

# Soviet Technology: System *vs.* Progress

By Gertrude E. Schroeder

**I**n the past several years, the Soviet regime has focused major attention on the task of accelerating technological progress, even to the extent of making the rate of technological advance the touchstone of the nation's success in its ongoing contest with capitalism. Technological progress has become a major theme in the Soviet press, and numerous government decrees and regulations have been aimed at increasing the rate of introduction of new technologies and products. As will be seen, however, the payoff from this ambitious campaign has thus far been minimal.

General Secretary Brezhnev himself posed the challenge the Soviet Union must meet in the technological field in an address to the International Conference of Communist and Workers' Parties held in Moscow in June 1969, and he admitted then that "the struggle . . . will be protracted and diffi-

cult."<sup>1</sup> He reiterated the challenge nearly a year later when, invoking the authority of Lenin, he said: "The fundamental question now is not how much you produce, but at what cost. . . . It is in this field that the center of gravity in the competition between the two systems lies in our time."<sup>2</sup> A Soviet journalist has put the matter even more graphically: "The campaign to accelerate technical progress has no less significance in our time than the struggle for industrialization in the years of the early five-year plans."<sup>3</sup>

Meanwhile, in an orgy of self-flagellation apparently intended to impress upon all the magnitude of the task at hand, the Soviet press has cited numerous examples of Soviet industry's technological backwardness relative to Western industry. The drive to eliminate this embarrassing gap has generated dramatic slogans about a technological race with capitalism, but the campaign is also closely tied to Soviet efforts to increase economic efficiency.

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<sup>1</sup> *Pravda*, June 6, 1969.

<sup>2</sup> *Ibid.*, April 14, 1970.

<sup>3</sup> *Trud*, March 5, 1969.

## Technological "Tailing"

In the past decade the national economy of our country has begun to show threatening signs of dislocation and stagnation. . . . The growth rate in national income has been going inexorably down. A rift has opened up between what is necessary for normal development and the real introduction of new production capacities. . . . Defects in the system of planning, accounting and incentives often lead to a contradiction between local or bureaucratic and state or national interest. The result is that reserves are not available and used for production research as they should be, and technological progress is severely retarded. . . . In our country labor productivity continues, as before, to be many times lower than in capitalist countries, and its growth rate is sharply declining. . . .

When we compare our economy with that of the United States, we see that ours is lagging behind, not only quantitatively, but—and this is the saddest part—also qualitatively. The more novel and revolutionary the aspect of the economy, the wider becomes the gap. . . . We are ahead of the US in the production of coal but behind in the production of oil, gas, and electric power, ten times behind in chemistry, and immeasurably behind in computer technology. The latter is especially essential, for the introduction of electronic computers into the national economy is of decisive importance and could radically change the face of the system of production and culture in general. This phenomenon has rightly been called the "second industrial revolution." Meanwhile, the total capacity of our pool of computers is hundreds of times less than in the USA, and as for the use of electronic computers in the national economy, here the difference is so enormous that it is impossible to measure. We are simply living in a different era. . . .

In the late 1950's, our country was the first to launch a sputnik and to send a man into space. By the end of the 1960's, we have lost the lead in this field (as in many others). The first men to set foot on the moon were Americans. This is one of the outward signs of an essential and ever-growing gap between our country and the West extending through the whole spectrum of scientific technological activity.

—From the Appeal of scientists A. D. Sakharov, V. F. Turchin and R. A. Medvedev to Soviet party and government leaders, March 19, 1970. Translated in *Survey* (London), Summer 1970, pp. 160–70.

The Soviets fully recognize that accelerated technological progress is essential if the rate of USSR economic growth is to be boosted above the level of the past decade—or, indeed, if the recent decline in the rate of growth is to be halted. As *extensive* means of accelerating growth—i.e., increases in the rate of investment and the rate of labor-force participation—near exhaustion, *intensive* sources of growth—improved technology and management—assume new importance. It is not surprising, therefore, that the Soviet leadership has launched a frontal attack on what it believes to be the root causes of the failure of the Soviet economic system to generate more rapid technological advance. This shortcoming was evidently a major theme at the Plenum of the CPSU Central Committee in December 1969, as well as a key point in a (still unpublished) followup letter to party, government, trade union and Komsomol organizations "concerning improvement of the use of production reserves and strengthening economic discipline."<sup>4</sup> This letter, which in effect introduced the most recent and most energetic campaign for economic efficiency, reportedly bore the joint imprimatur of the party Central Committee, the Council of Ministers, the All-Union Council of Trade Unions, and the Central Committee of the Komsomol.

