of this law. Indeed it is not just a continuous growth of production which is essential for socialism, but a continuous growth at constantly high rates. This more precise formulation of the principal law of socialism is quite important practically for the use of this law as a criterion in planning.

From this viewpoint the generally accepted formulation of the purpose of socialist production should be made more precise. The current formulation is not clear as to what needs are involved: personal or production and defense needs, current or future needs, sensible needs or whims. There is no doubt that the purpose of socialist production is the satisfaction of human needs (involving public services) but production, defense and other needs are indispensable conditions for attaining this purpose. It is also obvious that the socialist society consciously accepts certain limitations in the satisfaction of its current needs for the sake of high rates of more complete satisfaction of its growing needs in the future, and in order to reduce the period of the building of communism. Nor is there any argument about the fact that what we have in mind here are sensible needs. A more precise formulation of the principal economic law of socialism makes it possible to express a number of its major requirements mathematically.

As we know, the over-all index of economic development is the growth of the physical volume of the national income. This index characterizes an increase in a country's production, consumption and defense potentials alike. The rate of economic growth, therefore, can be characterized by the rate of growth of the physical volume of the national income. Consequently the economic development which conforms to the principal economic law of socialism best of all is the development in which the sums and rates of growth of the physical volume of national income is the greatest for a sufficiently long period. (1)

During socialist reproduction the national income grows constantly and can be expressed as a function of time. The rates of growth of the national income are also a function of time. The mathematical form of these functions and their specific parameters cannot be assigned for a future period a priori, or on the basis of data for the past. They depend on numerous variable factors and conditions of reproduction: constantly changing material and manpower resources, technical and organizational progress, developing needs, social and economic structural changes in production, distribution, circulation and consumption.

The functions and their parameters have to be obtained in the process of scientific planning through numerous calculations. The problem is to work out a system of calculations ensuring the maximum value of the integrals of these functions (of the physical volume and growth rates of national income) for a sufficiently long period (10 to 15 years).

The requirements of the principal economic law are not confined to the conditions considered above. The socialist society is interested not only in the volume and rates of growth of the national income as a whole, but also in the nature of its dynamics, i.e., securing, for a protracted period, the highest rates of development. This requirement can be expressed mathematically by the condition that the first derivative of the national income growth rate should be the largest possible.

Yet this condition does not exhaust the requirements of the principal economic law of socialism either. The structure of the national income also has essential significance for a socialist society, along with the volume of national income and its dynamics. It is important that a constantly high rate of growth of the net product should be combined with a constantly high rate of increase of both accumulation and that part of the national income which ensures the growth and improvement

of the quality of national consumption. National consumption cannot, on the average, grow at the same rate as the national income, but at the same time this lag should not be excessive. Within each specific period it should be as small as possible.

The three conditions listed above do not, of course, exhaust the essential features of the principal economic law of socialism. Nevertheless they contain specific over-all quantitative criteria which, if used as a guide, make it possible to compile and select the socialist plan variants which conform to the principal economic law best of all.

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The practical workers are keenly aware of the fact that the characteristics of the law of planned, proportional development have been worked out inadequately in economic literature. As a rule this law comes down to the objective possibility of, and the necessity for, planned management and coordination of all elements of the economy. But the notion that planned (proportional) development of the socialist economy is necessary and possible cannot yet be called an economic law. No one, for example, regards as a law the idea that the collective farm system or commodity production is necessary and possible under socialism. Formulating the law of proportional development, one should express the essence of the necessary proportions, and concretely and precisely enough to be relied upon in planning. These proportions not only exist but they do guide planning practice. Furthermore they have been, and are, elucidated in economic literature. Yet the authors of many works, including textbooks on political economy, have ignored them and have not related them directly to the requirements of the law of planned development.

The complexity of the national economic organism precludes the expression of the principal conditions of its proportionality in one or two formulas. Within the space of this article we can merely dwell briefly on the four principal requirements of the proportionality of the socialist economy.

1. Proportionality of the means of production and labor power. The development of any production depends on two basic factors: the means of production and labor power. To ensure the highest rates of socialist reproduction it is vital to use the means of production and labor power fully and to maintain complete proportionality between them. Observance of this condition is not a simple task. Apart from the correspondence between the total of the means of production and that of labor power, their productivity and the length of the workday should also be coordinated to ensure that the growth of the social product is maintained steadily by production capacities and living labor. If, for example, the growth of national product for a year is intended to be 10% ($q = 1.1$) and productive capital is to increase by 8% ($k = 1.08$), the "yield" of the capital, i.e., the volume of output per unit of capital, should increase on the average by 1.85% on the national scale ($g = 1.0185$). The product of the growth of capital and its "yield" should amount to 10% ($1.08 \times 1.0185 \times 100 = 110$). If, furthermore, the number of workers employed in social production increases over the year by 1.6% ($l = 1.016$), the workday being the same, in order to secure a rate of reproduction of 10% it is necessary that the labor productivity of workers, including those newly employed, show an average increase of 8.3% on the national scale as compared with the previous year ($p = 1.083$). The product of the increase of the number of workers and the magnitude of the increase of the annual productivity of their labor should also amount to 10% ($1.016 \times 1.083 = 1.10$). This functional balance relation can be represented through the formula:

$$q = kg = lp, \text{ i.e., } 1.10 = 1.08 \times 1.0185 = 1.016 \times 1.083$$

The formula reads: the rate of growth of the social product (q) is equal to the rate of growth of productive capital (k), multiplied by the growth of the production yield of this capital (g), or to the rate of increase of labor power resources (l), multiplied by the increase of the productivity of this labor (p). Violation of the proportion expressed by the formula leads to losses impermissible under socialism. If, for example, the productive capacity of the capital (their total mass multiplied by the yield) increases by more than 10%, while the labor force and its productivity increases by only 10%, this means that the means of production accumulated will be partially unused. If, on the other hand, labor power and its productivity make it possible to increase production by more than 10%, while the productive capacity of capital ensures no more than a 10% increase, a portion of manpower will remain unused. In both cases the rate of growth of the social product will be equal to 10%, since a more rapid growth ensured by the means of production in the first case will be limited by available manpower, and a more rapid growth of production ensured by manpower in the second case will be limited by available productive capital.

The formula also exemplifies this dependence: a failure to fulfill the plan at least for one of the terms of this formula inevitably affects all others. Thus, if the growth of the capital amounts to 8% and the increase of workers to 1.6%, but the capital yield does not come up to the contemplated amount of 1.85%, the social product will increase

by less than 10% and the plan for the growth of the annual productivity of production workers will not be fulfilled. The inverse dependence between the increase of the annual output of workers and the capital yield is quite similar.

2. Proportionality of the two divisions of social production. The balance proportion considered above, expressing the connection between the two principal factors of production, is not valid unless related to the structure of the material and technical base of the society and based on an adequate material structure of the social product and national income. The rates of growth of productive capital should be ensured through the production, in adequate proportions, of the material elements of production accumulation.

This proposition is widely known from the Marxist theory of reproduction. To become a requirement of the law of proportional development, the Marxist formulas should be developed and specified with allowances for technical progress and such conditions as the peculiarities of the turnover of fixed and circulating capital, changes in the consumption of materials and capital per unit of output, the rate of construction, the effectiveness of capital investment, etc. In a simplified form this proportionality can be expressed as follows: (2)

$$K = \frac{1}{k}(\nu - \varsigma)e_c \cdot \mu$$

The formula reads: the rate of growth of the productive capital (K) is inversely proportional to the capital outlay per unit of output (k) and directly proportional to the difference between the share of Division I of social production (ν) and the material outlay per unit of output (ς), multiplied by the effectiveness of the rate of construction (e_c) and the rate of the productive use of accumulations (μ).

Here is a numerical example. Suppose 1 ruble and 28 kopecks of the productive capital is needed on the average for the production of 1 ruble's worth of social product, the material outlay per unit of output equals 55 kopecks for 1 ruble of the product on the average, the share of Division I of social production is equal to 0.70, the effectiveness of the rate of construction amounts to 0.91 and the rate of productive accumulation — 0.75. Then the rate of growth of the country's productive capital will equal

$$\frac{1}{1.28}(0.7 - 0.55)\ 0.91.0.75 = 0.08, \text{ or } 8\%$$

The proportionality condition expressed by this formula, just as the previous condition, is observed in Soviet economic planning practice. Analysis of this condition shows in particular that if material outlays per unit of output grow more rapidly than capital outlays decrease or if the latter increases (provided the effectiveness of the rate of construction and the rate of productive use of accumulations are more or less stable), a steadily high rate of growth of social production requires a higher share of Division I, i.e., the priority growth of production of the means of production.

3. Proportionality of branches of production. This proportionality implies the coordination of all specialized branches of the economy and items of production, the number of which is enormous in modern society. Mathematically, it is expressed by the well-known set of equations for the output and distribution of products:

$$\begin{aligned}
x_1 &= f_{11}(x_1) + f_{12}(x_2) + \ldots\ldots + f_{1n}(x_n)\\
x_2 &= f_{21}(x_1) + f_{22}(x_2) + \ldots\ldots + f_{2n})(x_n)\\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\\
x_n &= f_{n1}(x_1) + f_{n2}(x_2) + \ldots\ldots + f_{nn}(x_n),
\end{aligned}$$

where x_1, x_2 and x_n are the volumes of production, accumulation, circulation and consumption and different types of products in physical units; $f_1(x_1)$, $f_{12}(x_2) \ldots f_{nn}(x_n)$ is the consumption of the corresponding types of products in the different branches of the economy (in physical units) as functions of the volumes of production, accumulation, nonproductive consumption and trade.

This set of equations reflects the necessary condition of reproduction proportionality, which consists of this, that the material need for each type of product, taking into account the balance of reserves and the foreign trade balance on the scale of the national economy, should be met by the corresponding volume of production. Calculations for such a coordination of the material proportions of different branches have been used in the USSR in practice from the very first years of planning in the form of "material balances."

4. Proportionality of products and outlays. This kind of proportionality essentially consists in that the value (and prices) of individual products are proportional to the outlays of the means of production and living labor in each branch of production. In the national economy this proportionality is also expressed through a set of equations, but in value terms rather than physical terms in this case:

$$\begin{aligned}
s_1x_1 &= s_1f_{11}(x_1) + s_2f_{21}(x_1) + \ldots\ldots + s_nf_{n1}(x_1) \pm m^o_1\\
s_2x_2 &= s_1f_{12}(x_2) + s_2f_{22}(x_2) + \ldots\ldots + s_nf_{n2}(x_2) \pm m^o_2\\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\\
s_nx_n &= s_1f_{nn}(x_n) + s_2f_{2n}(x_n) + \ldots\ldots + s_nf_{nn}(x_n) \pm m^o_n
\end{aligned}$$

where s_1, $s_2 \ldots s_n$ are the value estimates of products and outlays, including outlays of labor

power measured in terms of wages; and m^o_1, m^o_2, ... m^o_n are the economic results (accumulation or deficit of resources) for branches.

The calculations connecting the resources and outlays for different branches have also long been used in the USSR in drawing up the planned and reported financial balances. Therefore the claims of some Western scholars to the "discovery" of similar matrices are absurd.

The proportionality conditions expressed in the above formulas by no means exhaust the proportionality requirements of the socialist economy. But observance of them amounts to an economic law. Combined with, and relying on, the requirements of the principal economic law of socialism, these conditions, with due allowances for the requirements of other laws, play a regulatory role in socialist planning.

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The quantitative expression of the law of growth of labor productivity is of immense theoretical and practical importance. To measure labor productivity it is necessary to determine the socially necessary working time materialized in a given product — the value of the commodity. This value consists of two components: the transferred value of the means of production expended on this commodity and the outlays of living labor. The value of the fixed productive capital is reflected in the value of the commodity to the extent of its having worn out (depreciated), while living labor is incorporated in it to the amount of its total outlays, including both the paid and nonpaid parts.

The classics of Marxism regarded a decrease in the value of a commodity, calculated by this method, as a measure of the increase of the social productivity of labor, and pointed out that "in a society in which the producers regulate their production according to a plan mapped out in advance ... the productivity of labor would no doubt be measured by this standard." (3) Under capitalism the value and productivity of social labor have a distorted reflection in the capitalist costs of production and prices of production, and this "impedes the development of productivity." (4)

Starting from this premise one cannot accept the propositions advanced by I. S. Malyshev, L. A. Vaag, and V. V. Novozhilov, who claim that the price of production measures labor productivity more correctly than labor value, and that the use of the price of production contributes to the growth of productivity to a greater extent than the use of labor value. Some of them even believe that the best form of measuring outlays of social labor is the market price, incorporating, apart from the general rate of profit on invested capital, the rate of interest and land rent, and registering the relation of demand and supply. If these prices, they argue, were based on the planned ratings calculated according to the theory of marginal utility, the socialist society would obtain an ideal instrument for planning and, in particular, for measuring the productivity of social labor. (5)

The following reasoning is used to substantiate these propositions. Labor productivity depends on many factors, and to a considerable degree on factors like the capital per worker (and consequently the value of the productive capital), the gifts of nature (fertile soils), the use of scarce materials, and the rate of capital turnover (time factor). These factors are not reflected to any significant extent in value, but they are reflected directly and fully in the prices of production and market prices. Thus the prices of production and market prices measure labor productivity more accurately than labor value does. This line of reasoning cannot be accepted.

First of all, the enumerated factors do not exhaust the sources of growth of labor productivity. The latter are known to include such factors as a rise in workers' skills, a change in labor intensity, improvement of the organization of production, including further specialization, coordination, concentration and smoothness of production, improvement of the distribution of enterprises, rationalization of the organization of labor, etc. Yet in the formula of the price of production the entire surplus product and the entire result of the growth of labor productivity are related to one factor only: capital investment.

Second, it is possible in practice to indicate the sources and to approximately differentiate by factors the growth of labor productivity and the reduction of costs — i.e., the outlays that are vanishing or have vanished — attained within a certain period. But the remaining real outlays of social labor can be divided only into two elements: the outlays of labor incorporated in the means of production and the outlays of living labor.

Third, the saving of labor due to technical progress, i.e., the increase in capital per worker, cannot be regarded as strictly dependent on the value of the productive capital. In reality technically new capital may determine the growth of labor productivity and reduction of current outlays while the value of this capital changes in a great variety of ways. The price of production, on the other hand, presupposes, contrary to this fact, equivalent effectiveness of all capital investments.

Fourth, it is impermissible to lump together the factors of growth of labor productivity and labor productivity itself. The former are the cause and

the latter is the effect. Attempts to sum up the outlays of labor and the above factors, including those which contain no outlays of labor (the gifts of nature, time, scarcity) lead to the confusion and summation of heterogeneous quantities: causes and effects, outlays of labor and gifts of nature.

The social and historical conditions under capitalism give rise, as Marx revealed, to many irrational economic forms, including the price of land, fictitious capital and capitalist market prices. Marx exposed the fallacy in the view of the bourgeois economists that value is made up of three factors: labor + capital + land. It would not be necessary to return to this question if certain Soviet scholars did not try to "substantiate with mathematical vigor" propositions which revive the ideas of bourgeois apologists.

The most elaborate works along these lines have been published by Novozhilov and Kantorovich. These authors assert that labor value is incomplete, including only direct immediate outlays of living and materialized labor in the production of each commodity. But, they say, there are also indirect outlays of labor which should be added to the direct outlays.

What are these indirect outlays, or to use. Novozhilov's term, "inverse dependence outlays?" Novozhilov and Kantorovich reason as follows: in each kind of production, accumulated productive capital, the gifts of nature and some high-quality scarce materials are used along with the usual current outlays of means of production and living labor (reflected in labor value). These means of production are available in limited quantities, and if they are used at a given enterprise for the production of a given product (A) other enterprises and other kinds of production are thereby deprived of them. For the latter enterprises and kinds of production this results in higher outlays of social labor, which would be lower if the limited resources in question had gone to these enterprises and for the output of these products. Since the cause of higher outlays at these enterprises (and in these other branches) lies in the use of better resources at the other enterprises, these additional outlays should be added to the direct outlays of social labor at the other enterprise.

Let us take the example given by Novozhilov. "... The choice of the variant calling for heavier investment in a given economic unit lowers the cost of production of the unit, but raises the production costs of other products, and namely those in which the investment has had to be cut as a result of heavier investment in the given unit." (6)

Let us first of all answer this question: at what enterprises will the investment be cut and the outlays of labor rise? Three cases are possible: 1) other enterprises manufacturing the same product as the enterprise which has received the additional investment will suffer from reductions in investment. In this case labor value, determined by the outlays of labor which are average for all enterprises turning out the same product, will reflect all indirect outlays ("inverse dependence outlays"); 2) the cut in investments will hurt the allied enterprises supplying the means of production to the given enterprise. In this case the means of production consumed by the given enterprise will become more expensive and the labor value at this enterprise will again reflect the "indirect outlays"; 3) the investment cut will hurt enterprises having no connection with the given enterprise. Then the indirect outlays will not be reflected in the value of the given product, but they will raise the value of the total social product. Consequently in two of the three cases calculations in excess of value of indirect outlays will be double counting of the same outlays. In the third case the relative increase of the outlays of labor will be detected by the socialist society in the calculations for the national economy as a whole.

Kantorovich gives an example in connection with the distribution of arable land under different crops. (7) He suggests that "indirect outlays" be charged to the account for using better lands, assuming that this is the best method of measuring the total outlays of labor and the choice of the best variant. There is no denying that the most effective variant of the employment of very scarce resources under a given production program can be found more quickly with the aid of resolving factors, If, however, the net estimate of the plan is made without allowances for the indirect outlays, according to the general sum of outlays of labor for all products, the result will be the same as if the indirect outlays were added to the accounting using Kantorovich's method. The addition of the indirect outlays to the account merely distorts the actual outlays of labor for each product.

Another fact is no less important. If certain investments, scarce materials, or gifts of nature are used at a given enterprise, this does not at all mean that the entire sum of these resources causes a relatively lower labor productivity at other enterprises. Each economic unit envisaged by the plan puts out products indispensable for the national economy. It should be supplied with capital and natural resources, and in certain cases it cannot do without very scarce materials. Novozhilov is right in stating that the "inverse dependencies" (and indirect outlays) apply only to the additional resources obtained by the enterprise in excess of the resources necessary for the production of a given commodity

at a certain technical level. In other words, we cannot assume that the entire sum of productive capital invested in a given unit tends to lower labor productivity in other units. Such an effect results only from additional investments which raise the technical level of the unit in comparison with the average for the branch. Similarly it is not all of the forces of nature utilized in a given economic unit, but merely additional gifts of nature, that affect labor productivity in other units. Nor does the entire sum of scarce materials cause indirect outlays at other enterprises, but merely the sum of them over and above the minimum indispensable in a given kind of production.

Obviously the sum of these additional resources (investment, gifts of nature, scarce materials) ought to be isolated from the general mass of the resources in determining indirect outlays. As soon as this difficulty has been overcome, another still more formidable one arises: how are the norms of "effectiveness" (of the indirect outlays) to be established. As Novozhilov explains, these "inverse dependence outlays" are the "unrealized saving of labor" and cannot therefore be evaluated directly. Besides, the norm should by no means be determined from the experience furnished by specific economic units: it should be obtained as the limiting quantity, the application of which ensures the optimum economic plan. It is no wonder that the method of establishing these norms on the scale of the national economy has not been yet worked out.

From the above it inevitably follows that the price of production formula and its future development, incorporating rent and the various norms of effectiveness and "objectively conditioned estimations," does not reflect the real social productivity of labor. To be convinced of this one need only consider the formula recommended by Novozhilov for calculating labor outlays. By his own definition, production outlays should be measured in the following way: 1) outlays of living labor by the sum of wages; 2) outlays of accumulated fixed productive capital by the rent, incorporating "effectiveness" as well as depreciation; 3) investments by the norm of effectiveness (or by the bank interest rate in crediting); 4) outlays of natural resources by the differential rent, and 5) outlays of implements of labor and other circulating means of production by the prices constructed in accordance with items 1 to 4. (7)

Here we have a typical calculation of prices used under capitalism, with all of its distortions of real outlays of social labor. Contrary to the Marxist theory, for example, the outlays of living labor are measured under this scheme by its paid part alone. This means that the saving of living labor is deliberately and greatly underestimated. On the other hand, the outlays of labor incorporate elements which represent no real outlays of social labor (gifts of nature), as well as elements which duplicate the outlays of materialized labor (such as investment outlays duplicated by the depreciation of capital).

The proposed formula contains obvious contradictions and discrepancies if compared with its authors' theoretical concepts. The effectiveness norm and differential rent figure in this formula as accumulations, as outlays of surplus living labor over and above its paid part. But in the works by Novozhilov and Kantorovich the same elements are treated as indirect outlays (growth of production costs), that is, as a portion of the costs of production in other branches, to be added to the direct outlays of the given enterprise.

According to Novozhilov and Kantorovich, the effectiveness norm refers only to the additional investments, while the rent estimates refer only to the additional scarce materials. In the proposed formula these norms are applied to the total sum of investments, capital and materials.

Those who favor the above formula show, through mathematical operations, that the application of indirect outlays to the total sum of investments and capital does not change the results of the economic comparison of the plan variants. But they forget the main point: by charging the effectiveness norm over the entire sum of productive capital and investments they lose contact with real economic relations. Under this method the sum of extra charges to the capital becomes swollen and, together with rent, absorbs or sometimes even exceeds the total sum of the value of the surplus product. Characteristically, Malyshev has declared invalid the Marxist formula of the equality of the sum of the prices to the sum of the labor values, while Kantorovich uses the minimum (marginal) effectiveness as the effectiveness norm and changes arbitrarily the scale of prices to squeeze the sum of his prices into the sum of real outlays of labor. (9)

One of the methodological errors of the advocates of the price of production principle and its further "improvement" is the confusion of three different problems: measurement of labor productivity, price formation and distribution of very scarce resources.

It is tempting, of course, to settle all these problems by means of one formula. Yet differences of their economic essence can not be ignored. Thus prices are based on the law of value, which is not the same as the law of growth of labor productivity. Estimation of very scarce resources is linked with the operation of the law of differential rent.

Commodity prices depend not only on the above laws, but also on the laws of socialist reproduction, in particular, the law of planned development and other conditions which transcend the limits of the law of labor saving. Therefore the formula which quantitatively expresses the law of growth of labor productivity cannot coincide with the formula of price formation and the formula estimating the gifts of nature and scarce materials.

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In the present article we have touched upon the quantitative expression of only three economic laws. Yet even this brief analysis shows how complex the problem is. Expression of the economic laws in their totality, in their unity and interaction, as they actually operate in the economy and socialist planning, is an even more complex problem. It seems to us that application of the latest mathematical techniques could be of inestimable value in this field.

The current method of national economic planning, based on compiling an enormous number of tables, contains a serious defect: on the one hand, the tables do not contain all of the necessary data, and, on the other, coordination of the tables requires protracted, repetitive calculations. Finding the most effective, truly optimum variants for the development of the national economy and its individual branches by this method presents considerable difficulties and consumes much time and effort. Application of mathematical methods, especially electronic computers, will make it possible to solve the problems of socialist planning on a higher qualitative level, more thoroughly, with detailed calculations and complete coordination of all data within the shortest possible time.

The modern level of development of mathematics and electronic computer technique warrants the assertion that with the assistance of mathematical methods, well-organized statistics and project elaborations, it will be possible in the future to solve the following groups of plan calculations with the aid of the latest computer techniques: a) determining the optimum proportions of reproduction (the rate of economic development, the relationship between the basic subdivisions of production, different reproduction funds, etc.); b) determining a system of labor and value indices (the value of products and capital, commodity prices, accounting production costs, income and expenses; c) finding a system of branch and area physical indices (volumes of production for branches and areas, inter-branch and inter-area material and technical supply ties, distribution of labor resources, etc.).

Special, complex computers which model the social economy in the process of its expanded reproduction should be designed to implement the system of national economic plan calculations with the application of mathematical methods. Mathematically, calculations on such machines should be based on the coordinated balance sets of equations and functional dependencies of high orders. These sets of equations should be solved on the basis of the above criteria of socialist planning, determined by the economic laws of socialism. The task of creating these sets of equations and mechanized methods for their solution has no precedent in science in terms of its complexity. The complexity, dynamism, multiplicity of factors and conditions at work, interdependence of elements and changeability of parameters of the national economy no doubt surpass all physical, chemical or biological complexes.

Four measurements are involved in solving national economic plan tasks: 1) the branch structure of the economy (spheres, subdivisions, branches, enterprises); 2) its economic structure (social sectors, economic elements of reproduction such as capital, output, different outlays, accumulations, etc.); 3) the territorial structure of the economy and the geographic distribution of natural resources; 4) the dynamics of the economy, its quantitative and structural changes in time. Each of these measurements is quite complex. Many thousands of items are produced in the modern economy. The planned economy includes hundreds of thousands of industrial, construction, agricultural, transport, trade and communal service enterprises. Planning is effected for the next quarter and for twenty years ahead. Natural, labor and material resources are distributed unevenly, etc. Therefore the structure of reproduction in economic models should be specified with respect to individual structural subdivisions and with respect to the peculiarities in the turnover of individual capital funds and continuous changes produced by technological progress. The development of engineering and technology contains a multitude of different variants.

The production ties are made more complex by the relations of distribution, exchange and consumption. Inter-area exchange affects the volume of transportation and thereby the level and structure of material production. The sale of individual consumer goods depends on the income levels of the separate population groups and on the retail price levels. Consequently what is known as demand flexibility is involved here. This factor has a reciprocal effect on the planning of the structure of production of consumer goods as well as of incomes and retail prices.

Thus the equations characterizing socialist reproduction are inevitably long, involved and

non-linear, with discontinuities in many functions. But the complexity of the problem does not mean that it is insoluble. All of these problems are solved in practice by our planning agencies. Modelling the national economy in all of its elements, gradually reflecting in the models the entire pattern of complex ties and economic laws is, in our opinion, the true path towards creating the best technique of socialist planning, incorporating the application of modern mathematical methods and rapid-operation computer machines with cybernetic arrangements.