## Dimensions of the Gap

The Soviet aim of overtaking and surpassing the Western industrialized countries in the level of industrial technology is far more ambitious even than Khrushchev's vain goal of catching up with the United States in industrial output by 1970. For while nobody has yet devised any exact method of measuring international differences in levels of technology *per se*, a variety of evidence indicates that the USSR trails quite far behind the West in this area. Generalizing on the basis of a number of indicators, Michael Boretsky concluded that Soviet industrial technology in 1962 lagged behind that of the US by some 25 years on average; in some areas the lag was as much as 40 years, while in a few it was only 5-7 years.<sup>5</sup>

<sup>4</sup> *Partiinaiia zhizn*, No. 6, 1970, p. 3. This is one of many references to the letter, but in all the discussion, the text has, inexplicably, never been published.

<sup>5</sup> Michael Boretsky in *New Directions in the Soviet Economy*, Joint Economic Committee, U.S. Congress, Washington, D.C., 1966, Part II A, p. 149.

The size of the existing "productivity gap" between the Soviet Union and the West is another indicator of the gap in technology. According to the estimates of Abram Bergson, the overall productivity of the Soviet economy in 1960, as measured by output per unit of labor and capital input, was 28 percent of the US level when measured in Soviet domestic prices and 45 percent when measured in dollars; and for the non-agricultural sector alone, the respective levels were found to be 32 percent and 55 percent.<sup>6</sup> Bergson's study showed that a sizable overall productivity lag also existed in 1960 between the USSR and Northwest Europe. The Soviet position relative to the industrial West may have deteriorated over the past decade, moreover, inasmuch as productivity growth has slowed markedly in the USSR during that time, whereas it has speeded up in the US and remained high in Western Europe and Japan. Studies by Soviet statisticians of the relative levels of industrial labor productivity in the US and the USSR reveal a considerable gap in that area as well.<sup>7</sup> Of course, differences in the levels of technology used in production are not the sole explanation of productivity differences, but technology is necessarily a large factor.

There are still other evidences of the Soviet lag in technology. Machinery, the most technologically intensive branch of industry, makes up over 30 percent of Soviet imports from the industrial West, but only 2-3 percent of total USSR exports to these countries. This considerable imbalance has not diminished significantly over the past decade, suggesting that Soviet machinery-manufacturing technology has not improved relative to that of the West. Turning to specific industrial technologies, only about one-tenth of total steel output in the USSR was made by the oxygen-converter process in 1968, compared with nearly three-fourths in Japan, one-fourth in Western Europe, and nearly

three-fifths in the US. Soviet-produced computers are still second-generation, transistor machines, whereas the US and Western Europe are now producing third-generation computers using integrated circuitry. The USSR also has yet to complete an ammonia plant employing the new cost-reducing technology that has revolutionized such production in the West.

The Soviet technological lag cannot be attributed to any failure to allocate resources either to research and development or to education. On the contrary, the government has long invested large amounts in these sectors. The USSR currently devotes almost as large a share of its national product and its labor force to research and development as does the US,<sup>8</sup> while Western Europe lags far behind in this regard. At the same time, the percentage of college graduates in the Soviet labor force—most of them with technical training—has risen rapidly in the past two decades and now far exceeds the corresponding percentage in Western Europe, although it is still well below the US figure. Finally, the USSR not only maintains an extensive system for acquiring foreign scientific and technical information, but also has imported large quantities of industrial plant and equipment from the West, such imports totalling over \$4 billion from 1955 to 1968.

The prime cause of the Soviet Union's relative technological backwardness appears to lie in the procedures whereby new technologies are introduced and disseminated. The centrally administered Soviet economy has no spontaneous mechanism that operates automatically to spur technological progress in the way that profit-seeking competition does, however imperfectly, in the market economies of the West. Instead of stimulants, automatic deterrents to innovative activities have become embedded in the very warp and woof of the Soviet system. The principal deterrents are to be found in the bureaucratic machinery which attempts to administer the innovative process and in the ill-conceived system of incentives which purports to foster innovative decisions.

## *Innovation by Administration*

New production technologies and new products are "introduced" into the economy by deliberate actions of administrative bodies, and obsolete tech-

<sup>6</sup> Abram Bergson, *Planning and Productivity Under Soviet Socialism*, New York, Columbia University Press, 1968, pp. 22, 49.

<sup>7</sup> Official Soviet statistics claim that output per production worker in Soviet industry was 40-50 percent of the U.S. level in 1963: *Narodnoe khoziaistvo SSSR v 1963 godu*, Moscow, 1964, p. 69. A careful study by a Soviet economist, however, finds the relative level in that year to be 33.6 percent or 36.8 percent, depending on the weights used. Among the 11 branches of industry investigated, the relative levels ranged from 12.0-16.1 percent in fuels to 55.7-56 percent in ferrous metallurgy: M. Kudrov, *Vestnik Moskovskogo Universiteta, Seriya VII—Ekonomika*, No. 1, 1969, pp. 10-21. For a Western comparison yielding similar results, see: Gertrude E. Schroeder in *Dimensions of Soviet Economic Power*, U.S. Congress, Joint Economic Committee, Washington, D.C., 1962, pp. 139-162. Interestingly, the latter was carried out in physical terms, whereas the former both were made in value terms.

<sup>8</sup> OECD, *Science Policy in the USSR*, Paris, 1969, p. 385.

nologies and old products must be taken out of use or production in the same way. This complex process has to be carried out separately in each individual enterprise by means of specific plans for adopting new technology and producing new products. In turn, the materials and equipment required to accomplish these two key parts of one given enterprise's plans must be explicitly incorporated into the production plans of other enterprises. The whole process must be coordinated at higher echelons—at the top by the State Committee for Science and Technology and the State Planning Committee, and at intermediate levels by the numerous industrial ministries and supply agencies. Assorted other government bodies also get involved at various steps along the way.

As things now stand, the process of coordination functions poorly, and the various elements remain insulated from each other. For one thing, because it operates in a vacuum, as far as true costs and realistic prices are concerned, the vast bureaucracy engaged in "planning" technological progress has lacked a satisfactory means of determining the "payoff" of innovation—i.e., of deciding whether the cost of a given modification of production processes will be repaid in increased productivity. (The regime's attempt in September 1969 to improve the "coefficients" used in such calculations will be discussed later on.) For another, the ultimate customers of new technologies and products have traditionally had little opportunity to influence the producers of new machinery and equipment. Innovations have been planned and developed for the most part by a hefty and burgeoning research establishment which operates in isolation from the industrial enterprises.

This cumbersome administrative process itself tends to operate as a brake on technological innovation. But even more serious are the obstacles to the exercise of initiative by individual enterprise managers, who were supposed to be an important cog in the mechanism of innovation under the economic reform. Decisions to install new machinery and processes are entangled in a maze of technical regulations and directives from above. The system of taut planning throughout the economy also discourages managerial initiative by providing few reserves of supplies or plant capacity to handle the bottlenecks and inevitable disruptions which attend technological change in any economy.

Finally, perhaps the greatest deterrent of all has been the system of incentives, which was intended to spur innovative activity by enterprise managers, but instead causes them to cling to the traditional

emphasis on meeting assigned production targets at the expense of technological experimentation. Managerial bonuses—though no longer based mainly on the volume of physical output, as was the case prior to the economic reform of 1965—are now determined on the basis of planned sales and profits and on production of the "most important products." The result is that enterprise managers try to avoid introducing new technology and new products because these threaten to interrupt production and reduce profits, thereby decreasing bonuses.

Soviet planners apparently believe that the solutions to the problems of lagging technological progress are to be sought in three main policy areas. First, investment priorities must be structured so as to favor the more technologically advanced sectors, e.g., light metals in preference to steel, oil and gas in preference to coal. Specific proposals are being widely discussed, and presumably new long-range plans are being oriented accordingly.<sup>9</sup>

Second, remedies must be found for the chronic problems of the construction industry, which have caused delays in the activation of new capacities and the modernization of old plants. As one writer put it, "We design new enterprises in two or three years, we build them in five to seven years, and then we take one to two years to get them producing. . . . This shows how inefficiently we are using new technology and how we are slowing technical progress."<sup>10</sup> Here, the regime has sought to rely largely on such hackneyed administrative remedies as the creation of a series of specialized construction ministries, steps to limit the number of new construction projects that can be started in a given year, and the mounting of crash campaigns to complete a specified list of priority projects. Such remedies, however, were tried unsuccessfully in the past and apparently remain equally ineffective in the present, as evidenced by the continuing year-to-year rise in the volume of unfinished construction and by recurrent complaints in the press about the "scattering of resources" over numerous projects. More recently, there has been an incipient effort, apart from the measures just mentioned, to extend the ongoing general economic reform to construction enterprises under a government instruction issued in October 1969.<sup>11</sup> This effort, however, is proceeding at snail's pace, and its impact still remains to be seen.

<sup>9</sup> *Voprosy ekonomiki*, No. 1, 1970, pp. 72-83.

<sup>10</sup> *Nauchno-tekhnicheskie obshchestva SSSR*, No. 9, 1969, p. 4.