One of the pressing tasks facing Marxist economists is to study all aspects of the effect of all economic laws and factors of economic development on the proportions of reproduction and to formulate this effect in precise mathematical terms. The reproduction schemes should be made as specific as possible for this purpose. Gradually they should incorporate all those real conditions which have been put aside in earlier investigations for the sake of simplicity and concentration on what is basic and predominant.

The first prerequisite, without which the reproduction schemes are without practical significance, is the inclusion of reproduction characteristics and the turnovers of fixed and circulating capital. It is wrong to construct models in which the equations connect the volume and structure of the social product for two or more consecutive years, while the process of accumulation and changes in the use of productive capital are ignored. In the equations constructed by Academician V. S. Nemchinov and other authors, for example, all means of production produced within the current cycle of production $(c_1 + v_1 + m_1)$ are made equal to the material costs of production in the subsequent cycle. (10)

$$c_1 + v_1 + m_1 = (c_1 + \Delta c_1) + (c_2 + \Delta c_2) = c_1^1 + c_2^1.$$

This equation is based on the scheme of Marx and Lenin which assumes, for the sake of simplicity, that the capital invested has one turnover per year. But this assumption should not be retained for further analysis of social reproduction, or fallacious formulas and inferences will result. Actually, if productive capital turns over once a year on the average, the rate of growth of the social product equals the ratio of the accumulation fund and costs of production. If the turnover period is different, however, the rate of growth of the social product will differ from that calculated by the above formula, and the proportion proves to be invalid as a whole. The real rate of reproduction is proportional to the rate of growth of production capacities and depends, additionally, on a number of factors, as was shown above in the analysis of the requirements of the principal economic law of socialism and the law of planned development. To avoid an error, the production accumulation fund should be added not to the annual costs, but to the productive capital.

A second prerequisite for the construction of models of the socialist economy is the reflection of qualitative indices: the growth of labor productivity, the rise of the living standard, the growth of capital per worker, the effectiveness of capital outlays, etc. Models which ignore the qualitative processes of socialist reproduction deliberately distort reality and will be divorced from the practice of building communism.

Finally, a third major prerequisite for the successful construction of models for the national economy is the primacy of economic theory, underestimated by some mathematicians. Some of them, for example, believe that a model is constructed and analyzed by mathematicians, while the economists' concern is to interpret the economic meaning of the mathematical inferences obtained. Such an approach is incorrect. The starting point in the construction of economic models should be the essence of economic relations, the analysis of economic ties. It is the economists who should give the mathematicians the problems to be solved so that mathematical models and techniques reflect a definite system of economic dependencies and are subject to definite economic laws.

Violation of this principle is liable to result in grave errors. A case in point is the above-mentioned works of Kantorovich, which have put aside the requirements of the principal economic law of socialism, the law of planned, proportional development. They have also forgotten the law of value as the basis of price formation. As a result the mathematical paraphernalia have merely proved suitable for the bourgeois theories of the three factors of value and marginal utility — long ago criticized severely by Marxism. Novozhilov, who persistently interprets the mathematician Kantorovich's results in Marxist terms,has also found himself in a difficult position.

All of this once again shows the importance of observing the primacy of economic theory over mathematical operations in the application of mathematics in economic research, and, what is most important, the ability to reflect the requirements of the objective economic laws of socialism and specific conditions of the development of the socialist economy in formulas and constructions.

Footnotes

(1) This requirement corresponds in the main to the law of growth of labor productivity as well.

However the requirements of the principal economic law and the law of growth of labor productivity do not coincide completely. The former calls for the greatest national income per capita, while the latter demands the largest gross output per unit of working time. These criteria, affected by the structure of the social product, employment of the labor force and the duration of working time, are not identical, and the use of them leads to different results in certain cases.

(2) The derivation and analysis of this formula are given by the present author in an article published in the collection Voprosy Sotsialisticheskogo Vosproizvodstva, Izdatel'stvo Akademii Nauk SSSR, 1958, pp. 201-209. By the material outlay per unit of output is meant the share of the cost of material in the value of the product $\frac{c}{c+v+m}$; by the effectiveness of the rate of construction is meant the ratio of the value of the productive capital already put into operation to the productive capital investments; the rate of productive accumulation is the share of productive accumulation in the total amount of accumulation.

(3) K. Marx, Capital, Vol. III, 1954, p. 272. [Russian edition; the quotations from Capital have been retranslated from the Russian — Editor].

(4) Ibid., p. 273.

(5) See Primenenie Matematiki v Ekonomicheskikh Issledovaniiakh, Sotsekgiz, 1959; L. V. Kantorovich, Ekonomicheskii Raschet Nailuchshego Ispol'zovaniia Resursov, Izdatel'stvo Akademii Nauk SSSR, 1959.

(6) Primenenie Matematiki v Ekonomicheskikh Issledovaniiakh, p. 135.

(7) See Voprosy Ekonomiki, 1960, No. 1.

(8) Primenenie Matematiki v Ekonomicheskikh Issledovaniiakh, p. 174.

(9) See L. V. Kantorovich, Ekonomicheskii Raschet Nailuchshego Ispol'zovaniia Resursov, pp. 296-300.

(10) Primenenie Matematiki v Ekonomicheskikh Issledovaniiakh, p. 33.

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A. Boiarskii

ON THE APPLICATION OF MATHEMATICS IN ECONOMICS*

The problems of applying mathematical methods in economic science have been worked on intensively in our country for several years now. This work is being conducted by a special laboratory of the USSR Academy of Sciences, the Institute of Economic Research of the State Economic Council, the Institute of Complex Transport Problems of the USSR Academy of Sciences, by a number of universities, Moscow and Leningrad Universities, the Moscow State Institute of Economics, the Moscow Institute of Engineering Economics, the Siberian Branch of the USSR Academy of Sciences, the Armenian Academy of Sciences, and others. In April 1960 the USSR Academy of Sciences held a special conference at which economists and mathematicians met for joint creative discussions. (1) The problems involved in applying mathematics to economics are dealt with in monographs and economic journals. (2) This is unquestionably a progressive phenomenon.

The application of mathematics in economics essentially means that the use of mathematical methods allows for a more complete, profound and precise study of the quantitative aspect of economic phenomena, which is especially necessary in economic planning. The importance of exact quantitative relations in economics has been well understood at least since the times of William Petty. As Karl Marx pointed out, "instead of weaving together a whole series of words in comparative and superlative degrees and speculative arguments, he began to speak in terms of numbers, weights and measures...." (3) The mere designation "political arithmetic" indicates that even at that time the close tie between economic science and mathematics was clearly understood. This tie was stressed by Marx time and again.

The importance of the study of quantitative relations can be shown from many examples. Value

* The editors of Voprosy Ekonomiki agree with the basic criticisms of the author with respect to the works of L. V. Kantorovich and V. V. Novozhilov.

expresses a definite social relation which emerges along with commodity production. At the same time, value has a magnitude without which it would be impossible to speak of it in general. Surplus value expresses a definite relation of exploitation under capitalism. Its quantative relation to necessary value measures the degree or rate of exploitation. The different roles played by the two parts of capital in the growth of its value is reflected in the division of the total social production into two sub divisions. The quantative relation between the latter plays an important part in determining the rates of economic development. Proportionality of production requires a definite conformity between the ratios of the sub divisions, between the shares of newly-created and transferred value in production, the rates of growth of production, etc. Investigation of these elements requires the use of mathematics, including higher mathematics.

Marx was not faced with the task of planning an economy. Hence he could exclude from his analysis many complicating factors, and resort to numerical examples, and in some cases leave out exact elucidation of quantitative relationships. However, planning of the national economy demands a constant calculation of changing factors and magnitudes which might have a noticeable effect on the results. Hence the necessity of investigating in an algebraic form, since it alone makes it possible to break away from concrete numbers and find a general solution, which is frequently obtained by means of higher mathematics. Moreover planning requires the development of mathematical equipment.

In the past few years the scope and complexity of the interaction of the parts of the socialist economy have grown to a tremendous extent. This has made the problem of precise calculation of structural relations, rates of growth, etc. far more urgent. As the economy develops, each fraction of one per cent of these indices represents constantly growing magnitudes of output, capital, freight traffic, etc., and this increases the real damage caused by insufficiently precise calculations.

The elements of a modern economy interact much faster than in the past; this necessitates not only precise but rapid inclusion of these relations. Electronic computers have an important role in this work. The use of the latter in turn stimulates a greater use of mathematical methods, for it is useless without a mathematical expression of interrelations, without their translation into the language of mathematics — the only language in which they can be given to the machine and in which the machine can give the results.

Obviously in this field we are still far from obtaining a palpable practical effect. It is in this sense that one must say that our growing economy lags with respect to practical requirements, but not in terms of any Western standards. The work now in progress is thus a direct response to the practical requirements of the planned direction of our country's economy. But widespread use of mathematical methods in economic science and planning is not something new in Marxism, and still less does it signify any change in its methodology.

It is also important to realize that in this field it is necessary to surmount a number of specific obstacles, and not all of them are of a subjective nature.

First of all there are the distinct features of the object itself. We know that successful application of mathematics requires that science reach a stage at which it will be able to distinguish sufficiently homogeneous and simple elements which can be used as objects of calculation. Singling out such elements is infinitely more difficult in economics than in physics, or even biology. In economics there are no absolutely identical enterprises, plots of land, or even samples of commodities. In order to introduce any given parameter in a formula, a physicist or chemist measures it in a laboratory. Though this may require a complicated experiment or a long wait for a solar eclipse, it is nevertheless measurement of magnitudes fixed under set conditions with the aid of special instruments. To introduce a parameter in economics it is necessary to organize the collection of information on a nation-wide scale, to come in contact with large numbers of people who have specific interests, etc. And meanwhile there is no certainty that the given parameter will remain unchanged between the period of observation and the period of practical action based on the calculation of the parameter. All of this greatly hinders quantitative analysis in economics. Modern computing techniques have an important role in surmounting the obstacles arising from the rapid changes in, and the enormous quantity of, parameters.

The next obstacle, a subjective rather than objective one, is voluntarism. Peculiar to this concept is a rejection of the existence of objective laws generally. It is particularly hostile to the expression of laws in mathematical form, for this form is the most indisputable expression of objective relationships. Voluntarists find mathematical formulas even more unacceptable than judgments on the content of objective ties. For this reason elimination of the influence exercised by voluntarism is a necessary condition for the widespread use of mathematics. The poor mathematical training of economists, for which there is an historical explanation, and which is becoming increasingly intolerable, is not the least of the factors in this situation.

All of these difficulties can and must be surmounted. In order to do this, it is first of all necessary to overcome the anti-mathematical attitudes of some economists, for they have nothing in common with Marxism. Such attitudes have existed, and they have had a harmful effect. Even now, although everyone acknowledges the significance of mathematics, there are still some economists who react with suspicion to the intention to "force the law of value into a system of equations." Naturally no system of equations can disclose the qualitative nature of a social relation, but this cannot be used as an argument against the use of systems of equations which make it possible to solve problems of measurement related to value.

There is no denying that the application of mathematics involves much schematization of phenomena. Here is a simple example: the analysis of the dependence of costs of production on output, in which for a long time use was made of a differentiation of "constant" and "proportional" costs. However when there is a change in output some "constant" costs may change; the coefficient of proportional magnitudes changes also. For example, certain progressive piece-rate systems cannot, strictly speaking, be included in either group. Nevertheless, the above-mentioned scheme is successfully utilized in many calculations, even in supplying theoretical proof of the advantages of large-scale production.

Science always involves some schematization. To fear it amounts to rejecting Marx's abstract-analytical method and adopting the viewpoint of the vulgar economists, who, as Marx put it, take pride in opposing science with the fact that in phenomena things look different. Fear of mathematical abstractions is an extension of the fear of scientific abstractions in general, and this has nothing in common with Marxist methodology. The only important thing is that mathematical schemes should be brought to that degree of complete reflection of reality without which they have no practical significance.

The main principle of a truly scientific application of mathematics in economics is the principle of primacy of quality. Mathematical economic investigations can succeed only if they proceed from the economic content, from a clear understanding of economic categories and laws to mathematical formulas, to measurement of quantities, and not from the opposite direction. The qualitative nature of economic objects and their content are disclosed by Marxist-Leninist political economy. Separated from this main methodological principle, mathematical methods are not only ineffective, they may lead to harmful errors. Therefore any study of economics using these methods requires a thorough study of Marxist economic theory. One must also know the history of the struggle waged by Marxist science against its bourgeois opponents so as to direct investigations from the very outset along the right path, avoid repetition of old errors, avoid ways whose fruitlessness has already been established.

It would be wrong, for example, to think that wider use of mathematical methods in economics marks a new era, unrelated to its preceding development. That would only signify, on the one hand, an attempt to free mathematical analysis of economics from the primacy of qualitative analysis, and, on the other, failure to understand the part played by Marxist-Leninist political economy in the successes achieved by socialism. Proper utilization of mathematics in economics and planning is necessarily based on their preceding development; it must reflect, develop and improve the accumulated experience, and not reject it as something "pre-scientific."

It must be clearly understood that the greater use of mathematics can not be viewed as some isolated phenomenon, unrelated to the general enlivenment in economics set in progress in the main by the 20th Party Congress. This enlivenment, which is connected with the elaboration of the great and urgent tasks set forth by the Party, has naturally had an impact on their quantitative aspect, and aroused a deep interest in the application of mathematics. Thus the general enlivenment in economics is not the effect but the cause of the greater use of mathematics.

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Economics is particularly based on partiinost. This is equally true of the application of mathematics in economics. Its propositions cannot lose their partiinost because they come dressed in mathematical formulas, as can be demonstrated from a number of examples. For instance, amongst bourgeois mathematical economists, or as they call themselves, econometricians, the idea is widespread that output is proportionate to a certain geometrical mean of the invested capital and quantity of labor. By the same token it is postulated that both "factors" are of equal significance and change only in dependence on the relationship between their "weights." The "proof" supplied in support of this proposition is of a purely mathematical nature: assuming that in the absence of capital and labor output is equal to zero, it means that the size of both must be expressed in the form of multipliers (raised to a certain degree). This example shows us that the erroneous methodological principle of proceeding not from the content to formulas, but in the opposite direction, is closely interwoven in bourgeois apologetics. Bourgeois thought has

opposed the "input-output analysis" of the Harvard professor Leontiev to the Marxist schemes of reproduction. At first glance Leontiev's equations appear to be a naive reflection of the technological relations between different branches — of the fact that the output of a ton of coal requires a certain quantity of electric power, timber, etc., that output of power requires so many tons of coal, etc., in other words, truths that have been known from time immemorial. But this appearance is deceptive. If we consider the list of branches whose relations are reflected in these equations, we will find that "household economy" is presented as a branch producing "labor services." Labor is classified as a product, and a number of coefficients show what outlay of various consumer goods is necessary to produce a unit of labor. This method of including the working people in the scheme of consumption bears the imprint of its bourgeois origin.

Our literature has often pointed out the apologetic essence of mathematical models of cycles and of other works of the econometric school, which are essentially based on the theory of marginal utility. It is easy to trace the direct historical connection of econometrics with the subjective school, especially, of course, with its mathematical branch, which is invariably stressed by the econometricians themselves. The application of mathematical methods in Marxist science has always been based on totally different methodological principles. Marxism, including the scientific analysis of quantitative relations in economics, existed for many years before econometrics appeared; it continues to exist and is developing successfully even after its appearance.

Who would profit from a change in the designation of even one part of it? Terminology, of course, has no decisive significance, and the term "econometrics" is not going to frighten anyone. But this term has been designating a definite bourgeois school for many years. Adoption of the term "econometrics" in mathematical economic investigations based on Marxism might lead to overestimation of the similarity of the mathematical methods used, and to concealment of the far more important aspect of the matter — the antithesis of the theoretical concepts. There have already been certain statements to the effect that econometrics expresses a process of whereby bourgeois political economy is allegedly losing its apologetic nature.

Rejection of the term "econometrics" obviously does not mean neglecting the mathematical apparatus used in econometrical works. But this apparatus as such is not a part of econometrics; it belongs to mathematics as an abstract science of quantitative relations. In solving a number of economic problems one may successfully apply the finding of the maximum or minimum according to the rules of differential calculus, although the latter are also used by the theorists of marginal utility. But these rules are not their property. The errors of the marginal utility theorists are not due to the fact that they are solving the problem of the maximum function by the rules of differential calculus, but to the fact that they are unable to prove even the existence of this function, not to speak of whether it can be differentiated or of the character of its modification.

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The so-called "optimum planning" proposed by L. V. Kantorovich, (4) which has already been given an appropriate evaluation, (5) is an example of the erroneous inferences resulting from an attempt to proceed not from economic content to mathematical relationships, but the other way, from mathematics to economic content.

Kantorovich's journey in economics began with his solution, in the 1930's, of several technical and economic problems. One of them has a direct bearing on what was to follow. Let us assume that 5 teams (or 5 machine tools, 5 types of enterprises, land plots, types of raw materials, etc.,) may be used for producing any two types of articles — No. 1 and No. 2. But the possibilities of their utilization are limited: the teams have a set fund of time (this is also the case with the time fund of the machine tools, the capacity of the enterprises, the size of the land plots, and the stocks of each material, etc.). The possibilities of the teams are shown in the first rows of the table shown on the top of the following page. (6)

In all cases twice as many of No. 1 will be produced as of No. 2. It is obviously preferable to assign the production of No. 1 to the first teams (in the order set in the table) and the production of No. 2 to the last ones. If the production of 1,000 of No. 1 is assigned to Team V instead of Team I, the latter will turn out 125 more of No. 2, but then Team V will turn out 500 less. The sum total will amount to a loss. It is also obvious that it is not desirable to assign to the first three teams the production of No. 1 only. In this case the output will be 800 + 500 + 1,800 = 3,100; the other team will be able to turn out only 500 + 600 + 1,800 = 1,100 of No. 2, which is not sufficient. It is also impossible to limit production of No. 1 to the first two teams: in this case the output of these articles will amount to 800 + 500 = 1,300, while the other teams will turn out 450 + 500 + 600 = 1,550 of No. 2, which is too much. It is therefore clear that it will be best to assign to Team III the production of both articles in quantities necessary to secure the needed proportions (1,200,000 of No. 1 and 150,000 of No. 2).

		Number of teams (types of enterprises, land plots, etc.)				
		I	II	III	IV	V
Able to produce articles (in thousands)	No. 1	800	500	1,800	1,200	1,200
	No. 2	100	75	450	500	600
Time (capacity, area, etc.) needed to produce 1,000 articles	No. 1	$\frac{1}{800}$	$\frac{1}{500}$	$\frac{1}{1,800}$	$\frac{1}{1,200}$	$\frac{1}{1,200}$
	No. 2	$\frac{1}{100}$	$\frac{1}{75}$	$\frac{1}{450}$	$\frac{1}{500}$	$\frac{1}{600}$
Ratio of time needed to produce 1,000 No. 2 articles to time needed for 1,000 No. 1 articles		8	6.7	4	2.4	2

It turns out that the unit of No. 1 produced in the worst conditions (in the sense of maximum exclusion of No. 2) is the unit whose production will be assigned to Team III. At the same time, the unit of No. 2 produced in the worst conditions (in the sense of maximum exclusion of No. 1), is also the unit which is to be produced by Team III. But in this team the output of every unit of No. 1 supplants 1/4 of No. 2, while every unit of No. 2 supplants 4 units of No. 1. Thus, bigger ratios, shown in the last row of the table, to smaller ratios, down to 4. In this way ratio 4 plays a special role, on the basis of which Kantorovich designated it in 1939 as the "resolving multiplier."

But 20 years later, in Kantorovich's next work, the modest "resolving multipliers" of the 1930's appeared under the name of "objectively conditioned estimations." "Estimations of output determined in this way," he writes, "will be called objectively conditioned estimations (for short — o.c. estimations). In this case we have only determined the ratio of these estimations — 4:1, which means that if the estimation of article No. 1 is equal to "a," then for article No. 2 it is equal to "4a." It is important to note that this ratio has not been selected at random — it is objectively determined by the given conditions and is found in the process of analyzing an optimum plan." (7)

Why was a change of names necessary? The author explains it clearly enough: "Under these circumstances we feel justified in using the term "estimation" instead of "value" or "price" because estimation constructions have a somewhat limited, local character, for we are not making an analysis of outlays or constructing a plan for the national economy as a whole (for socialist society), but only within the bounds of the set of enterprises under consideration. This analysis is therefore not complete enough for determining value relationships.... The use of this special term would be unnecessary in the analysis of the whole national economy." (8) It is therefore unquestionable that Kantorovich's estimations are not substituted for value only because of technical reasons: the example of five types of enterprises capable of turning out two types of articles — this does not constitute the entire economy. If it were possible to extend the list of enterprises and articles to a point at which they would encompass all production, the necessity of distinguishing "estimations" from values (or prices) would vanish. "In principle prices should approximate o.c. estimations," (9) Kantorovich writes. This idea runs through the whole book.

Let us note to begin with that the transition from a few teams (or even enterprises producing similar articles) to the national economy as a whole is not as simple as our author assumes. The principal problem in analyzing price formation and in determining prices consists not only in finding the correct relationship of prices of bolts and nuts, or even of tractor tracks and gear-boxes, but primarily in correctly determining the relationships of prices of steel, electric power, fabrics, footwear, etc. Of course, one may include all these products in a table like the one above, classifying the articles under different numbers and the enterprises producing them under numerals I, II, etc., that would run into many thousands. But in whatever order you arrange them in the table, the Trekhgornaia Textile Mills cannot manufacture automobiles

and the Likhachev Motor Works cannot turn out fabrics. Let us return to our table and try to imagine how it would look if the first three teams could manufacture only articles No. 1, and teams IV and V only articles No. 2. In doing this, let us rename the teams into types of enterprises, which will indeed conform to the conditions of transition from the problem stated in 1939 to its interpretation in the book published in 1959, from which the figures are taken. The table works out as follows:

		Types of Enterprises				
		I	II	III	IV	V
Able to produce articles (in thousands)	No. 1	800	500	1,800	0	0
	No. 2	0	0	0	500	600
Capacity needed to produce 1,000 articles	No. 1	$\frac{1}{800}$	$\frac{1}{500}$	$\frac{1}{1,800}$	∞	∞
	No. 2	∞	∞	∞	$\frac{1}{500}$	$\frac{1}{600}$
Ratio of capacity needed to produce article No. 2 to capacity needed to produce article No. 1		∞	∞	∞	0	0

The last row, filled with zeros and infinity symbols, only shows that our attempt came to grief. Where shall we now find "o. c. estimations?" And yet it is obvious even without dealing with them that the enterprises should produce the things for which they were intended: the Trekhgornaia Textile Mills should not attempt to manufacture cars, and the Likhachev Motor Works should not compete with it in the output of fabrics. As to the fact that the proportion of output of article No. 1 to output of article No. 2, being equal to 3,100:1,100, may seem to be unacceptable, the only inference which follows from this is that in the future it will be necessary to build enterprises of the fourth and fifth types.

The reason why "o. c. estimations" are groundless is that after employing certain of its useful parameters in solving the mathematical problem, Kantorovich sought to impart post-factum to the solution an economic content it did not have; this indeed amounts to substituting for the right course — from the essence to its mathematical expression - the opposite method - from formulas to the essence — with the result that the interpretation of the latter is arbitrary and erroneous. In linear programming in certain cases some squares of the table are "prohibited," and they are inscribed with infinity (or an arbitrarily large numeral which replaces it). The transition from teams or branch enterprises to the totality of branches signifies a transition to another quality and to problems of a totally different character. The attempt to place them on the same level as intrafactory problems results in filling the table with so many "prohibited squares" that none are left for the application of the method.

But let us assume that five types of enterprises capable of turning out both articles can actually be used as a model for the entire national economy, and let us take a closer look at the "o. c. estimations." We have already seen that they conform to the conditions of production of the "last" units of each article. If the problem provides that twice as many of No. 1 should be produced as of No. 2, then both articles would "meet" under the heading II instead of the heading III, and the ratio of their estimations would not be 4 but 6.7. To anyone slightly familiar with economic theory and the history of its development it is clear that this conforms to the principle of extending to all products the determination of value through rent (in the broad sense of the word), that is, to the concept of marginalism.

Kantorovich's idea is that once we establish prices on the basis of "o. c. estimations," we make production of article No. 1 profitable only in the first three types of enterprises, and the production of article No. 2 profitable in the third to fifth types, i.e., only in the enterprises where the relative outlays for a given article are not higher than its estimation, and this will automatically produce an optimum variant. It follows that if the initial proportion changes in favor of article No. 2, then by establishing for it a relative estimation of 6.7

(instead of 4) we make it profitable in the enterprises of the second type. But unlike the theory of marginal utility, the Marxist theory of value long ago revealed the fallacy of the contentions that value and quantity are directly interdependent, that there is a direct dependence between the available product and the one that is being produced, the one that is in demand and that can be marketed, etc., because value is created by labor, not by the quantity of the commodity or the demand for it, its scarcity, etc.

Once Kantorovich has adopted this course, he does not swerve from it. "... Following a modification in the assortment order," he emphasizes, "a growing need for a type of article is connected with a relative increase of outlays, and, therefore, also of o.c. estimations for this article; a reduction of need — with a lower o. c. estimation." (10) This is actually the theory of supply and demand in its purest form, or at best Ricardo's theory of value. It is certainly not Marx's theory!

Kantorovich subjects all of the factors of production to these estimations, which are most reminiscent of the theory of marginal utility and which have nothing in common with Marx's theory. Since he holds that "o.c. estimations" can serve to determine profitability, they must not only be made for articles (output), but for raw materials, power, equipment, land, etc., and also labor. The greater the scarcity of any given material, the higher should be its o.c. estimation. (11) As to excess resources, it is suggested that they should have a zero estimation, again exactly conforming to their zero marginal utility. However the scarcity of a material or of other conditions of production is a very relative notion, which depends on the required volume of output for the production of which they are necessary.