<sup>11</sup> *Ekonomicheskaiia gazeta*, No. 46, 1969, pp. 9-16.



## Tackling Institutional Obstacles

In both of these first two policy areas—i.e., those involving the readjustment of investment priorities and the stepping-up of new plant construction and modernization—it can be seen that the regime's approach has been to attack the symptoms rather than the primary causes of the ailments it desires to correct. This is perhaps less immediately obvious but nonetheless also true of the leadership's approach in the third area of policy, which involves a widespread attack on the many obstacles that have long inhibited innovation throughout the industrial bureaucracy, but especially at the enterprise level. Here again, the essential line of approach is to identify and define some specific form of bad behavior and to prescribe actions or incentives designed to cure it, or alternatively to define the correct behavior and steps to foster it. Thus, as will emerge more clearly in the rest of this discussion, which will focus particularly on this third area, it is the surface symptoms that are dealt with, while the underlying causes are left untouched.

The most recent "campaign" launched in the USSR, under way since early this year, clearly falls in the third area and aims specifically at speeding up the rate of technological advance. Party organizations at all levels have initiated a wide variety of activities with this goal in view<sup>12</sup>; a conference on

"economic problems of scientific and technical progress" has been held<sup>13</sup>; and at least one of the 15 Union Republics—Belorussia—has issued a sweeping decree "On Measures to Accelerate Technological Progress in the Republic's Industry, Construction, and Transportation."<sup>14</sup> This drive is but the latest in a series of efforts aimed at overcoming the "technological gap." Indeed, the general program of economic reform that was launched with such fanfare in the Soviet Union five years ago has likewise had the acceleration of technological progress as one of its major objectives. Let us therefore turn to the role of the general economic reform in the overall Soviet effort to deal with this problem.

The general reform of economic management initiated in the USSR in 1965 sought to foster technological progress both through a restructuring of central management institutions and through the creation of effective financial incentives to encourage the introduction of new technology and new products at the enterprise level. The latter approach included an attempt to improve the pricing of new equipment and products.

On the organizational side, a new State Committee for Science and Technology absorbed the State Committee for the Coordination of Scientific Research and was given the task of coordinating a many-pronged attack on the problem of ensuring technological progress in the Soviet economy. The 1965 reform also restored the pre-1957 system of

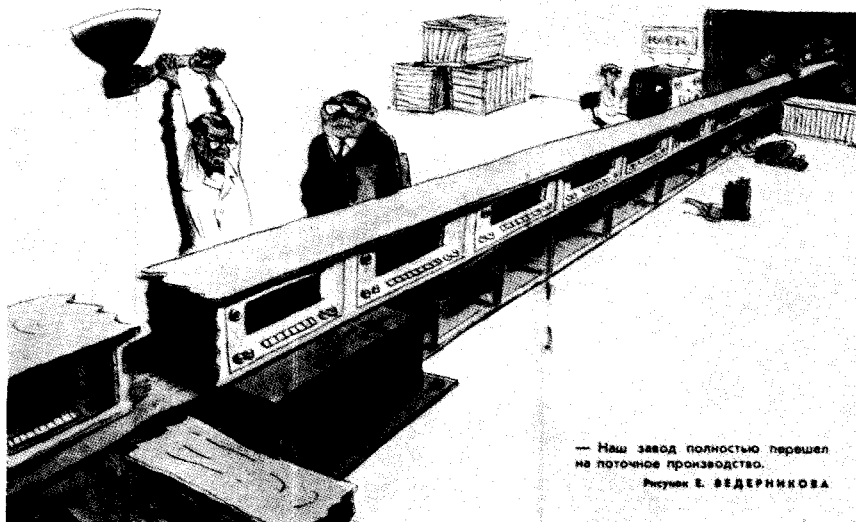
<sup>12</sup> For example, see *Partiinaiia zhizn*, No. 1, 1970, pp. 45-53; No. 4, 1970, pp. 34-39; and No. 10, 1970, pp. 12-19; *Kommunist*, No. 3, 1970, pp. 80-91.

<sup>13</sup> *Voprosy ekonomiki*, No. 4, 1970, pp. 151-155.

<sup>14</sup> *Sovetskaia Belorussia*, April 15, 1970, pp. 1-2.

—Our factory has completely converted to assembly-line operations.

—From *Krokodil* (Moscow), No. 32, November 1968.