Kantorovich even goes to the length of applying this same principle in estimating labor, (12) and then asserts that "in order to stimulate a proper distribution of labor, and create an incentive for achieving this both for enterprises and workers, these national economic estimations should be definitely reflected in wages and cost accounting, although ... we do not hold that wages should directly conform to their estimated effectiveness in the national economy." (13) True, the author does not suggest that the high estimation of scarce categories of labor should be paid out in the form of wages; instead he advances the idea of establishing a special fund to which the enterprises should contribute for the use of scarce categories of labor. His view is that "this would help to prevent hardly justified use of these categories of labor, and at the same time it would stimulate utilization of non-scarce labor resources." (14) Of course the labor of the latter categories would cost next to nothing, and if for some reason there were some surplus resources of some category of labor, the latter's "estimation" would also equal zero. It is not likely that Kantorovich subjectively wanted this, but objectively his position and the theory of wages of the well-known bourgeois economist John Bates Clark are as alike as two peas.

Thus, acceptance of the general propositions of marginalism inevitably leads also to analogous inferences for specific problems. It has already been pointed out that Kantorovich's "o.c. estimations," which should serve as a basis for prices, totally depend not on objective economic laws but on subjective factors, as is the case with the theory of marginal utility. For example, were one to decide to replace tin cans with glass jars, the "objective" estimation of tin would sharply decline, and the estimation of glass would rise, although there would not be any changes in production techniques for either tin or glass. More, the very character of dependence of marginal outlays in Kantorovich's system is in full accord with the usual concepts of the marginalists. According to the author, increased output of any product is necessarily achieved at the price of raising its estimation, of increasing the marginal outlays for it. His system includes the whole notorious arsenal of "laws" of marginalism: the law of declining productivity, the law of declining fertility, the law of declining effectiveness of outlays, etc. And yet it is a well-known fact that increasing production in existing enterprises results in lower outlays per unit of output, providing this increase does not go beyond the reasonable limits set by the modern level of technology. Beyond these limits an increase in output is achieved through construction of new enterprises, which, in turn, are not built after the image and likeness of the old ones, but according to the latest achievements of science and technology. As a result, outlays on them will be still lower. Kantorovich replaces the actual ratio of volume of output to outlays by its opposite. It could not be otherwise, because failing this the whole system of his estimations would collapse.

The subjective and by no means "objectively conditioned" character of the author's estimations is already apparent from the fact that the corresponding ratios between real outlays — even if marginal — cannot actually materialize in any case. The estimation ratio 4:10 in the example presented above was not taken from the actual process of production, but from an "optimum plan." But if in fact production was distributed among enterprises in a less than optimum way — whether because of inherited traditions or even simply because there was no specialist familiar with linear

programming -- then it may happen that the ratio 4:1 has nothing in common with the real process of production, and exists only in an imagined optimum plan. Therefore, if actual production corresponded to what Kantorovich defines as a "poor" variant, then the enterprises of type I would not produce any articles No. 1 and one could speak of the 4:1 ratio only in the subjunctive mood. But one may say any number of things in that mood, for it places no limits on fantasy.

According to Marx's theory, labor is the only substance of value. According to Kantorovich's system of estimations, labor is deprived of this significance and becomes only one of the "factors of production." True, the author frequently confuses the labor of people with the "labor" of enterprises, and by juggling terminology conceals his departure from the Marxist theory of value. Thus, having stipulated that in each enterprise "wages (number of workers remaining constant), electric power, fuel, expenses for equipment, other shop and factory expenditures and amortization are more or less equal, regardless of the article produced by the enterprise," (15) he describes the ratio of the magnitudes, of the inverse capacities of the enterprises, as "labor intensity." But this being the case, they could with equal justification be called "power intensity," "capital intensity," "depreciation intensity," etc. If, finally, we discard the above mentioned restrictions, but leave unchanged the figures of possible output, we will obtain the same 4:1 ratio estimations, but now it will have nothing in common with labor in general. It follows that the "o. c. estimations," which are determined by outlays under the worst conditions, are in addition determined not by outlays of labor, but by outlays of the capacities of enterprises, which mainly depend on their fixed capital. The author goes on to say the following: "If in the output of the given products labor is the only type of outlay (or all other types of outlays are unlimited and excessive), then the ratio of o. c. estimations for various types of output is determined by outlays of labor per unit of output of each kind...." (16) This actually amounts to an admission that estimations are not determined by labor at all, or not only by labor. For where can we find the type of production in which labor is the only factor, or at least the only limiting factor? If indeed labor is unrestricted (whenever necessary one can almost always expend its reserves), then it has no share whatsoever in the formation of estimations and, hence, in that of the prices of products, for it has itself an estimation equal to zero. Would not any bourgeois apologist endorse this concept?

Sensing that the "o. c. estimations" system contradicts Marx's theory of value, Kantorovich attempts to reconcile the two. But the attempt to reconcile the irreconcilable -- the labor theory of value and the theory of marginal utility -- is not at all new. The "investigations" of Tugan-Baranovsky in this direction are well-known. But the latter, although knowing political economy, substituted for Marx's theory of value that of Ricardo, which was more convenient for his purpose. At the end of his book Kantorovich inserts a special paragraph under the very promising title: "Calculation of Necessary Outlays in Average Labor." It begins with the following admission: "Naturally the question arises whether they ("o. c. estimations" -- A. B.) are not in conflict with the labor theory of value...." (17) The author attempts to dispel this doubt in the following simple manner. We shall take the liberty of freeing his "proofs" of algebraic forms and of presenting it in approximate figures. Let us assume that "o. c. estimations" have been found for every product, and that according to them the whole product is expressed in 1 billion rubles. On the other hand, the optimum plan (from which these estimations are taken) provides for outlays of the various factors of production: let us say, 10 billion hours of labor, 100 million hectares of land, 100 billion kilowatt hours of power, etc. According to Kantorovich, the outlay of labor of 10 billion hours must be divided by the total estimated output, that is, by 1 billion. The result obtained is 10. Now by multiplying all estimations by this coefficient of 10 we obtain what he calls estimation "in units of average labor." By doing this the author considers that he establishes a link between his estimations and Marx's theory of value. Simple, as all genius is! One point only remains unclarified: why not "prove" by the same method the conformity of estimations to outlays of land area instead of labor? To do this one can multiply all estimations not by 10 but by the coefficient $\frac{1}{10}$, obtained by dividing the total outlay in land (100 million hectares) by the estimation of the total product. One can similarly "prove" the connection of estimations with the "power" theory of value, by using the coefficient 100 (100 billion kilowatt hours divided by 1 billion), and so on. Feeling that the trick of "converting" everything into average labor is too simple, Kantorovich attempts to show further on that "the outlays of labor per unit of output determined in this way really conform to the outlays required for achieving output in the given conditions." But this cannot be demonstrated. Hence, by introducing the assumption of supplementary resources of labor, he accompanies it with a limitation that is vital for further "proof": "In this case, in order that labor conditions should remain invariable, it is necessary to assume that the production factors

which secure them are increasing proportionally...." (18) But if that is true, it does not matter in the least whether we select as the basis of our calculation the increment of labor resources or of any other factor. Taken as a whole the "proof" is no more convincing than the promise given on page 298 to express the estimations of all products through the estimation of a unit of labor, which itself, in case of sufficient labor reserves, in accordance with point "g" on page 282, may be equal to zero! Kantorovich, the mathematician, is so confused that he admits as real the possibility of divising by zero!

Speaking about labor, Kantorovich generally avoids the word "average." Only at the end of his book does he "eliminate" at one stroke all of his deviations from the Marxist theory of value — inasmuch as he "converts" in the above-described ways estimations into units of labor, then why not in units of average labor! But in a number of places in his book he makes a direct attack on the calculation of average outlays. (19)

The marginalist nature of Kantorovich's "o.c. estimations," in the hypothetical case when they are determined by outlays of labor, cannot resolve the main problem: calculation of the distribution of social labor. The reason for this is that the balance of labor is connected neither with imaginary (in the optimum plan, which, unfortunately, is far from always realized) nor with marginal outlays of labor, but with real and average outlays.

It is apparent from the above that the "o.c. estimations," despite the author's desire, cannot be used as a basis for prices, or as a measure of profitability, or for comparing different production technologies (particularly for deciding whether a new technology is suitable), or for a uniform estimation of every production factor in all enterprises, or for establishing the size of wages, etc. An attempt to apply this sytem in practical planning can only lead to imbalances, to a gap between the production plan and the balance of labor, to a disregard of the task of raising the productivity of labor and machinery (average!) and of reducing production costs (also average!). On the other hand, automatic increases in estimations when there is a scarcity of products or a general need to expand their output would stimulate the latter at the expense of using outmoded technology, higher costs of production, and its development in unsuitable areas. Therefore one must agree with the general negative appraisal of Kantorovich's system of "o.c. estimations" stated in the press, in particular, in the journal Kommunist.

Some elements of Kantorovich's totally fallacious conception can be found in V. V. Novozhilov's ideas, although he uses different terminology and designations. (20) Let us examine this matter on an example he himself supplies. (21) It is assumed that for fulfilling a given program of production of five types of products — A, B, C, D, and E — the trust needs a minimum capital investment of 250 million rubles. But it has been allocated 340 million, or 90 million more. Under the given program it is possible to make an additional investment of 30 million rubles for each type of product, and that would yield the following decrease in the production costs of the given products (see table below).

It is clear from the table that it is advisable to make additional investments of 30 million rubles in the output of products A, B, and C. Were it possible to invest another 30 million rubles, it should be directed to the output of product D, whose effect is 8.3%, and not to product E, where it would yield only 6.7%. The "last" ruble of additional investment in the best variant would yield 10.7 kopecks, or 10.7%. And this, according to Novozhilov, is precisely "the norm of effectiveness." Capital investment must be included in calculations with this coefficient. In that case investment of 30 million rubles in the output of product A and of product B would be automatically profitable, and in D and E unprofitable (C will occupy a neutral position). This actually amounts to inclusion in the calculation of outlays of such a "production factor" as capital investment with an estimation of 10.7%. And thus Novozhilov's "norm of effectiveness" coincides with Kantorovich's "o.c. estimations." Their origins also coincide: the "o.c. estimations" stem from an optimum plan, irrespective of whether it is in accord with actual production; Novozhilov's norm stems from the optimum distribution of capital investments, irrespective of whether they are in accord with the real

	A	B	C	D	E
Reduction of production costs:					
in million rubles	9.8	5.0	3.2	2.5	2.0
in % to 30 million rubles	32.7	16.3	10.7	8.3	6.7

distribution. Kantorovich's "o.c. estimations" are inconceivable without the law of diminishing productivity, etc., and Novozhilov's "norm of effectiveness" without the diminishing effectiveness of capital investment. According to Kantorovich labor is only one of the factors. According to Novozhilov, in addition to labor (present and past in the shape of consumed means) the calculation must include capital outlays at a percentage corresponding to the norm of effectiveness (at "o.c. estimations" of capital investments, Kantorovich would say). By analogy with the "norm of effectiveness," the calculations of Novozhilov's coefficients introduce utilized land and various means of production. The definite similarity between the concepts of Kantorovich and Novozhilov can be traced in the latter's article Calculation of Outlays in a Socialist Economy, published in this issue. It is not difficult to surmise that the "normative effect" of a given resource (land, or anything else) is the same "o.c. estimation," although the article does not clearly reveal how it should be calculated. The article talks about a new, transformed form of value, characteristic of a socialist economy, which represents the sum total of production outlays and of so-called "inverse dependence" outlays, i.e., of a limited resource estimated at its own norm — its price. What results is the old dictum: "labor is the father of wealth and land is its mother," and also the scheme of the marginal utility school, in which the minimum outlay in production is found with the aid of an "estimation" (read: "norms of effectiveness") of labor, capital (the same capital investment) and land. What both authors share is a lack of understanding of the distinction between the national economic and intra-branch aspects. One cannot discover from Novozhilov's writings how to calculate the utilization, let us say, of a coal mine from which one can extract neither iron ore nor copper pyrites — nothing except coal.

Thus the difference between the constructions of Novozhilov and Kantorovich can be summed up as follows: the former suggests that the calculation of some special, transformed form of value characteristic of socialism should be extended only to limited production factors; Kantorovich, on the other hand, wishes to encompass all production factors with his "o.c. estimations." Disagreeing with Kantorovich, Novozhilov writes that "in a model of planned price formation the norms of effectiveness of scarce resources alone can operate as resolving multipliers." (22) But if we recall that "resolving multipliers," or, in other words, "o.c. estimations" are equal to zero for unlimited factors, by the same token the distinction between the conceptions of both factors is almost reduced to zero, the more so because in the paragraph "Mathematical Interpretation of the Measurement of Differential Outlays" (in the collection The Application of Mathematics in Economic Investigations) we find, in slightly different designations, a number of propositions similar to Kantorovich's "theory" of "o.c. estimations."

Therefore it is impossible to agree with Novozhilov's arguments (in his article published in this issue) against the critical remarks of A. Katz. For instance, disagreeing with the contention that in his book outlays of labor and "estimations of scarcity of production factors are put on the same level," Novozhilov's response is that unlike bourgeois economists he is does not proceed from the "value or utility of consumer goods." But this is not the only point involved. Katz quite rightly remarks that in spite of this distinction there remains a basic similarity: both marginal utility and scarcity of means of production are expressions of a definite, formed relationship of the required and available volume of products. "The general minimum outlay of labor," according to Novozhilov, is determined in dependence on the relationship of supply and demand as the initial factor, but in actual fact the more favorable relationship of supply and demand depends in the final analysis only on the outlays of labor as the substance of actual production outlays. This is the essence of the problem.

True, an essential distinction is that Novozhilov objects to "o.c. estimations" of labor generally. This distinction is very significant. It seems to us that Novozhilov unfortunately has not thought this out to the end. Otherwise he would have rejected Kantorovich's entire system of "o. c. estimations," and have placed the application of mathematical methods on a sound basis. Here we wish to point out another shortcoming in Novozhilov's work. Although he deals constantly with plans, his construction looks to the past and is static in nature. The norm of effectiveness is determined by the effectiveness of the "last" ruble, in the sense of savings in outlays in comparison with the past. The additional 30 million rubles are used only for the purpose of manufacturing the same product, but with a larger investment. And yet it is completely clear that the additional investments must be used primarily to increase the output of the product. This cannot be hindered by the condition of the given volume of output. That volume is given only so long as the imaginary trust is isolated from the agency planning the national economy, and even so, it is permissable to overfulfill plans. The author may ask: what about imbalances? Well, proportions can be maintained, for which purpose the trust must distribute the additional 90 million

rubles among all of the five types of production. It is true that in this case it will no longer be feasible to establish a marginal "norm of effectiveness," and for this reason his whole concept will collapse. So much the worse for it. The fact remains that the principal effect of capital investment is growth of output, and not the substitution of one technology for another while the output marks time, and this essential factor of economic development must absolutely be taken into account in mathematical calculations.

Thus one is bound to agree with the contention of the journal Kommunist that in economics mathematical methods are not an end in themselves, but one of the important means used in analyzing economic phenomena. The use of mathematics can yield the necessary effect only if it is based on Marxist economic theory, which draws generalizations from practice on the basis of a correct qualitative analysis of economic phenomena.

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What has been said so far does not mean, of course, that in calculations one should not resort to mathematical methods, in particular to linear programming. It is just not necessary to make linear programming the basis for price policy. The great Russian mathematician P. L. Chebyshev wrote that mathematics came into being and advanced under the influence of the basic common task of human activity: to utilize to maximum advantage the available resources. Linear programming is one of the means of achieving this end. With its aid one can solve problems for determining the best plan of freightage, a number of problems concerning the distribution of assignments to enterprises (like the above-described problem by Kantorovich with five teams and two articles), choice of the best variant for using a scarce material if the latter is needed by several production units, the choice of the best technological variants, and many other problems. All of the above constitute a fruitful field for the application of linear programming, which can yield an immense effect in the national economy.

Under socialism linear programming has a far wider field of application than under capitalism, precisely because of the specific features of this method and the problems it can help solve. Linear programming is always dealing with a set of conditions. If a given problem in linear programming is not trivial, its solution will mean that in certain cases — in individual enterprises, areas, teams, industries, etc. — the most advantageous, from their viewpoint, system of operating must be replaced by another less advantageous one, the loss thus incurred, however, being more than covered by the gains accruing from using the corresponding resources in some other place or for another purpose. Under the capitalist system a problem of this type is insoluble because it conflicts with private property interests. For instance, the capitalist will seek to supply his enterprise from the nearest source (all other conditions being equal). But if the source is the nearest one for several competitors, then instead of solving the problem from the standpoint of minimum general outlays for all enterprises, the owners will begin a savage struggle to acquire the source. Only a planned economy can distribute the use of sources of supply more rationally. This is equally evident in the problem of optimum distribution of production, etc.

The mathematical solution of these problems, however, in no way involves Kantorovich's "o. c. estimations." Moreover a mathematical solution can only help in planning, for in addition to it account has to be taken of many other more important considerations. In view of this, even mutually conflicting solutions are significant — for instance, on the distribution of crops with the best use of the land areas, or with the best use of labor, or water for irrigation, etc. All of this data must be known in planning.

The availability of talented mathematicians is not enough for the effective use of linear programming, or for planning in general: capitalist countries also have them. What is still needed is a planned socialist economy, which has at its disposal all of the necessary elements for implementing the optimum solutions arrived at, and for choosing from a number of solutions derived from different criteria of what is optimum.

Linear programming supplies accurate solutions of many such problems, which, without it, find essentially intuitive, "next-best" solutions. This "next-best— has within it the possibility of achieving vast savings. There is no doubt that substantial sums of these economies will be realized within a few years with the aid of linear programming. A number of other problems concerning optimum solutions, often very important ones, are solved by means of classical analysis, etc. But many mathematical problems arising in economic research and planning are not in general problems of optimums. Thus, in investigations dealing with relationships between consumption and accumulation, which determine the rate of growth, i.e., the relationships of basic parameters of the economy as reflected in the national economic balance, mathematical methods should be used extensively, but here there are no mathematical problems having to do with optimums. As for optimum problems, by no means all of them are solved by linear programming, for many dependencies in economics are expressed in a non-linear way.

While the mathematical methods of solving optimum problems have an immense significance, it would be a mistake to regard them as the only possible application of mathematics. It has been mentioned above that the interrelations of the elements of reproduction should be investigated by mathematical methods. Their further break-down leads to a system of balances of inter-branch ties, in the study and planning of which mathematics has a very important, though ancillary, role.

In planning our national economy, we have accumulated a wealth of experience and have worked out a number of planning principles and methods. Mathematical methods must take account of this experience, proceed from it, and advance it. It would be wrong to reduce the use of these methods in economic studies and calculations to linear programming. This would only help weaken the effort in the mathematical analysis of reproduction as a whole and of inter-branch ties; and it would bring to a dead-end important mathematical studies in the field of price formation. Meanwhile, the latter problem offers a wide field for applying mathematics. No matter how questions of price policy are decided, their formation should inevitably be based on calculations. In calculations prices interact with one another, because all expended materials, too, must be estimated. To encompass this interrelation, in which many thousands of elements (prices) are involved, is an impossible task without modern mathematical facilities and computing techniques. One has to deal here with a system comprising a huge number of equations (linear ones at first approximation only) and a great many unknown quantities. The concrete form of these equations can be established only on the basis of a definite conception of price formation, i.e., through economic theory only. Mention should also be made of the complex mathematical problems arising in the study of the reproduction of fixed capital, owing to the non-coincidence of their physical movement with the movement of their value.

Neither should one fail to mention the vast prospects for the use in economic computations of the theory of probability. These computations must take account of possible fluctuations in the structure of demand, in production itself, which depends on many factors, etc. The very notion of reserves has in essence a probable character, and therefore their exact calculation elicits a number of problems which can be solved by the methods of the theory of probability. These methods are already in widespread use for exact calculations of all types of services used by the mass of the population — transport, communal, health, etc., — and for production: maintenance, power supply, transport, etc. As production on orders expands, still more favorable conditions arise for applying these methods of calculation in the sphere of material production. There are other economic problems in the precise study of which all fields of mathematics must be applied on an increasing scale.

It should be mentioned that the use of mathematics should not be restricted to plan calculations; it should also be used in investigating the quantitative aspects of economic categories and laws. Marx used mathematics for this purpose, although he did not have planning in mind. Hence it is probably not advisable to designate the application of mathematics in economics as "the theory of plan calculations," for this would unjustifiably restrict the scope of investigations.

Mathematical analysis of economics cannot be detached from economic science because this analysis cannot be achieved separately from qualitative analysis. Mathematical investigations of economic phenomena should not be made at some point of "junction" of mathematics and economics, nor in a "no man's land" between them, where the principles of economics are no longer operative — especially the principle of partiinost — and where one may arbitrarily devise economic laws. These investigations should be carried out obligatorily as a part of economic science, within its bounds. The point of "junction" of mathematical and economical objects, to our mind, does not constitute an object for a special, third science. If quantitative analysis goes hand in hand with qualitative analysis and is based on the latter it is a part of economic science. If it is divorced from it, it is at best an analysis of the abstract quantities which form a part of mathematics, and at worst it provides the soil for the emergence of any kind of subjectivist and similar constructions which distort reality. Mathematics must be incorporated into economics, not separated from it. Mathematical analysis of the economy must become the business of the economists themselves — it should not be turned over to the so-called "econometricians," or to anybody else. To this end the economists should themselves acquire the necessary mathematical knowledge. The first steps which have been taken to intensify their training in mathematics is still inadequate. Every possible means must be used to put right the training economists specializing in the application of mathematics.

All of this is indispensable for a rapid development of the effective use of mathematics on the basis of Marxist-Leninist theory. Based on the latter, it will promote a more thorough understanding of the functioning of economic laws, exact measurement of their action, and therefore their

even more effective application in economic practice, a more rational economy, and a more efficient use of the latest techniques.

Footnotes

(1) See the review of the scientific conference on the application of mathematical methods in economic investigations and planning in Voprosy Ekonomiki, 1960, No. 8.

(2) See the journals Voprosy Ekonomiki and Planovoe Khoziaistvo for the past few years, and the pamphlet O Primenenii Matematiki v Ekonomicheskikh Issledovaniiakh i Ob Otnoshenii k Ekonometrike, Gosstatizdat, 1959.

(3) K Kritike Politicheskoi Ekonomii, Gospolitizdat, 1953, p. 41 [Russian edition; the quotation has been retranslated from the Russian – Editor].

(4) See L. V. Kantorovich, Ekonomicheskii Raschet Nailuchshego Ispol'zovaniia Resursov, Izdatel'stvo Akademii Nauk SSSR, 1959.

(5) See Kommunist, 1960, No. 15; Voprosy Ekonomiki, 1960, Nos. 8 and 11; Planovoe Khoziaistvo, 1960, No. 1.

(6) These figures correspond to the main example set forth in Kantorovich's book, op. cit., p. 29.

(7) Ibid., p. 33.

(8) Ibid., p. 33.

(9) Ibid., p. 155.

(10) Ibid., pp. 51-52.

(11) Ibid., pp. 96, 105, 111, 139, 155, and others.

(12) Ibid., p. 91.

(13) Ibid., p. 92.

(14) Ibid., p. 92

(15) Ibid., p. 29.

(16) Ibid., p. 91.

(17) Ibid., p. 296.

(18) Ibid., p. 298.

(19) Ibid., pp. 37, etc.

(20) See his article "Izmerenie Zatrat i Ikh Rezul'tatov v Sotsialisticheskom Khoziaistve," in the collection Primenenie Matematiki v Ekonomicheskikh Issledovaniiakh, Sotsekgiz, 1959; and his article "Ischislenie Zatrat v Sotsialisticheskom Khoziaistve," published in this issue of Voprosy Ekonomiki [the latter article was published in the December 1961 issue of Problems of Economics – Editor].

(21) See Primenenie Matematiki v Ekonomicheskikh Issledovaniiakh, pp. 98-99.

(22) See Voprosy Ekonomiki, 1961, No. 2, p. 93.

Soviet Agriculture

Voprosy Ekonomiki, 1961, No. 10

M. Terent'ev

PROBLEMS OF THE FURTHER DEVELOPMENT AND CONSOLIDATION OF THE COLLECTIVE FARM SYSTEM

The Communist Party has done a great deal to strengthen the collective farms organizationally and economically and to instill in the collective farm peasantry a spirit of devotion to the cause of the victory of socialism and the building of communism.

The victory of the collective farm system was due, first and foremost, to the indissoluble union of the working class and the peasantry and the constant and comprehensive assistance given to the collective farms by the state. The successful

development of socialist industry enabled the state to equip collective farm production with modern machinery and render extensive financial assistance to the collective farms.

The Communist Party and Soviet Government manifest tireless concern for the development of the collective farm system, for the organizational and economic consolidation of the collective farms, and for raising the collective farmers' material interest in developing the collective economy of the agricultural artels. Since 1953 the Party has elaborated and implemented a number of organizational and economic measures designed to raise agricultural production sharply, and to develop and consolidate the collective farm system. The first accomplishment was a big improvement in the supplying of materials and machinery to agriculture. In order to render economic assistance to the collective farms, the procurement and purchase prices for agricultural products were raised, and the obligatory deliveries of produce to the state, which were in the nature of taxes, were abolished. The management of agriculture was improved on the basis of democratic centralism. This found concrete expression in the introduction of a new system of planning agricultural production and in giving the collective farmers themselves the right to decide many questions involving charter provisions. All of these measures were designed to unleash the economic initiative of the rural workers. There has been an amalgamation of collective farms, which is of importance for a more productive utilization of machinery and other means of production, and for the specialization and concentration of production.

A great deal of work has been done to strengthen the situation of the collective farms with respect to personnel. There are a large number of specialists with higher and secondary educations, as well as machine operators, working on the collective farms today. The number of specialists with higher and specialized secondary educations has increased by almost 2.5 times since 1953; the number of tractor drivers, combine operators and truck drivers is now over 1.5 million, as compared with 163,000 in 1953. The qualifications of collective farm chairmen have risen sharply. In 1961 about 60% of all collective farm chairmen had higher and specialized secondary educations, as compared with 18% in 1953.

The reorganization of the MTS [Machine Tractor Stations] and the sale of the machinery to the collective farms contributed to the organizational and economic consolidation of the collective farms and to the development of the collective farm system.

These measures ensure a further increase of collective farm production, based on the consolidation and development of the collective economy of the collective farms, the growth of their incomes, and the raising of the collective farmers' material interest in increasing the output of farm produce. In the period 1953 to 1960 the remuneration of the collective farmers' labor approximately doubled; in a number of collective farms it is approaching the level of wages of state farm workers.

The changes that have taken place since 1953 in the collective farm economies are characterized by the figures in the table at the top of page 26.

The reduction in the number of collective farms resulted in the main from amalgamations, and partially from the reorganization of economically weak collective farms into state farms; the reduction of the land areas allotted to the collective farms was chiefly due to transfers of land to the state farms which were established where collective farms had existed previously. At the same time the indivisible funds of the collective farms have increased (the reappraisal of their cattle taken into account) almost three times, and their gross output has grown considerably in volume. The growth of commodity output, the increase in purchase prices and the abolition of payments in kind after the MTS reorganization have resulted in a nearly three-fold increase in the cash incomes of collective farms. The collective farms have acquired a vast quantity of tractors, combines, trucks and other farm machinery. All this has served as a material prerequisite for the further development of the collective farm system.

The collective farm is now, as a rule, a large-scale economic enterprise equipped with modern machinery. Here are some average indices for the collective farms:

	1953	1960	1960 in % of 1953
Farm land (thousand hectares)	4.1	6.6	161
including arable land	1.8	3.0	167
Indivisible funds (thousand rubles)	76.6	449.4	times
Gross output in invariable prices (thousand rubles)	164.9	492.4	299
Cash incomes (thousand rubles)	54.4	303.2	5.6 times
Tractors (15 h.p. units)	0.02*	23.9	—
Combines (physical units)	—	6.1	—
Trucks	1.8*	9.5	5.3 times

* Not including the MTS machines.

	1953	1960	1960 in % of 1953
Number of collective farms (thousands)	91.2	43.9	48.1
Area of farm land allotted to them (million hectares)	375.9	287.8	76.6
including arable land	159.8	133.2	83.3
Indivisible funds (million rubles)	6,984	19,729	282.4
Cash incomes (million rubles)	4,964	13,313	268.1
Gross output in comparable prices (million rubles)	15,040	21,763	144.7
Gross output calculated per 100 hectares of arable land (thousand rubles)	9.4	16.3	172.3
Tractors (at the end of year, in thousands):			
physical units	1.8	620.8	345 times
15 h.p.	2.0	1,050.4	525 times
Grain harvester combines (thousands)	—	266.8	—
Trucks (thousands)	165.1	416.1	252.0
Commonly owned livestock (as of January 1 of the corresponding year, in millions):			
Cattle	27.8	36.3	—
including cows	8.7	12.8	—
Pigs	13.6	27.4	—
Sheep and goats	77.9	72.4	—
Poultry	71.0	78.7	—

In 1960 there was a considerable increase of farm produce output and of livestock in the collective farms per 100 hectares of farm land, as indicated by the following data (in % of 1953):

Gross output in terms of value	146
Meat production	156
Milk production	247
Production of eggs (per 100 hectares of sown grain crops)	147
Head of cows	200
Head of sheep and goats	126
Head of pigs (per 100 hectares of arable land)	241

The successful development of the collective farms' collective economy was made possible by the considerable assistance rendered by the state in supplying them with modern equipment and skilled personnel.

The socialist transformations in the countryside and the provision of farm enterprises with modern machinery resulted in a sharp increase in farm produce output in the country, particularly after 1953. This may be seen from the table at the top of page 27.

However the tasks involved in the building of communism and the gradual transition to communist social relationships calls for still higher rates of agricultural development, especially during the next decade.

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The form of collective farming, which provides the possibility of combining correctly the social and personal interests of the collective farm peasantry, is of great importance for the consolidation and development of the collective farm system. The agricultural artel has been, and remains, the most progressive form of collective farming. The Model Charter of the Artel provides for the socialization of the basic means of production, collective management of the farm, and distribution of the essential product among the collective farmers according to the quantity, quality and results of the labor they have put into social production. At the same time the members of the collective farm have the right to a personal plot and a certain number of cattle and poultry. The personal subsidiary

	1913	1953	1960	1960 in % of: 1913	1953
Sown areas (million hectares)	118	157	203	172	129
Gross output (million tons):					
Grain	86.0	82.5	133.2	158	161
Potatoes	31.9	72.6	84.0	263	116
Sugar beet	11.3	23.2	56.9	503	245
Raw cotton	0.74	3.8	4.3	577	111
Meat	5.0	5.8	8.7	174	150
Milk	29.4	36.5	61.5	209	168
Eggs (in billions)	11.9	16.1	26.4	222	164

husbandries of the collective farmers still play an important role as an additional object for the application of their labor and as a source of income. The state is also interested in the output of farm produce by the collective farmers in their personal subsidiary husbandries. There was a time when the agricultural commodities (especially livestock produce) received by the state from the collective farmers amounted to a large share of the total. But even now, despite the significant increase of the marketable output of collective and state farms, many collective farmers, along with satisfying their own needs in, for instance, milk, poultry produce, potatoes, vegetables and fruit, sell a certain amount of these products to the state and on the collective farm markets.

The need for personal subsidiary husbandries declines as the state's needs in farm products are more completely met from collective and state farm production, as the needs of the collective farmers are more fully satisfied from the collective economies of the agricultural artels, and as the collective farmers receive stable and high incomes from the labor they put into their artel economies. The production of farm produce will be fully socialized, and this will serve as the decisive prerequisite for the merging of collective farm property with the public property of the whole nation. At present, when not all of the collective farms are able to fully satisfy the needs of their members in such foodstuffs as meat, milk, potatoes, vegetables and fruit, haste in curtailing the collective farmers' personal subsidiary husbandries, provided that their size does not exceed the limit specified in the charter, would have an adverse effect on the collective farm system and the state as a whole.

The existence of the collective farmers' personal subsidiary husbandries is due to the insufficient development of social production on the collective farms. Once it reaches a higher level of development the collective farmers will voluntarily relinquish their personal subsidiary husbandries; they will economically eliminate themselves.

The Draft Party Program provides for the solution, on the basis of a mighty development of productive forces, of two major and closely connected tasks in the field of agriculture — to achieve an abundance of high-quality foodstuffs for the population and raw materials for industry; and to ensure the gradual transition to communist social relations in the countryside and to wipe out in the main the differences between the town and countryside. At the same time the further advance of the countryside to communism will proceed by way of the development and improvement of both forms of socialist farming -- the collective and the state farms. This program definition of the prospects for the development of agriculture for the period of building the communist society is of great theoretical and practical importance. The development of production and the perfection of the relations of production are being carried out in dialectical unity.

Expanded reproduction is a unified process of production, distribution and consumption. The production of material wealth plays the determining role in this process. Distribution, circulation and consumption depend on production, but they, in turn, have an active influence upon it. As V. I. Lenin pointed out: "...Distribution is a method, a tool, a means for raising production." (1) The Draft Party Program defines the unity of the process of development of production and the perfection of the relations of production as follows: "The economic basis for the development of the collective and state farms is the steady growth and most effective use of their productive forces, improvement of production organization and management

methods, a steady rise of labor productivity, and strict adherence to the principle: higher pay for better work and better results. On this basis the collective and state farms will, to a steadily increasing degree, become enterprises of the communist type in terms of their relations of production, the nature of their labor, and the level of the toilers' well-being and culture." This means that for the further development of the collective farm system it is essential to develop collective farm production to the utmost and to strictly adhere to the principle: higher pay for better work and better results.

Experience indicates that deviation from this Leninist principle and violation of the principle of material incentive retards the development of production. We know that the collective farms have achieved a further increase in output and a rise in labor productivity in the past two years. However the remuneration of the collective farmers' labor has in some areas remained at the 1957-1958 level, and in some places it was even reduced. In a number of cases this was primarily due to a violation of the Party's demand that the Leninist principle of stimulating material incentive in increasing output be adhered to strictly.

Let us take the Lithuanian SSR as an example. The collective farms of this Republic have substantially increased their gross output in recent years. Their cash incomes have risen sharply, and labor productivity has gone up. But the remuneration of the collective farmers' labor has fallen during the same period. This is born out by the following data available on collective farms, as of the end of the respective years (in % of 1957):

	1959	1960
Labor productivity	134.5	139.7
Pay for labor in kind and in cash per one man-day	100.0	91.7

It is clear from this data that the principle of personal material incentive has been violated in the collective farms of the Lithuanian SSR. Though labor productivity went up, the pay received by the collective farmers for their labor went down. Apparently the diminished material interest of the collective farmers in increasing output is one of the chief causes for the Republic lagging behind in the output of farm produce. The gross output of the Republic's collective farms is 16,900 rubles worth of produce per 100 hectares of arable land; they get 17.7 centners of milk per 100 hectares of farm land; the crop yields are still low here, and production costs are high.

The collective farms of the Estonian SSR, which work under about the same natural and economic conditions as do those of the Lithuanian SSR, produce 27,600 rubles worth of products per 100 hectares of arable land and get 248 centners of milk per 100 hectares of farm land; the crop yields in these collective farms are approximately twice those obtained in the Lithuanian SSR. The higher production level and the successful fulfillment of the Seven-Year Plan assignments as regards gross and marketable output by the collective farms of the Estonian SSR are primarily due, in our opinion, to the fact that here the principle of material incentive for the collective farmers is adhered to in the distribution of the gross income. This is apparent from the following data (in % of 1957):

	1959	1960
Allotments to social funds	185.6	146.2
Productivity of labor	133.0	156.0
Pay for labor in kind and cash per one man-day	129.7	131.6

As the table indicates, the collective farms of the Estonian SSR have sharply increased the allotments to indivisible funds, and, at the same time, substantially increased the collective farmers' remuneration for labor, on the basis of the growth of labor productivity. The collective farmers actually feel the results of their efforts and therefore strive to increase the output of farm produce and raise labor productivity.

In distributing the gross income in the collective farms due consideration should be given to combining correctly the collective farmers' social and personal interests. In order to do this it is essential that the accumulation funds in the collective farms increase at a faster rate than the funds to be distributed for labor, otherwise the successful development of social production in the collective farms and the creation of the material and technical base of communism would be unthinkable. But at the same time a certain share of the additionally created gross income must be allotted to raising the remuneration of the collective farmers' labor. If output increases, the collective farms' gross incomes grow, labor productivity rises and production costs go down, but the remuneration of the farmers' labor remains on the same, often low, level and sometimes even declines, then the

collective farm system and the cause of building communism are damaged.

It seems to us that in proceeding from this faulty practice the wrong conclusion is sometimes drawn, to the effect that some collective farms are allegedly incapable of increasing production and creating the economic conditions for giving their members a material incentive in increasing the output of farm produce. This serves as the basis for choosing the only way of raising farm production in such collective farms -- that of reorganizing them into state farms. Such a point of view is profoundly wrong; it leads to a weakening of the collective farm system, creates uncertainty among the collective farmers as to the possibility of developing their collective economy.

The principle stated in our Draft Party Program to the effect that the further progress of the countryside to communism will occur by way of the development and perfection of both forms of socialist farming — the collective and the state farms -- is of great importance to the future of the collective farm system; that is why it met the approval of the collective farm peasantry.

The subsequent development of the collective farm system depends primarily upon the growth of production based on advanced technology and science, upon introducing advanced technology in all of the branches of collective farm production, and upon organizing labor scientifically and raising its productivity. At the same time, when distributing the incomes, the principle of the correct combining of accumulation and consumption must be observed. Colllective farms cannot develop without a steady expansion of their production, insurance, cultural and communal service funds. At the same time it should be an obligatory condition for each collective farm to increase the collective farmers' incomes from the collective economy and to raise their living standards in accordance with the growth of labor productivity.

We consider that in order to realize this most important principle it is necessary to introduce some essential correctives into the existing practice of distributing the social product created in the collective farms between the latter and the state, as well as within the collective farms. The correct solution of this problem is of great importance for the building of communism and for speeding up the process of merging collective farm property with national public property. The forms and system of distributing the incomes of the collective farms which arose earlier were determined by the condition of the national economy and the agricultural artels. As the productive forces of the country and the collective economies of the collective farms developed, important changes were made in the forms and system of distribution of collective farm incomes. It seems to us, however, that a good deal in this area has become obsolete and is retarding the development of collective farm production.

The collective farms — as socialist agricultural enterprises — are an integral part of the national economy; they make their contribution to the national accumulation of our country's wealth. This contribution will steadily grow. A certain portion of the net income created in the collective farms is put at the disposal of the state through the system of income taxes and purchase prices. At the same time, the collective farms, carrying on production on a full cost-accounting basis, must allocate from their social incomes the necessary means for ensuring expanded reproduction and for remunerating the collective farmers' labor on a scale which will raise their material interest in increasing the output of farm produce.

We must adhere strictly to correct proportions in our planned socialist economy, which also applies to the distribution of the gross income created in the collective farms. In practice, however, this requirement of the law of planned, proportional development is frequently violated. The actual system of withdrawing a part of the income created in the collective farms through the system of income taxes and purchase prices has serious defects. First, when a share of the collective farm income is taken for the state's use, the necessity of correctly redistributing their additional incomes in the form of differential rent is not fully considered. Science and practice have established that high crop yields can be obtained in all areas of our country with different outlays of labor and means. Thus in many collective and state farms of the Krasnodar Territory, and in a number of other areas with high natural soil fertility, the grain crop yield reaches 25 to 30 centners per hectare, and without any agricultural improvements. Such high grain yields are obtained by advanced collective and state farms in the non-black-earth zone, but with higher material outlays on soil drainage, and applying chalk and mineral and organic fertilizers. This is the reason for the higher production costs of the produce both in field crop and animal husbandry. However income tax rates and state purchase prices are not differentiated enough. That is why in some areas of the country, and sometimes even in the same area, the collective farms which farm lands with high natural fertility get high incomes, while those which work soil with lower natural fertility get lower incomes.

There are several means, in our opinion, of achieving an economic levelling of the incomes of

collective farms and farmers who are working under different natural conditions. First of all fundamental changes should be made in the system of collecting the income taxes from collective farms, and there should be greater differentiation of state purchase prices for farm produce, so that the income tax collected from the collective farm is a share of net income and the purchase prices cover the socially necessary zonal outlays of the collective farms for production and allow them to accumulate funds for the development of production. With this aim in view a progressive income tax should be applied to the net incomes of the collective farms, and purchase prices (especially for meat and milk) should be established so as to cover production outlays that are normal in terms of modern production technology. There is still another way of levelling the incomes of collective farms and their members in the various areas of the country. As the material resources at the disposal of the state grow, it will probably be quite expedient to begin a fundamental improvement in the next few years of the farm lands of collective and state farms on a nation-wide scale, employing the labor and means of special organizations and, perhaps, the financial and labor participation of the collective farms. Practical experience has demonstrated that the carrying out, for instance, of land improvement by ordinary economic means leads to the dissipation of efforts and resources and does not produce the appropriate result.

As the supply of materials and equipment to agriculture improves and the output of marketable produce in the collective farms increases, the economic ties between the state and the collective farms will steadily expand. Given the fact that these ties will develop for a long period of time on the basis of commodity relations (sales and purchases) controlled by national plans, particularly great attention should be given to the problem of prices. In our socialist economy prices are a major instrument of planning in the hands of the state. It is by regulating the prices of farm produce and of the industrial commodities purchased by the collective farms (with due consideration of their production costs) that a normal exchange between town and countryside must be maintained. A one-sided raising or lowering of prices without due economic substantiation weakens production and disturbs economic activity.

An important role in the further development of the collective farm system is to be played by state credits for the collective farms' social production. There cannot be any growth and consolidation of the collective farms' material and technical base without the state's financial aid, without long-term credits. The collective farms must in the next few years complete the comprehensive mechanization of agricultural production, carry out large-scale construction of premises for animal husbandry and other production, cultural and communal-service buildings. All this will require large capital investments by the collective farms. The cash accumulations of collective farms in their accounts in the State Bank, which will increase from year to year, will be the main source of covering the means for long-term crediting.

We are of the opinion that improvements must also be made in the system of short-term crediting, so as to provide for the gradual transition to direct crediting of collective farms by the bank, including credits for labor remuneration.

Serious improvements are required in the existing system of income distribution in the collective farms. The gross output created in the collective farms is allocated to the compensation fund, the accumulation fund and the consumption fund. The compensation fund is always determined by the size of the actual outlays. Therefore, the smaller the material outlays the lower their share of the gross output, and consequently, more funds may be allotted to the accumulation and consumption funds. The system for building up the accumulation fund (state outlays being deducted) is regulated by the Model Charter of the agricultural artel and the corresponding recommendations to collective farms by the responsible bodies. The Charter provides that the collective farms must annually allocate a certain percentage of their cash incomes to replenish their indivisible funds and circulating capital. Actually the collective farms not only allocate a certain portion of their cash income annually for these purposes, but also the produce of their own production in the form of the increment of cattle and poultry, increased stocks of seeds and feeds, etc. Consequently the system of regulating assignments to the indivisible funds, as established by the Model Charter, has grown obsolete. Making use of their rights, the collective farms are reviewing the Charter and where necessary, are making changes in it. But this is not enough. The time has come for a fundamental change in the system by which the accumulation fund is created.

First of all, assignments to indivisible funds, as well as the replenishment of circulating capital, should, in our opinion, be calculated as a percentage not of the cash incomes, but of the entire gross income in cash terms. Moreover the size of allocations from gross income to the accumulation fund should be determined by the requirements of the development of collective production and cultural and communal-service construction. In doing this, however, the need for strengthening the

principle of personal material incentive of the collective farmers must be kept in mind.

The consumption fund of a collective farm should increase mainly through higher labor productivity and lower production costs. It should be taken into account that the consumption fund includes, besides wages, expenditures for public needs: maintenance of boarding schools, free education, old age pensions for collective farmers, maintenance of kindergartens and nurseries, bonuses, etc. Social consumption will be growing from year to year as the accumulations in the collective farms increase. This will be an important factor in raising the material and cultural level of the collective farm peasantry. But for the next few years the basic incomes of the collective farmers from their collective economies will be tied to distribution according to labor. The more labor the collective farmer puts into the collective economy and the better the results of this labor, the more income he will receive. So the point is to create in the collective farms a stable fund of distribution according to labor, to adhere strictly to the monthly advances, to move gradually towards guaranteed monthly wages, and to apply extensively progressive forms of supplementary pay for the best results of work.

Today the socialist principle of equal pay for equal work is applied within the framework of each individual collective farm. Subsequently this principle will become universal for the entire collective farm system due to the levelling of the economic conditions of collective farm production. All types of social maintenance (pensions, paid vacations, etc.) enjoyed by industrial and office workers are extended to collective farmers as well through collective farm and state funds.

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The Draft Party Program has indicated the ways for a rise of productive forces unprecedented in the history of human society, and for the transition to communist social relations. Realization of this Program will lead to an elimination of the differences between town and countryside. Farm labor, provided with the most advanced machinery, will become a variety of industrial labor; fundamental changes will take place in the cultural appearance of the countryside; the rural population will be on a par with the urban population in terms of cultural and living conditions.

As the social wealth of the collective farms increases and state financial aid grows, the collective farms will develop on an increasing scale the construction of production and housing facilities, increase the network of schools, hospitals, clubs and libraries, create public dining facilities, children's institutions, etc. We are of the opinion that the time has come to pass over to industrial building methods in the countryside. Following the example of the "Tselinstroy," a construction industry should be gradually established in the countryside, and the supply of building materials to collective farms should be provided for in the national economic plans. This will make it possible to construct, in a short period, the material and technical base necessary for a sharp upsurge of agriculture and for altering the appearance of the countryside.

The progress of social relations in the collective and state farms will be attended by the gradual formation of agrarian-industrial associations (as economic need for them arises), in which agriculture will be organically combined with the industrial processing of its produce. This will bring collective farm property closer to national public property, help raise the level of socialization of production and the molding of a new type of agricultural enterprise.

Footnote

(1) V. I. Lenin, Soch., Vol. 32, p. 425.

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A. Voronin

COMBINING AGRICULTURAL AND INDUSTRIAL PRODUCTION IN THE COUNTRYSIDE

The socialist economic system is characterized by a new type of social relations between the town and countryside. The forms of production ties between industry and agriculture which developed under socialism necessitate a harmonious, coordinated development of these two paramount branches

of the national economy. The tendency to combine industry and agriculture is, in our view, a legitimate process reflecting the development of new forms of the social division of labor between industry and agriculture on the basis of public ownership of the means of production.

A different trend is characteristic of capitalism. The process of capitalist socialization of production steadily widens the gap between industry and agriculture, with the result that the part played by agricultural production under capitalism is gradually reduced to the fulfillment of purely biological processes. The function of agriculture is reduced in the main to the production of agricultural raw materials. A particularly good example of this is the United States, where, with large-scale centralized finance capital and a limited and consequently expensive labor force in farming, the process of the social division of labor between industry and agriculture proceeds by way of a profound and complete separation of industry from agriculture.

The growing alienation of industry from agriculture under capitalism constitutes one of the foundations for the growing contrast between town and countryside, for the increasing exploitation of the countryside by the town. "Capitalism," wrote V. I. Lenin, "finally snaps the bond between agriculture and industry; but, at the same time, by its high degree of development it prepares new elements for this bond, for a union between industry and agriculture based on the conscious application of science and a combination of collective labor, and on a redistribution of humanity (with the destruction of both rural neglect, isolation and barbarism, and the unnatural concentration of vast masses of people in big cities)." (1)

A fusion of industry and agriculture is the highest form of social combination of production, which arises in the course of socialist socialization on the basis of public ownership of the means of production.

The tendency to combine, to organically integrate industry with farming arises out of the very character of the production relations between town and countryside, industry and agriculture, in the course of building communism. "The different stages in the development of the division of labor," Marx and Engels wrote, "are at the same time different forms of ownership, that is, each stage of the division of labor determines also the relation of individuals to one another in accordance with their relation to the materials, instruments and products of labor." (2)

To integrate industry with agriculture does not mean universalizing the branches; what is involved is their organic cooperation, their combination on the basis of a profound specialization of production. It not only does not preclude, on the contrary, it envisages the utmost development of specialization as one of the economic means of doing away with the vestiges of the old social division of labor. The combination of industrial production and agriculture is a specific form of socialization of labor, a specific unity of diverse types of production arising out of definite changes in the system of the social division of labor. It is the highest form of cooperation, characterized by closer ties of a technical and economic nature; it means not only an expansion of the socialization of labor but also a qualitatively different kind of socialization as such, and the establishment of direct cooperation, direct contact between the various specialized types of production.

The development of collective farm production and its gradual transformation into a variety of industrial production requires that agricultural production be closely coordinated technically and economically with various types of industrial activity. The emergence and expansion, when economically expedient, of industrial enterprises and branches catering to the needs of agricultural production in the collective farm sector is made necessary for a number of economic reasons. It is called for, in particular, by the need to more rationally utilize the labor resources on the collective farms in order to raise substantially the annual labor productivity of collective farmers, to further reduce the seasonal character of labor outlays and the use of machinery in connection with the growing farm specialization, and to meet the collective farms' rapidly mounting requirements for industrial products and services. The projected development of industrial production in the collective farm sector is also made necessary by the need to exploit the rich local resources and to use on a wider scale industrial waste materials to meet agricultural needs. It is also closely linked with the need to further increase the marketability of the collective economy of the collective farms and with essential structural changes in the nature of the agricultural materials produced. As a result of the growing intensification of agricultural production and the development of animal husbandry, vegetable growing and horticulture, an increasing share of the farm produce is now accounted for by the highly marketable perishable goods, which are difficult to transport (milk, meat, vegetables, fruit, etc.) and have to be processed on the spot. Finally, the development of industrial enterprises and branches in the collective farm sector is also called for by the general task of raising the well-being of the village, of transforming the countryside economically and culturally into agrarian-industrial settlements of an urban type.

"As the collective and state farms develop," the new Draft Party Program points out, "their production ties with each other and with local industrial enterprises will grow stronger, and the practice of joint organization of various types of production will expand. This will ensure a fuller and more uniform use of the labor force and production resources throughout the year, raise the productivity of social labor and enhance the living and cultural standards of the population."

Technical progress and higher labor productivity in agriculture lead to an absolute drop in manpower requirements for agricultural production proper. This is an objective law of technical development in agriculture.

By virtue of the specific character of the organization of labor and production on the collective farms, and absolute reduction of the need for manpower employed directly in agricultural branches does not bring about a corresponding reduction in the number of able-bodied members of the particular collective farm. "The collective farms," N. S. Khrushchev said in September of 1959, "are large-scale cooperative farms formed through the voluntary amalgamation of peasant households. Therefore the people employed in a given farm are not the minimum necessary to cope with the cultivation of the soil, to attend to the crops and breed livestock and poultry, but the number of workers in the particular cooperative. For it is impossible to permit a situation whereby one section of the cooperative's membership works while the other is deprived of the right to work."

The existence of substantial labor resources on the collective farms is indicated by a multitude of data, in particular from the data on land area per able-bodied person. At present the national average of power supply per 100 hectares of crops on the collective farms and RTS [machine repair stations] is roughly the same as on the state farms — about 70 h.p. But for every able-bodied person on a collective farm there are, on average, 7 or 8 hectares of arable land and from 12 to 15 hectares of agricultural land, while on the state farms the figures are 15 or 16 hectares of arable land and 40 to 42 hectares of agricultural land. The power supply per manpower unit amounts to 4.4 h.p. on the collective farms and 9.5 h.p. on the state farms. Thus the collective farms possess twice the amount of manpower per unit of power and land area than the state farms, while gross output per worker on the collective farms is half of that on the state farms.

In 1958 each able-bodied collective farmer worked an average of 214 man-days, that is, substantially fewer workdays than the number worked in the state enterprises. Rough estimates show that each year from December to February some ten million able-bodied persons on the collective farms are not utilized. The collective farms not only have surplus labor during the winter; they also have it in the period of intense field work. According to balance estimates, the provision of labor resources for the collective farms during the period of intense field work, with the existing level of mechanization of labor, was 107% for the country as a whole in 1958. With the introduction of comprehensive mechanization, the labor required can be reduced by 2.5 times as compared with the existing level.

The existence of surplus labor in a number of collective farms has an adverse effect on labor discipline in the collective farms, on the introduction of progressive work quotas and rates to conform with the present technical standards. In these collective farms the growth of labor productivity is being artificially retarded, anti-mechanization tendencies emerge, and there can be observed an inclination to inflate administrative and managerial staffs, squander workdays, etc.

According to our calculations, the Seven-Year Plan target of roughly doubling labor productivity on the collective farms will release at least 15% of the able-bodied collective farm production. The raising of labor productivity is closely connected with further specialization of agricultural production on the collective farms. Specialization of farming and higher labor productivity accelerate the process of releasing manpower from the agricultural branches and simultaneously intensify the seasonal character of labor outlays and machinery utilization.

The introduction of comprehensive mechanization and automation and further specialization of agricultural production require the productive use of the manpower released on the collective farms and elimination of the seasonal character of agricultural work. Among the measures intended to solve this major national economic problem, one which, in our view, has great significance is extensive development of enterprises of an industrial type, such as collective farm and, especially, inter-collective farm and mixed collective-state undertakings. The divergence between the period of production and the work period, wrote Marx, "is the natural basis for the combination of agriculture with subsidiary rural industries..." (3)

With the present level of mechanization of labor and the development of the productive forces in the countryside there is a surplus of labor resources, chiefly as compared with actual requirements for labor employed directly in farming, although for the time being only in the more

mechanized branches. But, as we know, production on the collective farms includes not only the agricultural branches but also a number of servicing branches involving non-agricultural production. The possibilities for using manpower in these branches increases with the development of collective farm production.

Technical progress and the increased concentration and specialization of agriculture, while releasing labor from the agricultural branches of production, broaden opportunities for the use of labor on the land, make it possible to utilize more fully the manpower reserves in a number of service, non-agricultural branches of an industrial type, in construction and capital repairs, in subsidiary enterprises and industries, as well as to use manpower on a wider scale in the non-productive sphere of cultural and communal services.

In 1959 78.2% of the able-bodied labor force on the collective farms was employed in crop growing on the collective farms and 12.6% in animal husbandry. The manpower employed in crop growing and animal husbandry declined from 94.3% in 1954 to 90.8% in 1959. The share of the labor force in the non-agricultural branches (in subsidiary enterprises and workshops, construction, motor transport and in the non-productive sphere) increased correspondingly from 5.7 to 9.2%.

The data from the annual account of the collective farms indicates that as a result of more intensive specialization of agricultural production the proportions in the branch division of labor are changing in favor of the more intensive branches of production, such as animal husbandry. In the period from 1953 to 1959 the outlays of labor in crop growing have dropped from 51.3 to 48% of the total outlays of work-days in the collective economy, while in animal husbandry it went up from 28.7 to 33.2%. The share of the outlays of labor in the non-agricultural branches of collective farm production totalled 19.8% in 1959, including 1.7% in the subsidiary enterprises and industries, 5.3% on capital construction and capital repairs, 4.2% in the servicing branches and 0.8% on work performed in the cultural and communal service institutions of the collective farms.

Fuller use of manpower in the non-agricultural branches of the collective farms is accompanied by further specialization of labor in these branches. In 1954, for example, 94.6% of the outlay of labor for capital construction went into construction and capital repairs of buildings and structures, and only 5.4% for the production and capital repair of machinery, equipment and implements, for building irrigation and land improvement facilities, for laying out orchards, berry fields, road construction, bridges, means of communication, etc. By 1959 the structure of labor outlays in this area had changed substantially. The outlays of labor in construction and for capital repair of buildings and structures dropped to 66.2% during the period and increased to 33.8% for other kinds of work.

The growth of concentration and the technical capabilities of the collective farm means of production, which determine the optimum level of manpower requirements for agricultural production proper, predetermine the scale of development of the other non-agricultural branches, especially the industrial ones, and make it both possible and necessary to utilize the surplus labor on the collective farms in these branches. "If these people, forced out of farming, are not to be left without work or obliged to crowd into the towns," Engels wrote, "they should be employed in industrial occupations in their own villages, and this can be done with profit for them only on a large scale." (4)

Modern large-scale collective farm production makes a varied and constantly increasing demand on industrial goods and services. At present this demand cannot be fully met by state industry alone. Besides, all large enterprise, including the agricultural ones, find it profitable from a technical and economic point of view to have their own power resources, transport means, construction enterprises, enterprises for processing farm produce, repair shops and so forth. The consolidation of economies during the concentration, centralization and coordination of collective farm production requires the establishment and development of many subsidiary enterprises and industries.

The technical and economic requirements for large-scale farming necessitate the development of industrial production in the rural areas, and the available natural, industrial and labor resources provide all of conditions for it.

Our experience indicates that the combining of agricultural and industrial production in a single unified process, which is required first of all by the needs of agricultural production itself, has an objective economic likelihood of development.

The industrial branches in the collective farm sector are steadily developing. In 1958 the fixed capital of the industries on the collective farms amounted to about one billion rubles. Its volume rose in the period from 1950 to 1958 by 80% in comparable prices. Some two million people, the majority with suitable qualifications, are employed in collective farm industry. The proportion of capital investments for the development of the subsidiary collective farm branches is growing. It exceeds, on the whole, one-third of total investments. The farms' outlays of labor are increasing, as is their

consumption of electric power; cash income from subsidiary enterprises and industries is growing, and they are acquiring increasing economic significance in the economic activity of the collective farms.

The conception of the "gross output" of the collective farms is gradually acquiring new meaning in connection with the emergence and development of a new branch of the social division of labor in the countryside -- collective farm industry. The concept "subsidiary enterprises" does not reflect the part played by the industrial-type enterprises in the collective farm economy. For instance, the construction branches, the motor transport economy, and the repair and technical facilities are being transformed increasingly from subsidiary into economically indispensable branches of the collective farm economy.

It follows that we are not speaking of small domestic industries, but of quite large and medium-size enterprises of local industry, established mainly through the combined effort of large collective farm groups on a collective farm-state basis.

Amalgamation of collective farms and the development of inter-collective farm and collective farm-state cooperation lead to an increase in the average size of industries, to their organization on an improved technical basis. At present there are more than 3,000 different inter-collective farm associations, of which approximately 80% are associations of an industrial type: inter-collective farm enterprises for producing building materials, for the primary processing of farm products and the production of concentrated feeds, litter peat enterprises, inter-collective farm construction organizations, power stations, repair workshops and so on.

Various groups of industrial enterprises have been developed in the collective farm sector which might conditionally be divided into auxiliary, servicing, processing and subsidiary enterprises.

One could cite many examples of the development of industrial enterprises on the collective farms. In the Crimean Region, for instance, 167 collective farms built with the assistance of state organizations and certain enterprises of the economic council, which provided the necessary equipment, an inter-collective farm cement plant near Bakhchisarai in 1958 and 1959, investing three million rubles in the undertaking. The annual capacity of the furnaces and equipment of the first section amounts to 140,000 tons of cement of the "400-500" grade. In the Chernigov Region construction is underway on an inter-collective farm cement plant with a capacity of 50,000 tons a year. The plan is to construct at the plant a large enterprise for the production of roofing materials. The estimated cost of the plant is 1,500,000 rubles. It is being built with the participation of 715 collective farms of the Region, each, on average, contributing 2,100 rubles. The Voronezh Regional Inter-Collective Farm Construction Organization has planned for construction in the next five years a silicate brick plant with a capacity of 30 million bricks per year, a cement plant with a capacity of 20,000 tons, two quarries to supply 80,000 cu. m. of stone, a wood working plant to process 10,000 cu. m. of timber, and three lime works with a capacity of 30,000 tons a year.

The experience gained in collective farm construction shows that collective farm co-operative ownership is not only a basis for the development of farming, but also for those types of collective farm industrial activity which, in their technological and economic aspects, are organically bound up with agricultural production.

In some areas of the country the combining of agricultural and industrial production is assuming ever wider scope. In the Kaushansk Area of the Moldavian SSR, for example, a general meeting of collective farm representatives decided to set up an area inter-collective farm union which will include the following: an inter-collective farm construction organization, which will bring together a construction and assembly department and enterprises to produce building materials; an inter-collective farm machinery repair workshop; an industrial combine (an oil mill, a mixed feed mill, bakeries, shops for primary processing of vegetables, fruit, grapes and other agricultural products); an inter-collective farm department for road building; service enterprises for collective farmers (shops for sewing and repairing clothes and footwear, laundries, hairdressing and barber shops, bathhouses, etc.); organizations for the material and technical supply of the collective farms; inter-collective farm stations for artificial fertilization of livestock; antibiotics production shops; incubator stations for poultry raising; an area school on advanced techniques and the training of personnel in general skills; a polyclinic; a young Pioneer camp; a holiday home, and an area inter-collective farm mutual aid fund.

This complex, which organically combines production, supply and sales functions, agricultural and industrial activities with the non-productive, cultural and everyday services, is a combination in which collective farm production is no longer, as a type, only agricultural production. It characterizes a qualitatively new stage in improving the internal economic structure of the collective farm type of production. Agricultural production, which determines the main content of collective farm activity, is organically combined with its supplementary

industrial branches.

In terms of developing the collective farm system of ownership, the unification of industrial and agricultural production, requiring, as a rule, the combined efforts of the collective farms, is a further step in advancing cooperative-collective farm property to the level of national public property.

It would of course be wrong to suppose that industrial development in the collective farm-cooperative sector does not have any economically rational limits, that within the framework of collective farm ownership any and all branches of industry can be developed, and that in this there is economic necessity. Such a conclusion would be fundamentally wrong and would conflict with the elementary conception of the objective process of greater social division of labor and increased specialization of production. Needless to say, the development of non-agricultural branches on the collective farms, especially industrial branches, has its rational limits, determined first of all by the technical and economic requirements for developing agricultural production on a large, highly mechanized farm.

There is no doubt that those non-agricultural branches which have no direct technological association with agricultural production, and which do or may have entirely independent significance in relation to it, are not, and cannot be, developed at all extensively in the collective farm sector of production. For instance, the development on a collective farm basis of branches such as electric power, the manufacture of building materials, etc., is, to some extent, a temporary phenomenon. It resulted from the fact that large-scale state industry cannot as yet fully meet the rapidly growing requirements of the collective farms for industrial goods from these branches.

When discussing the rational limits of developing collective farm industrial branches, it should be emphasized that these limits cannot be invariable. They change and are bound to change with the development of collective farm production, large-scale industry and agriculture, with a greater social division of labor between them, and the further specialization of production. In collective farm production, as in the national economy as a whole, growth of the social division of labor and its specialization results in the further detachment of industrial production functions performed in agriculture into independent branches of industrial production. Some examples of this are the elevator processing of threshed grain, the organization of repair work, the manufacture of building materials and so on. Specialization of branches, in turn, necessitates the combining of technologically related types of industrial and agricultural production. The two tendencies inter-twine.

It seems to us that, from the point of view of organically combining agricultural and industrial production into a single process, the greatest promise lies in developing those branches connected with the storage and processing of perishable agricultural produce which is unsuitable for transportation, the manufacture of concentrated feeds, small implements, packages, horse-drawn carting vehicles and similar items essential for reproduction in crop growing and animal husbandry. The question of further developing the processing industry in the countryside, which is now developing very slowly, is especially acute. As a consequence of this situation, the collective farms annually lose as a consequence of this situation, large quantities of farm produce. In 1958, for instance, some 17% of the vegetables produced on the collective farms and about 13% of the melons grown were used as fodder. In some republics, for example, Byelorussia, Estonia and Turkmenia, 22 to 24% of the total vegetable crop was used to feed livestock.

The plan for the 1959-1965 period provides that the collective farms, state farms and consumer cooperatives will build enterprises which will make vegetable and fruit canned goods, bake bread, put out sausage products, semi-finished meat products, butter, cheese and other foodstuffs. It is suggested that these enterprises should be established on an inter-collective farm basis so that modern equipment and technology can be employed.

Industrial processing of farm produce should be the natural completion of their biological production.

Experience has shown that excessive concentration of the processing industry, especially the building of large meat combines, equipped with the latest machinery but a long way from raw material sources, entails large outlays for transportation which often exceed the entire saving made from amalgamations. In driving cattle hundreds and thousands of kilometers for slaughter the animals lose weight, transportation outlays grow, and the result is that society loses millions of rubles.

The establishment of processing industry in the localities, dispersing it and bringing it close to the sources of raw materials is, in our opinion, made necessary by the changes in the very nature of the agricultural raw material, on the one hand, and by the development of processing techniques, on the other. With improved farming, such intensive branches as animal husbandry, vegetable growing and horticulture are developing rapidly, which means a greater proportion of perishable items which are difficult to transport. There is a definite

relationship between the processing and production of agricultural raw materials. The less suitable a raw material is for transportation and the higher the cost of its shipment, the more profitable it is to disperse the processing industry, to bring it nearer to its sources of raw materials. This sharply reduces transportation costs, cuts raw material losses and improves their utilization, provides more time for increasing output and helps to solve the problem of the seasonal character of labor on the collective and state farms. The possibilities for a more even work load and utilization of local enterprises for processing perishable farm produce largely depends on the development of storage and refrigeration facilities on the collective farms.

If the establishment of enterprises for storing and processing farm produce depends on the availability of raw materials, then the expansion of the raw material base as a marketable branch largely depends on the processing facilities. In the case of fruit, for instance, the influence of processing on the raw material base is especially great. Only when there are enterprises for processing and canning the perishable and not easily transportable items of the fruit growing industry is extensive development of these branches for marketing purposes possible. This is especially true of areas which are far from large urban industrial centers.

Hence the development of the processing industry in the localities is very important for increasing the amount of marketable agricultural products, and in promoting further specialization of agricultural production.

Development of the processing industry increases collective farm income, since, all other conditions being equal, it is more profitable to market semi-finished and finished goods than raw materials. The waste products of branches of the processing n dustry, of butter and cheese production, for example, can be used effectively in agriculture, especially in animal husbandry.

As a result of the development of the processing industries in the countryside, there will gradually arise, when economically expedient, as is pointed out in the Draft Party Program, agrarian-industrial associations in which agriculture will be organically linked with the industrial processing of its produce, with rational specialization and coordination of agricultural and industrial enterprises. The principle of economic specialization will be most fully developed in these associations. In the agrarian-industrial combines thorough going specialization will be combined with the eradication or substantial lessening of such negative phenomena connected with the development of specialization in individual collective or state farms as uneven and incomplete utilization of machinery, the seasonal character of agricultural labor, etc.

The organic combining of industrial and agricultural production into a single unified process gives rise to important social and economic consequences. The combining of industry and agriculture leads to the further development of socialized collective farm production, to essential changes in the internal economic structure of the collective farms, to improving the organization of collective farms as enterprises. The organic unification of agricultural and industrial production will help to overcome survivals of the old social division of labor under which the countryside was economically tied to agricultural activities only. It will bring about radical changes in population distribution, as a result of the more rational and even disposition of the productive forces throughout the country.

The previous distribution of production and methods of resettling the rural population, which were borrowed from the past, do not correspond to present requirements and retard further development of the productive forces in the countryside. The establishment of large agrarian-industrial production associations will be accompanied by a gradual transformation of small population points into big settlements of an urban type, which will provide all of the benefits of the culture and mode of life of the modern city, and combine urban comfort with the advantages of rural life. The solution, first of all, of production tasks, the general development of the collective farm economies, create the necessary conditions for this. The economic growth of the collective farms has led, in recent years, to a good deal of construction and improvement of communal services in the countryside. In many areas a movement is underway to reorganize villages into settlements of an urban type. During the reconstruction of villages on the basis of general plans, economic and housing construction is, as a rule, carried out comprehensively, with an eye to developing agricultural production. The scale and methods of building settlements is determined in each instance on the basis of the achieved level of concentration and specialization of production, transport facilities, natural conditions and so on.

Therefore further improvement of the forms of collective farm production is inseparably connected with the gradual reorganization of village life and its culture.

The combining of agricultural and industrial production on the basis of full-scale development of inter-collective farm and collective farm-state cooperation once again proves that the collective farm-cooperative system of production has not yet

made full use of all of its opportunities. The collective farm production complex will fuse more and more with state production. It is not impossible that at a certain stage of development the unification of industrial and agricultural enterprises within the framework of the economic councils will prove to be a new phase of socialization. The creation of a production complex of this kind, embracing within an economic administrative area all farms and all local industry, will make it possible to join together the power resources of the area, local industry, agriculture, transport, communications, etc. This will ensure the most complete use of all local labor, raw material, power, land and other resources.

Footnotes

(1) Soch., Vol. 21, p. 55.

(2) Soch., Vol. 3, p. 20 [All quotations from the works of Marx and Engels have been retranslated from the Russian – Editor.]

(3) Capital, Vol. II, 1954, p. 238 [Russian edition].

(4) K. Marx and F. Engels, Soch., Vol. 19, p. 345.

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ECONOMIC TIES BETWEEN INDUSTRY AND AGRICULTURE AND THE FURTHER GROWTH OF AGRICULTURAL PRODUCTION

The economic relations between town and countryside, between industry and agriculture, are one of the main questions of communist construction. The development and perfection of these relations predetermines the growth of the socialist economy as a whole and a continuous rise in the material well-being of the working people.

Satisfaction of the people's growing needs in foodstuffs and other consumer goods depends upon the level of production, and in turn stimulates the growth of labor productivity, and this means a further rise in production. The task is to see to it that this interdependent process occurs in a planned manner, utilizing all the advantages of the socialist planned system of economy. In other words, it is essential that a definite proportionality between the various branches of the national economy, and especially between industry and agriculture, be observed in the country's economic turnover.

In directing socialist construction, the Party is always concerned to improve the economic ties between industry and agriculture, between town and countryside, thus consolidating the alliance between the working class and the peasantry. The state has always extended financial and economic assistance to the developing socialist system in the countryside. It helps the collective farms and the state farms by supplying staffs of specialists and organizers of production. Agriculture also gets all kinds of machines, fertilizer and other materials from industry.

N. S. Khrushchev, in describing the role of industry in the development of agriculture in his speech at a session of the Supreme Soviet in March 1958, emphasized that the leading role played by socialist industry in the development of collective farm production is growing each year; it is supplying agriculture with modern machinery and is giving the collective farms enormous help in advancing their collective economy still more.

In return for this help the collective farm peasantry and all agricultural workers are increasing output and supplying the socialist cites with their produce. This mutual exchange of products between industry and agriculture forms the main content of the process of expanded reproduction of the socialist economy; that is why the Communist Party is focussing its attention on the maximum development and intensification of economic ties between industry and agriculture, town and countryside.

The January 1961 Plenum of the Party Central Committee noted the substantial progress made by agriculture in the past seven years as a result of a number of major organizational and economic measures. The total volume of agricultural output in

1960 was 1.5 times more than in 1953. The annual grain crop increased by more than 3 billion poods in the same period, and state grain purchases grew by almost 1 billion poods. Meat production increased 1.5 times and purchases over 2 times; the corresponding figures for milk are 1.7 and 2.5 times.

However the level attained in agricultural production is insufficient; it does not meet the growing popular demand for foodstuffs and industry's need for raw materials.

In the first two years of the Seven-Year Plan period, industrial output has risen 22.1% as against the planned 17%. The income of the population has increased over the past few years by an annual 24.2 billion rubles (in the new prices), which is almost one-third of the annual volume of retail trade. All this has raised the demand for foodstuffs, and primarily meat, milk and butter.

During the same period agriculture developed at lower rates than those assigned to it in the Seven-Year Plan. In 1959 and 1960 state purchases of grain, sugar beet, sunflower seed and potatoes were considerably below the Seven-Year Plan estimates. The plan for the procurement of meat, milk and eggs was on the whole fulfilled in 1959 and 1960, but due to plan overfulfillment in industry and the marked rise in the incomes of the people, the volume of purchases did not satisfy the country's growing need for these products. As a result there was a significant rise in the price index in 1960 on the collective farm markets in the towns.

Thus in 1959 and 1960 the production and state procurement of agricultural products did not correspond to the social need for those products.

In recent years annual state purchases of grain have averaged 2.927 billion poods, meat — over 7.5 million tons, milk — about 25 million tons, and so on. This level no longer meets the increased social need. The January Plenum of the Party Central Committee pointed to the necessity of bringing the annual purchases of grain up to 4.2 billion poods, meat -- to 13 million tons, and milk — to 50 million tons in the next few years. This state order requires that large scale measures for the further advancement of farm production be carried out. The Plenum indicated the necessity:

of strengthening further the material and technical base of agricultural production, and, in this connection, of improving the proportions between the development of industry and agriculture;

of maximum utilization of the reserves available in the collective and state farms in order to increase the output of all kinds of farm produce and, to that end, to raise the level of agricultural leadership;

of improving the system of supplying the collective and state farms with machinery and other means of production, and of perfecting the system of state purchases of farm produce.

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One of the major aspects of the economic relations between industry and agriculture is that, as heavy industry continues to expand, the material and technical base of agricultural production is systematically consolidated and develops, and the technical equipment of agricultural labor increases.

Within the past seven years alone, the fixed production capital of the collective and state farms (i.e., buildings, structures, farm machinery, various kinds of equipment) has almost doubled. As of January 1, 1960, the value of this capital was 41.9 billion rubles (in the new prices). The power resources of agriculture increased 1.6 times in the same period; fleets of tractors — 1.5 times; automobiles — 2.5 times; use of electric power — 3 times.

Thus agriculture has at its disposal substantial material and technical resources. However it lags considerably behind the other branches of the national economy in terms of the fixed productive capital, the power and technical resources with which its labor is supplied, and this is reflected in the rates of development of agricultural production.

The January Plenum of the Party Central Committee acknowledged the necessity of allocating additional capital investments for the development of agriculture and those branches of industry that service it — the production of tractors, farm machinery, mineral fertilizers, and building materials. The aim is to strengthen the material and technical base of agriculture in the shortest possible time, and, on this basis, to achieve a rapid rise in agricultural production.

At a time when the socialist economy is developing rapidly, when heavy industry has made a great advance and is growing at high rates, more funds can be directed towards the development of agriculture without detriment to further industrial growth or the consolidation of the country's defense.

Considering that a number of branches of industry have overfulfilled their Seven-Year Plan targets substantially, the Plenum of the Party Central Committee noted that it would be advisable to maintain the subsequent growth of heavy industry at the rates set in the Seven-Year Plan, so that the funds accumulated as a result of overfulfillment of the Seven-Year Plans can be channeled for the development of agriculture and those branches of industry that service it. This will improve the relationship of the rates of development in agriculture and

industry, and ensure a further advance of the national economy as a whole.

In directing additional capital investments into the development of agriculture, the Party and Government point out the necessity of using them effectively. Plans for capital outlays in agriculture must reckon with the specific features of agricultural production; it is more difficult and complicated in this area than in any other to determine and substantiate the most rational use of capital investments. But the general principle for planning capital investments for all branches of the economy remains that resources must be channeled for those measures which will yield the greatest effect in the shortest time.

The correctness of this principle has been brilliantly demonstrated by the development of vast expanses of virgin and long fallow lands in Kazakhstan and the eastern areas of the Russian Federation. Between 1954 and 1960, 41 million hectares of new lands were brought under cultivation in our country, 44 billion rubles of state capital investments having been allocated for that purpose. During the development and cultivation of those new lands, the entire capital investment was fully repaid just from the sale of the marketable grain grown there, and there was a net income of over 32 billion rubles. At present 40% of the country's total grain supply comes from the virgin lands.

The point was made at the January Plenum that the problem of irrigating and draining millions of hectares of new lands must be solved on the same scale as the development of the virgin and long fallow lands. That is why the Party believes that the additional funds channeled for the development of agriculture must be used primarily for irrigation development in Central Asia, the southern part of the Russian Federation, the Volga area, the southern area of the Ukraine, the Trans-Caucasian republics, and also for the reclamation of marshy and excessively moist lands in the non-black soil belt of the RSFSR, the forest lands in the Ukraine, in Byelorussia, Lithuania, Latvia and Estonia. Irrigation and drainage of now practically unused lands will make available for cultivation millions of hectares of the most fertile soil, on which the output of such valuable farm products as cotton, rice, maize, meat, milk, butter, wool and so on can be sharply increased.

Although there are a variety of machines on the collective and state farms, many jobs are still not mechanized today. Even in grain production, which is most highly mechanized, a number of jobs are done by hand. Comrades Gitalov, Manukovsky and other participants in the January Plenum noted that suitable machines have not been designed as yet for the comprehensive mechanization of animal husbandry, as well as maize, sugar beet and potato growing.

It is urgent, as the decision of the January Plenum noted, to introduce farm machines working on electric drive, to raise sharply the output of powerful tractors with higher speeds and the implements for them, of self-propelled chassis, grain and ensilage harvesters, machines for processing grain after harvest, cotton pickers, equipment and machinery for the mechanization of animal husbandry and the application of organic fertilizers, motor vehicles and trailers, and machinery for irrigation and reclamation work in mountainous areas.

The Plenum noted the need for stepping up the comprehensive mechanization of all branches of agriculture, and instructed the organizations concerned to draw up a state plan for this work, the object being to accelerate it as much as possible and to complete it in the main during the current Seven-Year Plan period so as to go over in a few years to a production line technology of cultivation, harvesting, and post-harvest processing of the major farm crops.

Achievement of comprehensive mechanization of agricultural production, especially in animal husbandry, depends to a great extent on the use of electric power in farm production. At present electric power is chiefly used in agriculture for lighting, even though there are a number of branches of farm production where mechanization is impossible without the application of electric power. After the January Plenum, the Government passed a decision calling for the intensification of work on the electrification of agriculture, envisioning the inclusion of collective and state farms on a broad scale in the state power system and the construction of large rural electric power stations. This will greatly increase the possibilities for electrifying and mechanizing agricultural production.

One of the most important and urgent tasks is to greatly increase the production and delivery to agriculture of mineral fertilizers, herbicides, toxic chemicals and other chemical substances. According to the Central Statistical Administration of the USSR, 51.7 kg. (in standard types) of mineral fertilizer were applied per hectare of arable land in the Soviet Union in 1959, as compared with the US figure of 163.5 kg., the British — 646.7 kg., the French — 405 kg., and the West German — 389 kg. Those countries also have higher yields of farm crops. The data of research institutions and the best farms show that when certain quantities of mineral fertilizer are used, an average grain yield of 25 to 30 centners per hectare is possible, as against the present 10 to 14 centners.

To secure such a yield, the production and delivery to the farms of mineral fertilizer must be increased approximately 4 times during the current Seven-Year Plan period. This will require additional investments for the development of the mineral fertilizer industry. In planning the latter's expansion, the requirements of the farms with respect to the quality of fertilizer must be kept in mind, and the additional allocations must be used in such a way as to meet those requirements. The fertilizers' effectiveness must be raised and the amount of labor and resources that are expended in their utilization must be reduced by increasing the output of high-concentrate and complex fertilizers. It is enough to point out that only 18 or 19% of superphosphate is phosphorous acid, while the rest is just ballast. If we get rid of the ballast, considerable amounts of labor and money expended on the transportation of the fertilizer and its application to the soil can be saved.

The aim of the Party and Government in channeling large sums for the expansion of those branches of industry that service agriculture is not only to ensure the effective use of the new capital investments, but also to see to it that the production capacities already available in those industries are utilized to the best possible advantage.

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A sharp increase in the output of all kinds of farm produce can be achieved if, along with increased supplies of technical equipment, mineral fertilizers and other means of production, everything, all the available reserves and potentialities of the collective and state farms are mobilized and used. This will increase the state's resources of foodstuffs and raw materials and will help expand the economic ties between the town and countryside and strengthen the socialist economy as a whole.

We have a great many advanced collective and state farms and collective and state farm workers who, by their brilliant results in organizing production, are showing all workers in agriculture how to get high labor productivity and abundant output. Comrade N. S. Khrushchev has aptly named them our "beacons," who are lighting the way to the general growth of agricultural production. The task is to apply advanced methods of organizing production on a wide scale in all the collective and state farms, and to place these methods in the hands of literally all farm workers. To reach that goal, agricultural leadership must be improved and the planning of agricultural production perfected still more.

The January Plenum pointed up the need for drafting concrete measures aimed at increasing the output of farm produce in the near future, beginning at the bottom, from the teams and sections to the collective and state farms, and involving collective and state farm workers and agricultural specialists in this undertaking on a wide scale. It instructed the Party central committees and the councils of ministers of the union republics to direct this work.

These instructions of the Plenum were aimed at the further development and perfection of a system of planning agricultural production. They provide for the drafting of a broad program for agricultural development, based on the targets set for the sale of the basic farm products to the state and on the possibilities of each farm.

The Party Central Committee and the USSR Council of Ministers have been instructed to generalize these measures into a single program for the development of agricultural production up to 1965.

The characteristic feature of the projected program for the further development of agricultural production is the extensive introduction of advanced methods of organizing farm production in the collective and state farms, and the maximum utilization of the reserves and potentialities of every farm so as to eliminate, in the shortest possible time, the gap between agricultural output and the country's growing needs for agricultural products and to overtake and surpass the United States in per capita output of the main farm products in the next few years.

The attention of the Party and the people is concentrated primarily on the further development of grain farming as the basis of all other branches of farm production, including animal husbandry.

The most important way of increasing our country's grain supply, and the most reliable means of strengthening the feed resources of animal husbandry, is to extend the sown area and raise the yield of the maize grown for grain. To that end, high yields of maize grain — at least 50 centners per hectare -- must be obtained from large areas this year and in subsequent years.

Grain output is also being increased by bringing new lands under cultivation and raising the yield of grain crops in the virgin lands. During the remaining years of the Seven-Year Plan more than 8 million hectares of virgin lands are to be brought under cultivation, mainly for grain crops. At the same time it is one of the most important tasks of the collective and state farms in the virgin land areas to introduce a scientific system of farm management, improve farming methods and so raise the yield of their grain crops.

Great possibilities for raising grain output are available to the collective and state farms of the non-black soil belt and other areas of the country. The average yield, over many years, of winter

crops grown on the sort-testing fields of the non-black soil belt is 22 to 25 centners per hectare, and of spring grain — 20 centners. This indicates that the collective and state farms of the zone can radically raise their yields of grain and other crops by introducing advanced technology and organization of production. The pressing task before the collective and state farms of the zone, as well as of other parts of the country, is to substantially increase their output of leguminous and cereal crops, and especially buckwheat.

Maximum development of the grain economy presupposes further increases in the output of the technical crops — cotton, flax, sugar beet, and oil-bearing plants — and vegetables, potatoes and other farm products.

A marked rise in the output of grain will serve as a basis for the rapid development of animal husbandry. The present level of production of livestock products cannot satisfy the country's needs in meat, milk, eggs and other products. Whereas the USSR has approximated the American level for per capita output of milk, and has overtaken it in butter output, our output of meat is only 50% of the American level.

During the first years of the Seven-Year Plan, animal husbandry did not develop as quickly as the plan estimates projected. It will have to make up for this omission in the remaining five years, and succeed in unconditionally fulfilling the plan targets for the development of animal husbandry. This means an increment of at least 1,500,000 tons of meat and at least 8,700,000 tons of milk a year.

Estimates show that to reach the Seven-Year Plan targets for output of meat and milk, an average annual increase of at least 3 million head of cows must be secured in the years that remain and, by the end of 1965, a total of 50 million head.

The measures outlined also call for the development of hog raising, greater output of poultry meat and eggs, and the development of sheep raising.

However, increasing the number of all kinds of livestock, and raising their productivity and thus obtaining the necessary amount of meat, milk, eggs and wool, are all problems that turn on the problem of fodder.

At the present time most collective and state farms produce totally insufficient amounts of fodder for their livestock, and the composition of the feed is often unsatisfactory. The protein content of the fodder rations usually does not exceed 60% of the scientific standard. Given this situation, too much fodder is often used. For instance, in 1960 the collective and state farms used about twenty million tons of fodder units more than they should have for what they produced because of the protein deficiency of the fodder; with the extra fodder they could have produced another two million tons of meat (in living weight). All of this indicates that the collective and state farms must work not only for more fodder but also for better quality fodder.

As the zonal agricultural conferences demonstrated, the fodder problem must be solved creatively on the basis of the concrete conditions prevailing in each farm and the correct organization of production. Only if the collective and state farms introduce widely a scientific system for conducting their economies can they successfully solve such tasks as extending and improving the production of maize for grain and silage and sugar beet for fodder, increasing the area and raising the yield of leguminous crops rich in protein, and of animal and perennial grasses. Such a scientific system will take into consideration all aspects of the organization of production: the line in which the farm is specializing; correct coordination of its main and secondary branches; agrotechnical and zootechnical measures; the machinery system and their effective utilization; the organization and payment of labor; wide application of scientific advances and progressive methods, etc.

The experience of the leading state farms shows that specialization, and the concentration of production that goes with it, permit a faster and more effective introduction of comprehensive mechanization and advanced technology, a sharp rise in labor productivity, lower production costs, and a greater output of products per unit of land.

The specialized grain and vegetable state farms, the poultry farms, and the state and inter-collective farm enterprises set up for fattening livestock are good examples of this. Dairy state farms are being established to supply the people of the large cities and industrial centers with cheap fresh milk. At the present time the state farms account for over 40% of the marketable produce of agriculture. This puts a great responsibility on the workers in the state farms. The state farms will continue to develop immeasurably as advanced agricultural enterprises which show the collective farms how to organize production scientifically.

Many examples of efficient organization of production in the collective farms and inter-collective farm enterprises can be cited.

As a rule, in the larger collective farms where production is better organized, a larger output of produce per unit of land area is accompanied by a rise in marketable produce, larger allocations to the indivisible funds and a marked increase in the farmers' pay for their work. This can be illustrated by the results of the economic activity of the Thaelmann and Gastello collective farms in the

Minsk district of the Byelorussian SSR, comparing them with the average indices for collective farms in the Minsk District. The figures are presented in the following table (in % of the average indices for the collective farms of the Minsk District):

	Thaelmann Collective Farm	Gastello Collective Farm
Gross output per 100 hectares of arable land	161	106
Marketable output per 100 hectares of arable land	195	107
Allocations to indivisible funds per 100 hectares of arable land	196	116
Cash Pay for Farmers' Work	124	121

By comparing the figures for the Thaelmann and Gastello collective farms, one can see that the level of cash pay depends on the output of marketable produce per unit of land.

More profound analysis of the economic results of the work of these collective farms shows that the size of allocations to the indivisible funds and the levels and relationship between payments in cash and kind for the farmers' work are influenced both by a rise in marketable produce and by other factors, in particular, the structure of material outlays.

By way of illustration, let us examine the influence of the fodder structure on the level of material outlays. In 1959 the Gastello Collective Farm used considerably more fodder per unit of livestock produce, due to the low protein content of the feed, than did the Thaelmann Collective Farm. This resulted in high production costs and made the livestock branch of the farm operate at a loss, whereas the profitability of animal husbandry at the Thaelmann Collective Farm was 40%. If the Gastello Collective Farm had used its fodder supply at the same rate as the Thaelmann Collective Farm, it would have obtained 85,000 rubles worth of additional produce and would have almost caught up with the Thaelmann Collective Farm for profitability of animal husbandry.

The example of the Gastello Collective Farm shows that, given more efficient farm operation and a correct combination of branches, good results can be obtained without any additional outlays in developing the collective economies of the collective farms, both in terms of accumulations and of remuneration for the collective farmers' work. It follows that these and many other collective farms must be helped more quickly to work out and introduce scientific systems of running their economies and to correctly organize and pay for the farmers' work.

In his speeches at the zonal conferences, Comrade Khrushchev repeatedly stressed that there were marked shortcomings in the organization and remuneration of collective and state farm labor, and that they retarded the growth of labor productivity in agriculture. "We must establish a system of payment for work," he said, "not only according to work done, but also according to the quantity and quality of the produce obtained." The organization and remuneration of labor must stimulate the struggle for high rates of development of agricultural production and contribute to its continual progress. A system of supplementary payment for work must play an important role here. Proposals must be drawn up concerning the principles of additional pay for work in the collective and state farms for overfulfillment of output plans and improvement of quality.

Thus the further advancement of agricultural production requires the implementation of a whole series of technical and organizational measures which take into consideration the natural and economic conditions of the areas and of each individual farm, that is, the organization of production on scientific foundations. "The organization of agricultural production must be placed on a more solid scientific foundation," Comrade Khrushchev stressed at the January Plenum of the Party Central Committee.

Given the situation, agricultural specialists must function not as advisers or consultants, but as organizers and technical directors of production. Research institutions, experimental farms, and agricultural scientists have just as important a role to play.

The main agricultural bodies in the localities must be the experimental farms, established as a rule on the leading state farms. By their example in rationally organizing production, these farms can exert an influence on the collective and state farms around them which will be far better and more fruitful than any administrative interference could possibly be. It is the duty of the experimental farms to generalize the experience of the best farmers and, by their activity, to help introduce scientific achievements and progressive methods in the collective and state farms of the

area. Under these conditions, the functions of the USSR Ministry of Agriculture are also changing radically.

The decisions of the Party Central Committee and the USSR Council of Ministers on the reorganization of the USSR Ministry of Agriculture carefully state the new principles for directing agriculture. The Ministry of Agriculture, instead of being an administrative apparatus for running agriculture, which it has been for many years, must become a center for the scientific organization of agricultural production.

The main functions of the Ministry and the local agricultural bodies under the new conditions are to direct the work of the agricultural research institutions and experimental farms, to advance agricultural science, to study and generalize progressive methods, to introduce into production on a wide scale the achievements of science and the experience of leading farm workers, and, to train specialists for the collective and state farms.

With the help of the scientific institutions and experimental farms, the USSR Ministry of Agriculture will draw up recommendations for the collective and state farms on the technology and organization of production, systems of running the farms, the introduction of progressive forms of organizing and remunerating labor, etc. All of this will give the activity of the Ministry a vigorous, effective character and increase its influence on production.

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One of the most important prerequisites for the further advancement of agricultural production is an improvement in the conditions and system of exchanging industrial and agricultural products. The prices for industrial and farm goods play an important role here. The interrelated and interdependent development of agriculture and industry, the distribution of the national income, the consolidation of the alliance of the working class and peasantry — all of these things depend on prices. The level of sales prices on manufactured goods and purchase prices on farm products influences the rate of industrial and agricultural development, the incomes of the collective farmers and farms, the level of retail prices, and, consequently, the material standard of life of all of the Soviet people. Therefore in its price policy the Party is guided by the necessity of protecting both the interests of the state and the personal interests of all groups of working people.

In 1958 uniform prices for farm produce, differentiated only for the zones, were established. At the time uniform prices were also introduced for tractors, farm machines, spare parts, fuel, fertilizers and other industrial commodities used in agricultural production. These measures considerably improved the proportions of exchange of the main agricultural products for farm machinery and other industrial goods needed in agriculture. This made the proportions of product exchange between agriculture and industry substantially more advantageous for Soviet agriculture than is the case in the United States. For example, in order to buy a caterpillar tractor an American farmer must sell three or four times the amount of basic farm products (grain, meat, milk) as our collective farms have to sell for the purpose, and to buy a truck — two and three times as much. About the same difference in ratios exists in the purchase of mineral fertilizers. This data emphasizes the advantageous conditions that exist for the development of agriculture in the USSR as compared with the USA.

It must be noted however that, due to the inadequate rates of agricultural development and low labor productivity, the cost of production is still high in many collective and state farms. This lowers the effectiveness of the new prices established for farm produce. Thus, for example, the high cost of production of livestock products means that in many collective farms the receipts from the sale of those products merely covers the outlays entailed in their production; in a number of cases they do not even cover outlays. Such a situation lowers the material incentive of the collective farms and their members. It would be wrong to resolve this problem mechanically by raising prices on farm produce. The state purchase prices for the products of the collective farms and the delivery prices for the output of the state farms are being, and will be, perfected primarily by improving the relationship between prices for individual kinds of produce and not by direct price increases. Higher prices for farm produce entail changes in retail prices and affect the real incomes of the working people. Other methods must be used to improve the conditions of product exchange between industry and agriculture.

In order to cut outlays and raise the material incentive of the collective farms and their members in increasing agricultural production, the government has decided to reduce the prices of industrial products that are used in agricultural production, and also to exempt 80% of collective farm receipts from livestock products from income taxes. In addition, prices for trucks have been reduced by 17%, for tractors — 9%, for other agricultural machines — 4.3%, for spare parts for tractors, trucks and farm machines — on average, 40%, and for gasoline — 40%. All of this will reduce the expenditures of the collective farms by the sum of 869,000,000 rubles per year and will substantially reduce costs of production. This state assistance

is expected to encourage every collective and state farm to draw on all its available reserves to raise output and thus reduce costs of production and increase its profits.

An equally important means of consolidating the economic ties between industry and agriculture involves the system by which the collective and state farms are supplied with machines, spare parts, mineral fertilizers, and other materials and technical means, and also the purchase and procurement system for farm products.

The system by which the collective and state farms have until recently been supplied with tractors, farm machinery, mineral fertilizers and other materials does not take adequate account of the needs of agricultural production. Orders were not placed with industry for the production of the necessary machines, while collective and state farms were supplied with tractors and other machines without consideration for local conditions or the specific features in the development of various branches of agriculture.

The "Sel'khoztekhnika" [Agricultural Technical Supply] societies now being set up on instructions from the Plenum at the center, and in the republics and regions, will act as intermediaries between the collective and state farms, on the one hand, and the industrial enterprises, on the other. They will determine the needs of the collective and state farms for tractors, farm machines, fertilizers and other materials and, through the USSR State Planning Committee, place orders with industrial enterprises. They will sell the collective and state farms the necessary machines in accordance with the planned volume of production and the funds allocated. Thus the "Sel'khoztekhnika" society will place orders with industry and will receive from it all of the machinery spare parts, fertilizers and other materials for agriculture; at the same time it will act as a trading organization supplying the collective and state farms, on a cost accounting basis, with all of their materials and technical equipment, and organizing the maintenance and use of the macinery. The system of supplying the collective and state farms with machinery and other material and technical resources through the "Sel'khoztekhnika" society is democratic in character. This is expressed not only in the fact that councils are being created under the "Sel'khoztekhnika" societies, made up of representatives from the society itself, the collective and state farms, and the leading farm machinery plants, but also in that the direct contact between agricultural and industrial personnel will result in greater recognition of the interests and needs of both agriculture and industry. Such a system of supplying machinery for the farms permits a more correct determination of what kind of machines, and in what quantities, are needed by the collective and state farms in different areas of the country; the system makes it possible to take greater account of the specific production conditions of different types of agricultural production, and, on this basis, to place orders with industry. At the same time, mutual control is established over the demands made by collective and state farms on industry and on the fulfillment of the demands by industrial enterprises. Moreover, both the collective and state farms and the enterprises will have an interest in the activity of the "Sel'khoztekhnika" society. Thus, in the sphere of circulation a direct influence will be exerted on production both in agriculture and industry, and therefore on the working and living conditions of the people engaged in agriculture and industry.

Improvement of the procurement system is an important means of developing agricultural production further and of meeting the growing needs of the population and industry for the products of agriculture.

Serious defects existed in the system of procuring farm products until recently. Many procurement organizations were engaged in purchasing farm products from the collective and state farms, without proper control by the state over their work, and without unified direction. As a result the business relations of the collective and state farms and the industrial organizations which received the products of agriculture were not properly coordinated. Procurements were often made without regard for the long range development of agricultural production.

The January Plenum called attention to the need for reforming and improving the organization of state purchases of farm products, so that procurements will become a means of extending and strengthening the ties between agriculture and industry, will ensure a planned organization of business relations between the collective and state farms, on the one hand, and the industrial enterprises engaged in processing farm products, on the other, and so that purchases are based on a considered disclosure and substantiation of the needs of the population and of industry for farm products, and a coordination of these needs with the possibilities of agriculture.

Accordingly the Party Central Committee and USSR Council of Ministers adopted a decision on the reorganization and improvement of state purchases of agricultural products, and set up the State Procurement Committee to organize and manage purchases of farm products.

It was established by this decision that farm

products must be realized through contracting, that is, in agreements by the procurement organizations and enterprises with the collective and state farms.

The contract system makes it possible to take account of the interests of the contracting parties and, on the basis of concrete analysis of the possibilities of farm production and more exact estimates of the needs of the population, to ensure that the state will get the required amounts of produce. This system provides for mutual obligations on the parties: on the collective and state farms as concerns the sale of a definite amount, quality and assortment of farm produce; on the procurement organizations and the enterprises as concerns the timely acceptance of the produce, payment for it according to established prices, timely cash advances (credits) in definite amounts, and also help to the collective and state farms in organizing production and transporting produce to the delivery points and enterprises.

The government decision notes that the contracts shall be based on the state purchase plans and the long-term plans for the development of collective and state farm production, and that they shall apply for two to eight years, sectioned by years. The conclusion of contracts must, according to the decision, be preceded by a study of the condition of production in the collective and state farms, by profound and comprehensive checks on the production and purchase plans, and by the elaboration of measures for the fulfillment of the purchase plans. This will increase the influence of purchases on the development of agricultural production.

The organization of procurements of farm products on the basis of agreements (contracts) calls for radical changes in the planning of such procurements. The planning bodies must provide in the state plans for purchases not according to groups of products (grains, oils, meats) but according to each type of product; they must establish purchase targets not for legumes generally, say, but for peas, kidney beans and so on; not for fats in general, but for the types of oil bearing plants; not for meat in general, but for beef, pork, poultry, etc. The plan targets for purchases must take into consideration zonal differences and be well substantiated both with respect to meeting the need for agricultural products and in terms of considering the prospects of the development of production.

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The additional allocations of funds for capital construction and for the technical equipment of agriculture will broaden and strengthen the material and technical base of collective and state farm production. A higher level of leadership in agriculture will make it possible to utilize the reserves available in the collective and state farms more effectively, to better direct the initiative and activity of the farmers in the broad application of scientific achievements and progressive methods in production, and to raise the farmers' material incentive to increase output of agricultural products.

In turn, reorganization of the system by which machinery and materials are supplied to the collective and state farms and improvement of the procurement system will improve the organization and the conditions for the exchange of products between industry and agriculture, and strengthen the influence of such economic levers as prices and credits on the development of agricultural production.

All these measures are aimed at the further expansion of economic ties between industry and agriculture, between town and countryside, this being the decisive condition for the further growth of agricultural production and for improving the material well-being of the working people of town and countryside.

Analysis of Western Economies

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THE INFLUENCE OF TECHNICAL PROGRESS ON CAPITALIST REPRODUCTION

The Draft Party Program, on the basis of a generalization of new phenomena in the development of imperialism, shows that, at a time when mankind is entering the period of its greatest scientific and technical revolution, capitalism on the whole is increasingly restricting the growth of the productive forces. Technical progress in societies dominated by monopoly capital is turned against the working people and sharpens the antagonism between labor and capital.

The contemporary achievements of science and technology, which enable mankind to produce ever greater amounts of material values with ever smaller outlays, create for capitalism a tangle of social and economic contradictions which it cannot solve. The laws of capitalist reproduction are in conflict with the laws governing the development of technology. As the Draft Party Program points out, "the relations of production under capitalism are much too narrow for the scientific and technical revolution. Socialism alone is capable of effecting this revolution and of applying its fruits in the interests of society."

The influence of technical progress on capitalist reproduction and the contradictions which the development of technology encounters under capitalism are fully revealed in the process of creating the national income. They are expressed most strikingly in the dynamics of the national income of the United States, the capitalist country with the highest economic and technical development.

Calculations of the physical volume of the US national income over long periods are available in Soviet economic literature. But the dynamics of the physical volume of the national income in itself only reflects the movement of the mass of material values, one part of which goes for consumption, the other part for accumulation. Yet for a characterization of the process of creating the national income it is not only the growth rate of its physical volume which is important, but also its movement as magnitudes of newly created value. In capitalist society the direct aim and driving force of the capitalist mode of production is not the satisfaction of human needs, but the production of surplus value. Capitalists are by no means indifferent about which factors expand production. They are interested only in those sources of increasing the physical volume of the national income which at the same time ensure a growth of the mass of newly created value.

The magnitude of the national income as the sum of all newly created values is determined by the working time (or the number of man-hours) expended in the course of the year for the creation of material output. (1) The number of man-hours actually worked in the sphere of material production is calculated by multiplying the average number of persons employed in the productive sphere by the average length of the work week. To determine the number of people employed in the productive sphere in the United States after 1929, we used American statistics of average employment by branches of social production published in the Survey of Current Business. We accept without correction the official indices of employment in agriculture, forestry, fishing, the mining industry, contract construction and the manufacturing industry, as well as the data on the number of people engaged in repair jobs and production and technical services. In other branches which cover both the productive and non-productive spheres we calculate only the people engaged in material production. (2)

Official American statistics give employment by branches of social production of the United States only after 1928. The number employed in the sphere of material production for earlier years is determined on the basis of estimates of one of the American research centers, the National Industrial Conference Board. To determine the average number of man-hours actually worked in the sphere of material production for a certain period of time, for example, a week, it is necessary to multiply the average number employed in branches of material

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production by the average number of work hours for that period. Unfortunately, owing to the lack of the corresponding data, it is impossible to determine exactly the average number of work hours for the entire sphere of material production in the USA. However, the information available for a number of years makes it possible to establish that the average weekly number of man-hours worked in the manufacturing industry and in the entire productive sphere in the United States are directly proportional magnitudes. Hence we will not violate truth if we consider the data for the manufacturing industry an index of the average weekly number of work hours in the entire sphere of material production in the United States. The change in the number of man-hours worked in the productive sphere in the United States in two periods (1900-1929 and 1929-1957) is given in Table 1.

Table 1

Year	Average weekly number of man-hours worked (millions)	Average weekly number of man-hours worked (in % of 1929)	Year	Average weekly number of man-hours worked (millions)	Average weekly number of man-hours worked (in % of 1929)
1900	1,050	79.7	1943	1,517	120.9
1909	1,336	101.4	1947	1,338	106.6
1910	1,397	106.1	1948	1,347	107.3
1919	1,294	98.3	1949	1,249	99.5
1920	1,342	101.9	1950	1,327	105.7
1923	1,317	100.0	1951	1,387	110.5
1929	1,317	100.0	1952	1,399	111.5
1929	1,255	100.0	1953	1,420	113.1
1933	855	68.1	1954	1,330	106.0
1937	1,052	83.8	1955	1,398	111.4
1939	980	78.1	1956	1,415	112.8
1940	1,031	82.2			

The data in Table 1 indicates that since the second decade of the present century the number of man-hours expended for the production of the national income practically stopped growing. This means that the expansion of the physical volume of US national income proceeded mainly through the growth of output per man-hour, that is, by raising the productivity of labor and increasing its intensity. This is apparent from the table shown on the top of the following page.

An increase in labor productivity is always accompanied by a growth in the technical composition of capital — the relations between the mass of applied means of production and the quantity of labor needed to operate them. The higher the labor productivity, the larger the mass of means of production which can be operated by the same quantity of living labor. Usually the growth rates of these two interrelated magnitudes — labor productivity and the technical composition of capital — are not the same. In the 19th century, the century of steam power, the development of the productive forces was such that the technical composition of social capital increased faster than average labor productivity, that is, the mass of means of production operated by the given quantity of labor grew faster than the volume of output. There was an increase not only in the mass but also in the value of the means of production per given quantity of living labor.

Let us see how the relationship between the growth rates of labor productivity and the technical composition of capital in the United States is changing under the influence of technical progress in the 20th century. Here we are first of all interested in the change in the value of the means of production as a result of the rise in labor productivity.

The growth of labor productivity exerts a dual influence on the magnitude of the value of the means of production used with the given quantity of labor, that is, on the capital per unit of labor. On the one hand, it rises through an increase in the mass of means of production as the technical composition of capital grows. On the other hand, it declines as labor outlays for manufacturing the means of

Table 2

Growth in the Physical Volume of the Annual Product Through Greater Output per Man-Hour
(in % of 1929)

Year	Physical volume of annual product without the raw materials used from the inventories of previous years*	Average weekly number of man-hours worked	Output per man-hour	Growth of physical volume of annual product through greater output per man-hour
1894-1903	36.8	79.7**	46.2	—
1904-1913	53.7	106.1***	50.6	20.7
1923	80.5	100.0	80.5	100.0
1929	100.0	100.0	100.0	100.0
1939	100.8	78.1	129.1	100.0
1943	153.0	120.9	126.6	3.8
1956	219.6	112.8	194.7	100.0

* The physical volume of the annual product for the period after 1929 is calculated as the sum of the end material product, material outlays in the sphere of services and the increase in stocks in unchanged prices (U. S. Income and Output, 1958, pp. 126-127). The method of calculating the material outlays in the sphere of services was described in Mirovaia Ekonomika i Mezhdunarodnye Otnosheniia, 1959, No. 11. The physical volume of the annual product of the US for the earlier period was calculated on the basis of data provided by S. Kuznets, National Product Since 1869, New York, 1946.

** 1900.

*** 1910.

production declines. That is why the value of these means of production changes in direct proportion to the rise in the technical composition of social capital and in inverse proportion to the rise of average labor productivity in Department I of social production. This dependence can be expressed in the formula $\frac{S}{Y} = \frac{W}{Y} : P$, where S is the value of the means of production used, W is their physical volume, Y is the newly created value which serves as an index of outlays of living labor, and P is the productivity of labor in Department I.

It follows from this formula that if the capital per unit of labor (for example, calculated per man-hour) rises, the technical composition of social capital increases faster than the average labor productivity in Department I. And, on the contrary, if it declines the technical composition of social capital rises more slowly than the average labor productivity in Department I.

Consequently, to determine the change in the relationship of the growth rates in the technical composition of capital and labor productivity in Department I, it is sufficient to determine the change in the value of the means of production operated by a unit of labor. It is made up of the value of fixed and circulating capital. The value of fixed capital per average unit of labor is determined by dividing the aggregate value of all production buildings, machinery and equipment functioning in the sphere of material production by the sum of newly created value. Owing to the absence of direct data on the value of the fixed capital employed in the United States, we use the estimated data of R. Goldsmith on the component parts of the national wealth of the United States. From it we select and summarize the data on economic structures and equipment. The obtained result will exceed the actual volume of fixed capital functioning in the sphere of material production, since it includes the fixed capital in the non-productive sphere (except houses) and the unemployed productive capacity. In the period under consideration the mass of buildings and equipment of a non-productive nature increased with disproportionate

rapidity. That is why in our calculation the growth in the value of fixed capital is somewhat overstated. But, as welshall see below, such a distortion cannot affect the final conclusions.

As Table 3 shows, in the period of the general crisis of capitalism there is a decline in the value of fixed capital per average unit of labor. Of course if we were able to exclude from these calculations property of a non-productive nature and unemployed productive capacity, the long-term trend reduction in capital per unit of labor would be expressed more distinctly, and its indices would not rise in years of crises and depressions and fall in war years, as shown in the table.

existing equipment, requiring relatively small capital investments, increase productive capacity several times. The value of new equipment, as a rule, is much lower than the value of the replaced equipment of equal capacity. The extensive introduction of automation exerts a particularly great influence in this direction. The faster expansion of productive capacity as compared with the increase in the value of the instruments of labor can be seen in particular from the drop in capital outlay per unit of output, that is, the decline in the mass of instruments of labor per unit of output. Thus, the US fixed capital outlay ratio has dropped since World War I by 43%. (3) The fixed capital outlay ratio in the mining industry dropped 2.2

Table 3

Calculation of Fixed Capital Per Unit of Labor in the United States

Year	Value of fixed capital (billion dollars)	National income (billion dollars)	Capital per unit of labor	Capital per unit of labor (in % of 1929)
1899-1908	28.4	16.1	1,769	109.6
1909-1918	53.2	29.9	1.776	110.0
1919	89.0	57.0	1.839	113.9
1929	109.7	67.7	1.621	100.0
1939	97.3	54.5	1.786	110.2
1943	120.8	123.9	0.975	60.1
1948	217.2	171.6	1.266	78.1
1950	265.3	184.1	1.441	90.1
1955	367.0	251.0	1.462	90.2

The long-term downward trend of the capital per unit of labor can also be established on the basis of official data for the US manufacturing industry. This data has the advantage of not including the fixed capital of the non-productive sphere, though even it is not free of some distortions resulting from conjunctural fluctuations in the employment of productive capacity. Our calculations, arrived at on the basis of official American statistics, show that the fixed capital per unit of labor in the manufacturing industry of the United States was 0.864 in 1919, 0.744 in 1929 and 0.565 in 1955, that is, in the 37 years since the First World War it dropped by more than one-third.

Such a large decline in the value of fixed capital operated by a unit of labor is due to the fact that modern scientific and technological progress makes it possible to expand productive capacities without a corresponding increase in their value. Today in many instances minor changes in the design of

times between 1919 and 1948. (4) In the manufacturing industry it declined by 35% in the 30 years after 1929. (5)

As for the value of the materials processed by a unit of labor, on the whole it is also declining, although their mass is constantly rising with the growth of labor productivity. For lack of data on the total consumption of raw and other materials in current prices, it is impossible to calculate directly the circulating capital per unit of labor in the US economy. But we can judge the trend of its movement by the corresponding index in the manufacturing industry, which is the main consumer of articles of labor in the country (see Table 4 on the top of the following page).

Table 4 leaves no room for doubt that the circulating capital per unit of labor in the manufacturing industry has a downward tendency. Deviations in some years from the long-term trend are connected with fluctuations of economic activity, which

Table 4

Circulating Capital Per Unit of Labor in the US Manufacturing Industry*

	1919	1925	1929	1937	1947	1950	1953	1955	1957
Raw material inventories, unfinished and finished output (billion dollars)	11.2	12.5	13.8	12.1	28.9	34.3	45.4	43.7	53.5
Net output (billion dollars)	27.2	29.1	34.7	29.0	87.7	105.8	139.8	151.9	166.6
Capital per unit of labor for all circulating capital	0.412	0.429	0.4	0.417	0.330	0.327	0.325	0.306	0.321
Capital per unit of labor (in % of 1929)	103.0	107.2	100.0	113.0	89.4	88.6	88.1	82.9	87.0

* Historical Statistics, Colonial Times to 1957; Statistical Abstract of the United States.

usually tell most on the volume of stocks and their prices.

Thus after the First World War the capital per unit of labor both for fixed and circulating capital began to decline. This means that the growth of the mass of means of production employed by the given amount of labor began to be accompanied by a more rapid drop in their value. Such a situation was observed even earlier. Thus Marx wrote: "In individual cases the mass of the elements of fixed capital may even increase, while its value remains the same or even falls." (6) But while in the past a change in the mass and value of the elements of fixed capital in opposite directions was the exception, it has now become the rule.

The drop in the value of fixed capital in itself does not influence the amount of exploited labor, since the latter is determined not by the value of the existing means of production but by their material volume. The amount of labor which capital can command does not depend on the value of this capital, but on the mass of raw and auxiliary materials, machinery and elements of fixed capital and necessities of life, all of those things which make up capital, no matter what its value may be. (7) But the causes which bring about a decline in the value of fixed capital also lead to an absolute fall of employment in the productive sphere.

In situations where average labor productivity rose more slowly than the technical composition of social capital, an absolute increase in the mass of labor engaged in creating the means of production was a necessity. Otherwise reproduction would be impossible, for the need for means of production caused by the growth in the technical composition of capital increased faster than their production expanded as a result of higher labor productivity. The requirements in production buildings, equipment, raw materials, power, etc., which were rising as a result of technical progress, could not be satisfied only by increasing labor productivity, without drawing fresh labor into branches of Department I. Thus if the technical composition of capital grew, let us assume, three times faster than labor productivity, the additional requirement in means of production could be satisfied only to the extent of one-third by raising labor productivity, while the remaining two-thirds had to be covered by increasing the amount of labor in branches of Department I. In turn, the growth of employment in branches of Department I created an additional demand for the output of Department II. All this furnished favorable conditions for the application of a greater quantity of productive labor both in Departments I and II of social production.

The situation changes radically when the average productivity of labor rises faster than the technical composition of social capital. In this case the greater requirement in means of production lags behind the expansion of their output through higher labor productivity. The absolute amount of labor needed in Department I for satisfying the requirements in means of production declines. (8) This not only undermines the possibilities of increasing employment in the productive sphere, but even makes it difficult to maintain it at a stable level.

Even to command the former mass of productive

labor, capital must now expand production at a faster rate than the rise in labor productivity. If the increase of output keeps in step with the growth in labor productivity, in Department I the mass of labor employed declines to the same extent as the growth rate of labor productivity exceeds the technical composition of capital. Let us assume that in a given period of time labor productivity in Department I rose six times, while the technical composition of all social capital doubled, that is, labor productivity in Department I rose three times as fast as the technical composition of capital. If in the same period total production also grew six times, then the mass of means of production doubled while the amount of labor engaged in their creation declined by one third. The entire mass of productive labor employed in Departments I and II became smaller, although production grew at the same rate as labor productivity. Employment in the productive sphere could remain unchanged only if production expanded more than six times, that is, if it grew faster than labor productivity. But, as we have already pointed out, in the period of the general crisis of capitalism output in the United States is growing much slower than the rise in labor productivity. The relative narrowness of the capitalist market prevents a faster expansion of production. That is why the quantity of labor in the productive sphere in the United States has not increased to any appreciable extent for several decades. For the same reason, subsequently, as the automation of production spreads, in the process of which labor productivity rises many times faster than the technical composition of capital, the amount of labor employed in the sphere of material production in the United States begins to decrease, notwithstanding all artificial stimulants by the state.

For capitalism a cessation of growth in the quantity of productive labor means a loss of the most important source for increasing the mass of surplus value. This attests to the limited, historically transitory character of the capitalist mode of production. As we know, the amount of surplus labor appropriated by the capitalists is determined by the rate of exploitation and the quantity of labor used simultaneously under such a rate. These two factors are by no means of equal significance. A higher rate of exploitation can compensate for a decrease in the total amount of employed labor only to a certain extent. "Two workers, each working 12 hours daily," Marx wrote, "cannot produce the same mass of surplus value as 24 workers who work only two hours, even if they could live on air and hence did not have to work for themselves at all. In this respect, then, compensation for the reduced number of laborers by intensifying the degree of exploitation has certain insurmountable limits." (9) The mass of surplus labor is always only a part of the total mass of employed labor, just as the total mass of surplus value is a part of the value of the national income. That is why if the total quantity of productive labor does not change, the mass of surplus labor can increase through a higher rate of exploitation only within very narrow limits. When the mass of labor employed is reduced, a higher rate of exploitation can somewhat retard the fall in the mass of surplus labor, but it cannot eliminate it completely. "If development of the productive forces reduced the absolute number of laborers, i.e., actually enabled the entire nation to accomplish its total production in a shorter time span," Marx wrote, "this would cause a revolution because a majority of the population would find itself out of circulation. This is another illustration of the specific limit of capitalist production, and of the fact that it is by no means an absolute form for the development of the productive forces and for the creation of wealth, that, on the contrary, at a certain point it collides with this development." (10) Extensive introduction of automation, accompanied by an absolute decline in the mass of productive labor employed brings capitalist production close to this point.

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We have analyzed some social and economic contradictions of capitalism which were engendered and sharpened by the contemporary development of science and technology. In socialist conditions technical progress brings about entirely different consequences. The downward tendency in capital per unit of labor and in capital outlays per unit of output, established above, holds good not only for the United States; it is inherent in all industrially developed countries. In the post-war years such a tendency has been observed in the Soviet Union as well. Thus the capital outlay ratio for fixed productive capital in the USSR was 78.5% in 1959 as compared with 1940.

The decline in capital outlays per unit of output in the USSR resulting from technical progress facilitates higher growth rates of production and more rapid creation of the material and technical base of communism. The relative decrease in the mass of labor employed in the sphere of production associated with the fall in capital outlays per unit of output not only does not create any employment problem in the Soviet Union but, on the contrary, provides the economic basis for reducing the work day and increasing the leisure time enjoyed by the builders of communist society with a simultaneous rise in their real incomes, as envisaged in the

Draft Party Program. "The Soviet Union will thus have the shortest and, concurrently, the most productive and highest-paid work day in the world," the Draft Party Program points out. "Working people will have much more leisure time, and this will create additional opportunities for improving their cultural and technical level."

This graphically demonstrates the superiority of the socialist mode of production over the capitalist mode.

Footnotes

(1) The number of total man-hours actually worked in the sphere of material production is at the same time also the number of man-hours of productive labor of average weighted skill and intensity necessary for the creation of the physical volume of the national income in the given year. This number serves as an index of the total average socially necessary time for the given year, that is, the time which determines the value of the national income.

The number of man-hours actually worked in the productive sphere does not yet give a complete picture of the quantity of social labor expended for the creation of the national income, since it does not take into account changes in the complexity of average labor over time. It is impossible to measure these changes directly. At the same time it may be asserted that the complexity of average labor did not rise to such an extent that the dynamics of the outlays of reduced labor would differ substantially from the dynamics of the actual outlays. During the 20th century, parallel with the rise in the general educational level of production workers as a whole and a certain increase in the stratum of workers with special training, the time given for vocational training and the level of this training declined sharply. The reduced gap between workers with little training and untrained workers is reflected in the rapid decline of the difference between their average wages. See the article by A. Katz, "O Rabochei Aristokratii v Soedinennykh Shtatakh Ameriki," Mirovaia Ekonomika i Mezhdunarodnye Otnosheniia, 1960, No. 7. These two opposing tendencies have to a certain degree counterbalanced each other, which retarded a rise in the complexity of average labor.

(2) In most of these branches the same workers perform productive and non-productive functions. Therefore the term "employed in material production" is understood here as the equivalent of the number of workers necessary to perform only productive functions.

(3) The physical volume of fixed capital for the entire economy of the United States was calculated on the basis of R. Goldsmith's data.

(4) I. Borenstein, Capital and Output Trends in Mining Industries, 1870-1948, New York, 1954.

(5) Calculated on the basis of data provided in U. S. Income and Output, 1958, and Statistical Abstract of the United States.

(6) Capital, Vol. III, 1954, p. 245 [Russian edition; all quotations from Capital have been retranslated from the Russian — Editor.]

(7) Ibid., pp. 258-259.

(8) In Department II employment falls faster than in Department I. This is determined not only by the rise of labor productivity, but also by the intensification of the social division of labor and specialization of production. As the differentiation of social production develops an ever increasing number of productive functions branch out from Department II and acquire independence, inasmuch as their direct result is goods designated for production requirements in other branches. They are transformed from functions of Department II into functions of Department I. For example, in connection with the spread of industrial methods of housing construction, there is an increase in the number of operations which formerly were performed directly at the building site and therefore were related to Department II, while now they are done at industrial enterprises which belong to Department I.

(9) Op. cit., pp. 257-258.

(10) Ibid., p. 274.

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MARX'S CAPITAL AND CONTEMPORARY CAPITALISM*

Marx's Capital is the basic work of Marxism-Leninism, of the doctrine of the victorious socialist revolution. Capital, along with Marx's other works, the writings of Engels and Lenin, and the documents of our Party, form the theoretical basis of the new Program of the Soviet Union, as they have of all its preceding programs.

The Communist Manifesto, The Introduction to the Critique of Political Economy, The Eighteenth Brumaire of Louis Bonaparte and other of Marx's works are an integral part of Marxism, but Capital is its nucleus. Marx himself always considered Capital as his life's work.

Capital is the ideal scientific work: it combines the most profound and detailed factual research with the broadest generalizations, analysis of the essence of the capitalist mode of production and the laws of its development with scientific foresight of its inevitable downfall.

During my own long life I have carefully studied Capital innumerable times. But in rereading it I again find ideas which I had not given sufficient attention to before, whose significance I had underestimated, ideas that even today retain their full import. Let me take just one example. Concerning the supremacy of the Catholic Church in the Middle Ages, Marx writes, "The more able the ruling class is to draw the most outstanding people of the oppressed classes into its midst, the more stable and dangerous is its rule." (1)

And actually one of the major reasons for the relative stability of bourgeois power in the highly-developed capitalist countries is the capacity of the ruling classes to win over systematically some leading representatives of the working class movement, to "draw them into their midst" and transfer them into counter-revolutionary bourgeoisie.

An inexhaustable wealth of ideas makes Capital an eternal source of widsom for serious investigators into the present, past and future history of mankind. It is not our aim to consider all of Capital. I should only like to point out that, in contrast to many bourgeoisie economists who, with the exception of certain classical economists like Quesnet, Smith and Riccardo, glide over the surface of phenomena, Marx reveals the inner essence, the laws of development of capitalism.

The exploitation of man by his fellow man is the basis of the capitalist mode of production, as it is of all other class social formation. Under capitalism, however, in contrast to the previous formations, this exploitation is veiled by the sale and purchase of labor power as a commodity, according to value; it is masked by a seeming equality between the buyer and seller of labor power on the labor market. Marx's purpose in Capital was to reveal the inner essence of capitalism and expose the mechanism of exploitation. Marx shows how surplus value is created by the workers in the process of production and is appropriated by the capitalists, how it is realized by selling commodities at their market value, is turned into profit, and finally is distributed among the various strata of the ruling classes in the form of employers' income, interest and ground rent. Under capitalism any unearned income, in whatever form it may appear, has as its only source the surplus value produced by the proletariat. The motive force of capitalism is the striving to appropriate surplus value, the thirst for profit.

Marx, the supreme scholar, gives us an example of an objective and thoroughly scientific analysis of the capitalist mode of production. But he does not remain an indifferent observer. Capital is a highly emotional work; it breathes hatred for the bourgeoisie and contempt for all apologists of capitalism and falsifiers of political economy, history and philosophy. It is permeated by a warm sympathy for the exploited workers, especially for the women and children, whose situation Marx studied most carefully through official English statistics, Marx speaks ecstatically of any revolutionary action by the proletariat, even the most insignificant. Capital is a book about the class struggle; it is a scientific substantiation of the inevitability of the ultimate victory of the proletariat throughout the world.

The economic analysis of capitalism found in Capital is closely interwoven with Marx's ideas on pre-capitalist social formations, the historical

* On the occasion of the publication of Volume 23 of the second edition of the Collected Works of K. Marx and F. Engels.

premises and the process of emergence of the capitalist social system, and the methodology of economic analysis; it is interwoven with a critique of bourgeois economists (although in less detail than in his Theory of Surplus Value), with observations on the common features of the economies of all social formations, and on the future socialist and communist society, with thoughts and observations concerning philosophical problems — the dialectic method, the dependence of the consciousness, the ideology of men, on their social being, etc.

Therefore attempts to present the economic doctrine of Marx in isolation meet with failure. They are almost always undialectical, dry, and devoid of the spirit of class struggle. (2)

Marx always emphasized the difference between the laws of the capitalist mode of production and the laws of nature. According to Marx, a law, being an internal relationship between phenomena and processes, manifests itself through a struggle between various tendencies as the ruling tendency. He writes: "Generally under capitalist production every general law is realized in a very confused and approximate way, simply as a prevailing tendency, as some sort of average tendency which is constantly fluctuating and which is never firmly established." (3)

Marx consistently applies the dialectical method in his analysis. I would like to recall for the reader these words of Lenin: "At the beginning of Capital Marx analyzes the most simple, ordinary, rudimentary, generally apparent, commonplace relationship, which one meets up with billions of times in a bourgeois (commodity) society: the exchange of goods. Analysis reveals in this simplest of phenomena (in this little "cell" of bourgeois society) all the contradictions (resp. the seeds of all contradictions) of contemporary society. Further exposition indicates the development (both growth and movement) of these contradictions and of this society, in the Σ of its separate parts, from its beginning to its end.

"In general, this should be the method of exposition (resp. study) of the dialectic...." (4)

Capital is a model of dialectics, an example of its proper application. A lack of understanding of dialectics is at the basis of the assertion by bourgeois critics that Capital contains "innumerable repetitions." There are no repetitions in Capital! What appears to the person who does not think dialectically as "unnecessary repetition" is investigation of the subject from various points of view. The analysis of capital itself can serve as an example.

From the point of view of the formation of value and surplus value, capital is divided into constant and variable capital. The latter gives rise to new value, which is in itself surplus value.

From the viewpoint of transferring existing value to a new product, capital breaks down into fixed capital (buildings, machines and equipment) the value of which is transferred to a product gradually, over an extended period of time, in the process of several turnovers of capital and circulating capital (raw materials, secondary materials, etc.), the value of which is entirely transferred to a new product with each turnover.

From the point of view of function, capital exists in three forms: industrial, loan, and trade. Industrial capital assumes different forms. It begins its activity in a monetary form; as a result of purchases of means of production and labor power, it takes the form of productive capital which in the course of a certain period is found in the production process where it absorbs surplus value. After the completion of the production process it once again assumes the form of a commodity. However, this again produced commodity has a value which is greater than it was at the beginning of the production process. After this, if the commodities are sold, the capital once more assumes a monetary form, but this sum of money is now larger than the initial amount.

After a comprehensive analysis of individual capital, Marx analyzes the movement of aggregate social capital. This is no by means "repetition"; it is a necessary step in analysis. Marx writes: "We are not talking about definitions, under which things can be classified. The discussion concerns definite functions, which should be expressed in definite categories." (5)

The reproach of bourgeois professors that Marx supposedly does not have a "complete theory of crises" is also due to their lack of understanding of dialectics. Actually Marx created the only correct theory of crises. At the stage of analysis of simple reproduction he demonstrates the possibility of crises. In analyzing the process of capitalist production as a whole, he demonstrates the inevitability of periodic crises of overproduction. The validity of Marx's theory has been confirmed by the experience of an entire century.

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Is Capital actually a difficult or, as many bourgeois critics maintain, a completely incomprehensible book?

Capital is not, of course, a work of belles-lettres. Patience and effort are necessary in order to understand it. This is due to the depth and wealth of thought which it contains, as well as to the fact that the essence of the capitalistic mode of production, which Marx brought to light, is sharply different from customary "reality," that is, from the

outward manifestation of this essence.

Subjectively, therefore, Capital is read with difficulty. Objectively, however, this book is quite comprehensible. It is constructed in a completely logical way; every part is based on the results of the previous parts. There are no vague or indefinite parts, no non-dialectical contradictions. Bourgeois economists write incomprehensible books, although they are easy to read. The superficial manifestations of capitalism are examined in them rather than its essence. That is why these books can be interpreted in various ways; they are lightweight by virtue of their external erudition. They are objectively incomprehensible, since they contain nothing rational.

What are the reasons for the subjective difficulties in studying Capital? The first reason has to do with the greatest virtue of the work, that it analyzes the essence of capitalism and not its superficial phenomena. Under capitalism people are filled from childhood with the illusion that the capitalist provides the worker with work and bread, that he "maintains" them. (The efforts of the apologists of "free enterprise" have helped in this in no small measure.) That is why Marx's completely correct thesis that "the money given to the worker is essentially only a transformed, equivalent form of a certain part of the value of the commodity produced by the worker hinself" is difficult to understand subjectively. (6) It is also difficult to understand that it is not the capitalist who "gives bread" to the worker, but in reality it is the worker who maintains the capitalist.

Under capitalism people are accustomed from childhood to the idea that anything can be bought for money. Therefore it is difficult to understand subjectively that the ability to serve as a purchasing agent is not a property of money itself, but an expression of a definite social relation, an expression of a commodity economy.

People know that they can put their money in a savings bank and receive interest on it. As a result it is easily possible to believe the assertions of vulgar economists that capital, by itself, possesses the property of creating profit. In order to understand the actual source of all profit, it is necessary to overcome the firmly entrenched illusion that money automatically yields profit.

A capitalist selling commodities on the market and the consumer buying these commodities are convinced daily that the prices of commodities depends upon the relationship of supply and demand, on competition. It is difficult for them to get to the essence of the phenomenon, which is that the market price of the commodity is, in the final analysis, determined (excluding chance fluctuations) by social value. The entire "life experience" of the person who lives in a capitalist society, his "common sense," make it difficult to understand the essence of capitalism as revealed in Capital.

The reader's class status and political convictions are also an important subjective factor. Although a worker in a capitalist society seldom has the opportunity to understand the details and subtleties of capital as a social relation, he can from his own experience easily understand its essence — exploitation. He must work hard every day, and lives poorly, whereas the capitalist lives well without working. It is easier for a communist, who is fighting against the capitalist system, to understand Capital than for the defenders of the system.

Capitalists, bourgeois professors of political economy who serve capitalism, and all those who have an interest in preserving the capitalist system find Capital incomprehensible because they do not want to understand it as a result of their class interests. To understand Capital is to uncover the untruths about the benefits of the bourgeoisie and capitalism, and to recognize that capitalism is a social formation which is historically doomed to destruction, and is not eternal.

Bourgeois critics of Capital often reproach Marx for allegedly paying too much attention to production and for not attaching suitable significance to consumption. This is incorrect. Consumption and production form a dialectical unity and Marx always examined them in their mutual connection. Marx clearly and accurately characterizes consumption as the ultimate goal of production. He writes: "...the production of constant capital never occurs for its own sake; it occurs only because this constant capital is consumed in greater quantities in those branches of production whose products are for personal consumption." (7)

It is generally known that Marx regards the contradiction between capital's striving for unlimited expansion of production and the limited effective demand of the masses under capitalism as the ultimate cause for the inevitability of overproduction crises. Marx is the first economist who analyzed the consumption of labor power in the production process and pointed up its significance in the creation of surplus value.

Bourgeois criticism of Capital is superficial and incorrect because the critics, not understanding dialectics, consider only separate parts of the work, taken out of context. Capital can only be understood as a single entity.

The debate over interpretation of the schemes of reproduction of aggregate social capital at the beginning of the 20th century show what can result when these demands are disregarded. "Orthodox" opportunists (Kautsky, Hilferding and others)

declared that capitalist reproduction, according to Marx's schemes, could supposedly be realized without hindrance. In 1926 Hilferding went so far as to state at a meeting of a bourgeois scientific society that it is well that the second volume of Capital is seldom read, because from the schemes of reproduction it is possible to draw the conclusion that capitalism is eternal. On the other hand, the revolutionary Rosa Luxemburg asserted that Marx's schemes show the inevitability of capitalism's automatic collapse as a result of the impossibility of accumulating capital.

It is clear that both sides were wrong, since they ignored Capital as an entity and proceeded from the mistaken viewpoint that Marx drew up a scheme of the actual, real process of capitalist reproduction. The opportunists' assertion contradicts Marx's doctrine as a whole: the inevitability of disproportions, of periodic crises of overproduction, and the inevitable overthrow of capitalist rule by the revolutionary proletariat. Rosa Luxemburg's conception runs counter to the whole spirit of Capital as the scientific basis of the class struggle. Although fifty years have passed since her book was published, the accumulation of capital continues at high rates despite the general crisis of capitalism.

The most general conditions in which the process of capitalist reproduction can proceed evenly are given in Marx's schemes. But Marx never thought that constant equilibrium, a constantly restored proportionality, an even course of capitalist reproduction were really possible. He himself says the following about these schemes: "The fact that commodity production is the general form of capitalist production...gives rise to certain conditions of normal exchange, hence of a normal course of reproduction on both a simple and expanded scale, which is characteristic of this mode of production. These conditions, which are transformed into so many conditions of an abnormal course of reproduction, into so many possibilities for crises, since equilibrium, given the spontaneous character of this production, is itself accidental." (8) (Italics mine – E. V.)

Capital contains many analogous statements, and it is strange that both sides could so incorrectly understand Marx's schemes.

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After the publication of the first volume of Capital, the exploiter classes launched a violent attack against Marxism. At first the bourgeoisie generally attempted to suppress the book. When they did not succeed, they unleashed against Capital a whole army of apologists for capitalism, in the front ranks of which were professors of political economy. In the last quarter of the 19th century one could hardly find a single German professor of economics who had not published a book or brochure which "refuted" Capital.

But the campaign of the bourgeois professors did not have the expected effect: Marxism increasingly became the ideology of the revolutionary workers. The bourgeoisie then changed its tactics. Instead of the crude frontal attack, a "laudatory" discrediting of Marxism, an emasculation of the revolutionary spirit of Capital, was begun. For this purpose the bourgeoisie mobilized the leaders of right-wing social democracy. The "scientific" works of Bernstein, David, Hertz, Hildebrandt and others, which criticized individual propositions of Marxism and strove to dilute the revolutionary content of Capital, appeared one after the other. Nowadays we find this same line of attack against Marxism in the books of Laski, Strachey, Browder and others.

The victory of the Russian proletariat in the Great October Socialist Revolution resulted in a new rise in Marxism's influence throughout the world. The revolutionary Third International replaced the bankrupt Second International. The bourgeoisie found that an ideological struggle against Marxism was insufficient. In a number of countries it brought fascism to power; communist and even socialist parties were banned. This is still the case in the United States, the Federal Republic of Germany, Franco's Spain, and a number of other countries.

After World War II the bourgeoisie once again changed its methods of struggle against Capital. It realizes that in a world in which one-third of humanity has thrown off the fetters of capitalism and is successfully building a socialist and communist society, Capital cannot be defeated by mere denial. The ideologists of the bourgeoisie and of right-wing social democracy now declare that Marxism was correct, but only for the underdeveloped countries; it is not suitable for highly developed countires, since in these countries capitalism has nothing in common with the capitalism of Marx's time, is radically different from it, and actually is no longer capitalism. Let us examine this most recent line of attack against Marxism, against Capital, in greater detail.

Contemporary capitalism remains the same social system it was when Capital was published. The laws of its development remain as they were before. As then, the pursuit of profits and still greater profits is the motive force of capitalist production. Now, as before, the source of profit is surplus value, produced by the workers and appropriated by the bourgeoisie. Even now the worker must sell his own labor power daily in order to live. Even now the capitalists can live in luxury

without working. As before, the concentration and centralization of capital continues, as does the process by which the small producers and small and medium capitalists are ruined. The basic contradictions of capitalism — between the social nature of production and private appropriation — continues to exist. That is why there are still crises, mass unemployment, and class struggle between capital and labor.

Moreover, capitalism today corresponds more closely in several important aspects to the theoretical conceptions in Capital than during Marx's time. As is well known, Marx, in order to simplify the analysis, examined a "pure" capitalist society, consisting of but two classes — the proletariat and the capitalists — although, of course, he was well aware that petty commodity producers constitute a substantial portion of the workers. At the present time the overwhelming majority of the population are proletarians (workers and employees). The figure for England, for example, is 95%.

Marx proceeded from the fact that capitalist production wholly and completely encompasses all branches of the economy, although at that time agriculture, with the partial exception of England, was carried on primarily by primitive methods and was, to a substantial degree, natural in character. Today agriculture in highly developed countries is carried on with the aid of complex machines and is a branch of capitalist production, in which the organic composition of capital often approaches the composition of capital in industry.

Now let us turn to the "arguments" of the defenders of the theory that capitalism has radically changed in the highly developed capitalist countries. They maintain that the workers in the "rich" capitalist countries have themselves supposedly become capitalists. What demagogic nonsense! Many American workers actually buy their automobiles and even their little homes on the installment plan; they insure their lives so that in the event of the breadwinner's death their families will not immediately be in need. Some even have some savings. But are they capitalists? Not at all! Just as before, they have to sell their labor power to a capitalist. Just as before, they are objects of exploitation. The capitalist is the one who can live without working, by exploiting others.

The widely publicized acquisition of stock by workers, especially American workers, is a special form of demagogy. Many capitalists foist the enterprise's stock on their workers and employees, hoping to give them an incentive for increasing the firm's income and to strengthen their control over the joint-stock company (the greater the number of small share-holders of the particular firm, the smaller the amount of shares necessary for its control). We often encounter claims in the American press to the effect that there are millions of share-holders in the United States and, as a result, that capital belongs to "all the people." Consequently, they say, there is no difference whatsoever between workers and capitalists in the United States. What a lie! Possession of one or a few shares yields the worker an income of between 10 and 25 dollars a year. Therefore he was, and still is, an exploited worker — a proletarian.

Gaitskell, the leader of the British Labor Party, invented a new variant of this falsehood: he declared that England is no longer a capitalist country, since in England "everybody works." Mr. Gaitskell evidently regards as "work" a rentier collecting dividends, a landlord collecting rents, and a home owner collecting rent. Even for the exaction of this income the capitalist uses hired employees.

In the West one often hears talk about "managerial socialism," the essence of which boils down to the fact that capitalists are supposedly no longer the masters of their enterprises, insofar as direction of the enterprises is transferred to employees, directors, the so-called managers. This is nonsense! The real master of a firm is the owner of the controlling number of shares. McNamara, the present U.S. Secretary of Defense was once president of the Ford Motor Company, and Ford himself was only a member of the board. Ford could replace McNamara at any time, however, since McNamara was only Ford's employee.

The apologists of capitalism maintain that the economic successes of the Soviet Union and other socialist countries is due not to the socialist system but to successful planning. They also assert that planning can provide the same rates of economic growth under capitalism as it does under socialism.

This is either a deception or misunderstanding of the essence of socialist planning. A society can plan its economy only when the means of production, at least the decisive portion, are socialist property. Planning is impossible under capitalism, where the decisive portion of the means of production is in the hands of the capitalists, where the capitalists and their unions, in accordance with personal interests, can produce a certain commodity or discontinue its production, sell or not sell their manufactured articles, and increase or reduce their prices.

It is true that a number of bourgeois countries such as France and Italy have long-range plans. But what are these plans? The state plans only the development of the state sector. With respect to

the private sector, which is much larger proportionally, only prognoses of spontaneous development can be compiled, based upon the total of previous years. Insofar as the state sector co-exists with the private sector, and is intimately intertwined with it, it is subjected to the strong influence of the anarchy of the capitalist market. This makes even the planning of the state sector unreliable. "Regulation" of capital investment, price formation and foreign trade in the private sector by the state is effective only when it serves the interests of the great capitalists. If it does not serve their interests, they find many ways to circumvent it. Planning, in the present sense of the word, is impossible in the conditions of anarchy prevailing in capitalist production.

In emphasizing, notwithstanding bourgeois and social-democratic demagogy, that contemporary capitalism is the same social system, with the same laws of development, as in Marx's time, we by no means wish to say that capitalism has not undergone any changes. These changes are so vital and numerous that it does not seem possible to consider them in detail within a single article. Marx, however, foresaw these changes.

English capitalism of the third quarter of the 19th century, upon whose study Capital was primarily based, was, from a contemporary point of view, undeveloped, primitive and impoverished, despite England's "industrial revolution" at the end of the 18th century, and despite the fact that it had the most powerful colonial empire. Production techniques and transportation were backward. Steam power was the only form of energy used in factories, on railroads, and in ships. Sailing vessels still constituted the major portion of the navy. There were no electric motors, automobiles, airplanes, telephones, or radios. Heavy industry was poorly developed; only 4.7 million tons of pig iron were smelted in 1871, and the smelting of steel was insignificant. Light industry was most characteristic of English capitalism at the time. The textile industry occupied the most prominent position.

Labor productivity was not high because of general technological backwardness. The owners compelled their workers to toil 10 to 12 hours a day. Wages were low, the level of exploitation was high, and the workers lived in horrible poverty. The concentration of production was very slight; in 1870 an average of 165 workers were employed per factory in the leading branch — the textile industry.

In 1885 the national wealth of England was estimated at 10 billion pounds sterling, of which more than half took the form of land, housing, furniture, state and municipal property, rather than productive capital. Capital constituted only 4.5 billion pounds sterling, of which only 1.4 billion was invested in industry and trade, and almost as much (1.3 billion) was invested abroad. By way of comparison, we note that the assets of "General Motors" in 1960 were 8.5 billion dollars, that is, 3 billion pounds sterling. Even if we take into consideration the depreciation of currency, this sum is approximately equal to the sum of capital invested in English industry during Marx's time.

The English government was also poor. In the fiscal year 1877-1888 government expenses amounted to 80 million pounds sterling, including 28.6 million pounds for the army and navy. At the present time, as we know, the military expenditures of England are reckoned at more than 1,500 million pounds annually.

Even the bourgeoisie was not rich by present day standards, although the England of that time had a substantial parasitical stratum of rentiers. The overwhelming majority of capitalists personally ran their enterprises; the bourgeoisie lived economically and accumulated means. It stands to reason that the other capitalist countries of the era were technologically even more backward, undeveloped and poor than England.

Marx's genius is confirmed by the fact that in analyzing this "classical" pre-monopoly capitalism, which existed on a comparatively small portion of the earth, he revealed the internal laws of its development and defined its future course. (9)

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Yes, contemporary capitalism is incomparably more developed, more productive and richer than it was in Marx's time. This, however, is only a quantitative difference. What is decisive historically is the qualitative difference.

While Capital was being written, capitalism was historically a progressive social formation. It was to fulfill an important historical mission: by developing the productive forces, it was to create the material base for the building of socialism, convert direct producers into proletarians, rally the workers into great armies, make revolutionaries of them, create its own grave-digger.

Contemporary capitalism is historically an obsolete, dying social formation (it has already died on one-third of the earth) which has objectively turned into an obstacle to human progress. Here we have the decisive qualitative differences. The bourgeoisie now has but one goal: to preserve its obsolete system. As the Party Program points out, socialism today is increasingly becoming the decisive factor in world history.

This does not mean that the capitalist countries have been compelled to conduct their politics in accordance with the demands of the socialist world. It does mean, however, that the great bourgeoisie

must take the mutual relations between the capitalist and socialist worlds into account in their foreign politics, and frequently even in their internal politics. The bourgeoisie cannot even develop its relations with the workers in the old way, following their own interests exclusively. They must take care not to accelerate the rate at which the working class is being made into a revolutionary class. Sometimes the bourgeoisie must restrain certain monopolies which, ignoring the general class interests of the great bourgeoisie, sharpen class contradictions. Nixon's intervention, while he was Vice-President, in the metallurgical workers' strike in order to achieve a compromise is a clear example of this. The existance of the socialist world and its successes are having an increasing influence on the entire life of the capitalist world.

Since Capital was written, joint-stock companies have supplanted individual enterprises everywhere. The growth of concentration has given rise to monopolies, to monopoly capitalism — imperialism.

Lenin has given us an excellently elaborated doctrine of contemporary capitalism. His Imperialism As the Highest Stage of Capitalism is a continuation and creative development of the ideas in Capital. Lenin frequently repeated that the laws which Marx revealed in Capital remain completely valid even under imperialism. Concentration gave rise to monopolies. Monopolies, which fleece the people and the small and medium sized capitalist enterprises, have brought concentration to an unheard of scale. At the end of 1960 the capital of the 100 largest industrial, trade and transport firms in the United States amounted to 176 billion dollars. Taking depreciation of currency into account, this sum exceeds all the capital invested in English industry, trade, and transport in 1885 by 17 times. Along with the increase in wealth, the parasitism of the great bourgeoisie grew to monstrous proportions. In the United States in 1960 dividends and interest amounted to 40.8 billion dollars. This sum is equal to the average annual wages of 12 million American industrial workers.

There exists a huge gap between the incomes of the financial oligarchy and the workers, and this gap continues to widen.

There is no statistical data on the incomes of the wealthier people in the United States, but we can make approximate estimations. It is estimated that the elder Kennedy, the father of the present President, has a fortune of roughly 300 million dollars. If we assume that this capital yields only 5% interest, his income amounts to 15 million dollars a year. It is clear that it is impossible to spend such a sum on personal consumption. Large capital continues to increase.

The luxury of American millionaires borders on madness. It was reported in the American newspapers that Ford arranged a celebration in honor of his daughter's 18th birthday, and for the occassion he sent for a gardener from Paris and had twenty thousand rose-bushes planted. All this cost 225 thousand dollars, a sum equal to the yearly earnings of 271 agricultural workers.

While American millionaires are thinking up the most fabulous schemes to spend their parasitically acquired incomes, it is estimated that there are over 5 million people completely unemployed in the United States. Of that number, more than one million are no longer entitled to unemployment benefits and live on a pittance which is given them by charity. While the bourgeoisie of highly developed countries accumulates incalcuable wealth, the majority of the population of the underdeveloped countries of Asia, Africa and Latin America continue to live in poverty.

In contrast to Marx's time, the great bourgeoisie has become a completely parasitic stratum with no connection whatsoever with production. Its physical work is done by wage workers, engineers perform the technical direction of the enterprises, office work is handled by office employees, well-paid director-managers do the administrative work, and hired scientists carry on the scientific research. The great bourgeoisie squanders money and is involved with "high policy" and speculation.

A social system which leads to such results is historically ripe for destruction.

How does it, nevertheless, maintain its existence? The following are the most important means by which it does this.

A) State-monopoly capitalism, which combines the strength of the monopolies and the state for the purpose of preserving the capitalist social system in individual countries and throughout the whole bourgeois world. State-monopoly capitalism has yet another goal: to ensure, with the state's help, the enrichment of the monopolies by redistribution of the national income. These goals contradict each other politically. In its striving to perserve the capitalist social system, the monopolistic bourgeoisie enjoys the support of those strata whose source of income is exploitation. In reducing the income of these strata, however, monopoly capital is expropriating them on a mass scale. This leads to the growing isolation of the monopolists and creates, as the Party Program pointed out, the possibility of uniting the whole people in struggle against the rule of the monopolists.

One must carefully distinguish between state-monopoly capitalism and state capitalism. The former is historically reactionary, while the

latter, in the underdeveloped countries, is relatively progressive, in that it promotes the development of the productive forces.

B) The apparatus of suppression (the army, police, gendarmes, the courts, prisons, etc.), which has never been, throughout the history of capitalism, as strong or as costly as it is now.

C) The so-called "above-class" general welfare state. The ideologists of imperialism cultivate in every possible way the illusion that the activities of the capitalist state serve the workers' interests. In fact they serve only the interests of the great bourgeoisie. Government policy in the areas of social security, public health, and so on is intended, on the one hand, to maintain the workers' health at a level necessary for their exploitation, and, on the other, to bring the workers politically closer to the existing system. In view of the demands which present-day technology makes on workers, the capitalist cannot get along without general compulsory school education. In 1960, for example, the Association of English Employers requested that the government increase the term of compulsory school education because young workers do not calculate well enough for present-day technology and have a poor knowledge of the English language.

D) Reformism — right social democracy and its leaders, who have been bought off by the bourgeoisie and have joined it. The influence of reformism has grown in post-war years in the highly developed countries — in the United States (where the trade union leaders are the reformists) and in Western Europe, where there was no mass unemployment in the post-war years, where the growth of labor productivity without a corresponding reduction of working time facilitated a significant increase of surplus product appropriated by the bourgeoisie, and where this gave the bourgeoisie an opportunity to provide a somewhat higher standard of living to a considerably wider stratum of the workers than the previous labor aristocracy. This does not at all mean, as the apologists of American capitalism proclaim, that the entire American working class lives well. Nothing of the sort. Side by side with the millions of unemployed and partially employed there are many millions of poorly paid people: the unfortunate agricultural workers who wander all year from one part of the country to another, the negroes, immigrants (especially those who have illegally come across the country's southern borders), the workers in the tobacco and sewing industries. Official data indicating an increase in the proportion of elderly women who are working testifies to this as shown in the table on the top of the adjoining column.

It is not due to a good life that old women enter into wage labor.

	1940 (in %)	1960
Women from 55 to 64	19	38
Women 65 and over	6	11

E) The ideological subordination of the proletariat, historically rooted and preserved by the bourgeoisie in every way it can. About six million trade union members voted for candidates of the Conservative Party in the last parliamentary elections in England. It is especially in the highly developed capitalist countries that the powerful influence of church, school, press, radio and so on impede the dissemination of revolutionary ideology.

The bourgeoisie can perhaps delay somewhat the inevitable downfall of the capitalist social system, but it cannot prevent it. The internal contradictions which Marx revealed in Capital will inevitably bring this structure to ruin. In the United States, the richest capitalist country, where technology develops at the fastest rate, the bourgeoisie cannot assure employment to the workers. Production increases, but employment drops. Internal contradictions and wars against colonial peoples who are fighting for their freedom are weakening capitalism. Capitalist society is now without any sort of progressive ideology: anti-communism, the striving to maintain exploitation,aand the pursuit, where possible of higher profit is its real ideology. Everything else is used to deceive those who are exploited. Capitalism is growing relatively weaker while socialism is growing stronger.

This change in the relationship of forces is determined by the following major factors.

A) The rates of growth of production under socialism are several times greater than under capitalism.

One English bourgeois institute, The National Institute of Economic and Social Research, calculated the annual rate of growth of production per worker in the major capitalist countries for approximately the last hundred years (up to 1959). The results shown in the table in the left column on Page 62.

We can say that the average annual rate of production growth per worker in the leading capitalist countries comes to 2% for the last century. There is no reason to suppose that it will be any higher in the future.

Apologists of capitalism, referring to the significant growth of industrial production after World War II, maintain that profound crises of

	Base year	Rate of growth in %
Japan	1880	2.1
Italy	1863	1.2
Germany	1853	1.5
France	1855	1.5
The Netherlands	1900	1.1
Sweden	1863	2.1
United States	1871	2.0
England	1857	1.2

overproduction like the one from 1929-1933 will never occur again. But this assertion has no scientific basis.

The crisis of 1929-1933 and the period of depression which followed it was the result of the operation of the laws of capitalism in the period of its general crisis. The upsurge of production and the temporary absence of profound overproduction crises in the post-war period in the highly developed countries is primarily the result of World War II. Tens of millions of young men were taken into the army. Millions of others were employed in military enterprises producing instruments of destruction which were destroyed on the battlefields without any benefit to society. Arms and military equipment constituted about one-half of all production. Items intended for long use were not produced. New homes were not built and old ones were not repaired. Supplies of raw materials and manufactured goods were exhausted. Fixed capital was worn out, especially in non-military branches. Tremendous values were destroyed by aerial and artillery bombardments. Instead of real values, monetary means were accumulated: money in peasant strongboxes, deposits in savings banks, state loans in the hands of the urban population, and huge sums in bank deposits and government securities held by the capitalists. This extraordinary and significant expansion of the capitalist market led to an intense growth of post-war production in such countries as the United States and Canada, which were not theaters of war. Somewhat later an analogous process unfolded in the countries which had been defeated (West Germany, France, Italy and Japan), where military destruction did not permit restoration to begin right after the war. Despite the new impetus to production growth in the United States provided by the Korean War, the factors which gave rise to the great expansion of the capitalist market after the war had exhausted themselves by this time. The constant laws of capitalist production, which lead to a relative narrowing of the market, increasingly determine the course and contenance of capitalist reproduction. The dynamics of industrial production in those capitalist countries which were not theaters of military action clearly testifies to this.

Industrial Production

(1953 = 100)

Year	US	Canada	England
1956	109	120	113
1958	102	120	113
1960	119	130	128
1961 (first half)	121	128	130

In the last five years production has increased very slowly in these countries. There were no bases for a new upsurge. The contradiction between the social character of production and private appropriation was sharpened to such an extent that only 80% of the production capacity of these countries is being used. This hinders mass renewal and growth of fixed capital, without which a real upsurge is impossible. As the breach caused by the mass destruction of life during the Second World War is filled, unemployment will assume an even greater mass character. This will narrow the market for consumer goods. The agrarian crisis decreases the purchasing power of peasants and farmers. There will be no "golden decade of the sixties," as predicted by American economists. A 6% growth of production, predicted by Fortune, the organ of the great bourgeoisie of the United States, is unrealistic.

An extended upsurge is also impossible for those countries which suffered from the war and consequently began restoring their economies much later. Today the capitalist economy is more reminiscent of the 1930's than the 1950's in terms of the operation of its internal laws of development. The victory of socialism in the economic competition is assured.

B) The socialist world has common goals. The progress of one country strengthens all the other countries. The socialist countries are united by the common ideology of Marxism-Leninism.

The capitalist world is rent by innumerable contradictions: between the imperialist powers themselves; between imperialism and the colonial peoples who are freeing themselves, and so on. In some countries a struggle is going on between labor and capital. The contradiction between the

monopolists and all the other classes and strata of society is sharpening in the imperialist countries.

C) The material and, also, the scientific and technical base is developing more rapidly in the socialist countries than under capitalism, because under socialism it serves the interests of society as a whole, while under capitalism it serves the interests of capital in acquiring profits.

The Soviet Union has already outstripped the leading capitalist countries in important areas of science and technology. This has ensured a strengthening of the defense capacity of the Soviet Union and the entire socialist world. Warmongers can urge an attack on the Soviet Union all they like, but it must be supposed that responsible statesmen will carefully consider whether it is worth hastening the end of capitalism by unleashing a third world war.

Socialism is thus inevitably becoming the decisive factor in world development. In a certain sense, as indicated above, it already is the decisive factor. The whole policy of the ruling classes of the imperialist countries and their satellites is aimed at preserving the capitalist system and at struggle against socialism. The imperialists examine their every step, their every measure in the areas of economics, ideology and, first and foremost, politics exclusively from the viewpoint of whether it helps or harms socialism. It is precisely this fact which explains why all the imperialist countries, despite the contradictions which exist between them, have united in a military bloc. It explains why there are American, English, and French military units on German territory, why West Germany forces conduct maneuvers in England and France, and why the leaders of the "democratic" countries proclaim fascist countries as members of the "free" world and conclude military pacts with them. It explains why the imperialists, who have been shamelessly oppressing colonies for centuries (and which today, after the political emancipation of these countries, are still exploiting them) pose as friends of the economically underdeveloped countries.

But the maneuvers of the ruling classes, which are aimed at preserving the capitalist system, are doomed to failure. The revolutionary theory of capitalism's downfall elaborated in Capital has become practice: in our historical epoch of the transition from capitalism to socialism, the complete victory of Marxism-Leninism, socialism and communism is historically assured throughout the world.

Footnotes

(1) Capital, Vol. III, 1955, p. 615 [Russian edition. All quotations from the works of Marx and Engels have been retranslated from the Russian — Editor.]

(2) The best known of such attempts was Kautsky's book Karl Marx's Economic Doctrine, which was popular in its day. Victor Adler, the leader of Austrian Social Democracy up to the First World War, said in reply to readers' complaints that Kautsky's book was difficult to understand, "I know a good commentary to Kautsky's book: Capital by Karl Marx."

(3) Op. cit., p. 168.

(4) Vol. 38, pp. 358-359 [Presumably reference here is to Lenin's Collected Works — Editor.]

(5) Capital, Vol. II, 1955, p. 222.

(6) Ibid., p. 67.

(7) Capital, Vol. III, p. 316.

(8) Capital, Vol. II, p. 496.

(9) Marx wrote: "The bourgeois economist, whose limited brain is not able to distinguish the form of a manifestation from that which is manifested in it, shuts his eyes to the fact that even at the present time everywhere on earth the labor fund only in exceptional cases appears in the form of capital." See K. Marx and F. Engels, Soch., Vol. 23, p. 581. (Italics mine — E. V.)