— Наш завод полностью перешел на поточное производство.  
Рисунок В. ВЕДЕРНИКОВА

industrial ministries. A principal argument for this restoration was the need to establish a unified approach to technological development in each branch of industry, the absence of such a unified policy having been the main sin laid at the door of the abolished and little lamented regional economic councils (*sovnarkhozy*). The restored ministries have been accorded broad powers in planning and implementing the development and introduction of technology in their respective domains.<sup>15</sup> Each ministry has become, in effect, the tsar in control of technological policy for its particular industry, where it is responsible for ensuring a unified and coordinated approach, but it must also coordinate its actions and proposals with such other state committees (e.g., Science and Technology, Planning, Prices, Material-Technical Supply, Inventions and Discoveries, and Standards, Measures and Measuring Instruments) and ministries as might be concerned. If foreign purchases of plants, patents or licenses are involved, still other agencies must be consulted.

In the area of incentives, the reform established new success criteria for enterprises and granted them more leeway in certain areas of decision-making. Fulfillment of planned targets for sales or profits and for return on capital replaced gross value of output as the determinant of bonuses for managers and technicians. These bonuses are paid from a special "material incentive fund" formed out of profits. Presumably, new production techniques would be more profitable than old ones, thus inducing managers to introduce them in order to increase profits and hence managerial bonuses; however, fulfillment of the planned production goals set for "most important products" in physical output quantities still remains a necessary condition for payment of the bonuses. In addition, the reform permits enterprises to establish a separate "production development fund," also formed out of profits which they can draw upon to finance plant modernization without having to obtain direct state investment allocations—an obvious invitation to managers to upgrade production technology.

The framers of the economic reform also intended product prices, along with profits, to serve as "economic levers" for inducing innovation at the enterprise level. The new State Committee on Prices established in 1965 was given explicit responsibility for "raising the role of prices in pro-

moting technical progress in all its many aspects."<sup>16</sup> In October 1966 and January 1967, wholesale prices for products of light industry and the food industry were revised. In July 1967, revised industrial wholesale prices were put into effect for machinery and other branches of heavy industry, the first major revision of such prices since 1955. The intent was to fix new relative prices which, among other things, would encourage firms to replace obsolete technologies and produce new products.

The complex incentive provisions established by the reform were, however, tacked on to an already existing and even more intricate set of arrangements—a patchwork quilt of devices introduced over the years with the specific aim of overcoming managerial resistance to innovation. One group of measures consists of numerous bonus systems financed in various complicated ways. For example, there are separate bonus schemes for producing new and better models of machines and equipment, for increasing the percentage of new products in total output, for fulfilling and overfulfilling output plans during periods when new technology is being mastered, for bringing production in new plants up to designed capacity on schedule, and for designing and producing new consumer goods. A second approach is to reimburse enterprises for the high initial costs of producing new products, particularly new machinery, through special "mastery" funds (*fondy osvoeniia*). The injection of the new incentive provisions of the economic reform on top of these already existing arrangements thus adds to the complexity of the overall incentives setup, without offering any real promise of heightened effectiveness.

## New Approaches

Indeed, it quickly became obvious to the Soviet leaders that the melange of old and new incentive provisions and the new pricing structure were not going to improve matters significantly. Consequently, a number of supplementary measures have been taken during the past two years. They include new organizational approaches, changes in planning practices, and revised procedures for pricing new products and calculating the payoff of new invest-

<sup>15</sup> *Ekonomicheskaya gazeta*, No. 34, 1967, pp. 7-9.

<sup>16</sup> *Finansy SSSR*, No. 11, 1965, p. 93. When first established, the State Committee on Prices was subordinated to the State Planning Committee but was made an independent union-republic body at the end of 1969: *Pravda*, Dec. 31, 1969.

ment. Speedy introduction of these measures was pushed by a major party-government decree promulgated in October 1968 "On Measures for Increasing the Efficiency of the Work of Scientific Organizations and Speeding up the Utilization of Scientific and Technical Achievements in the National Economy."<sup>17</sup>

*Organizational Approaches:* The decree of October 1968 recommended that the industrial ministries and other appropriate bodies establish "research-production complexes" combining research institutes, design bureaus, and production enterprises. Also, the ministries were to begin transferring the research and design organizations currently subordinate to them to the direct control of enterprises. In another step, the formation of new production associations (*obedineniia*) uniting several production enterprises for purposes of common marketing, investment, and research and development—which has been actively discussed in recent years—now has evidently been given high-level government sanction, mainly because of the advantages they are expected to provide in coordinating research and introducing new technology.<sup>18</sup> The press has already reported the formation of a few research-production complexes and a number of production associations. There have also been reports of the formation of some special research and design enterprises, completely outside the regular industrial management hierarchy, which fill orders for work under direct contract with industrial enterprises. They operate nominally under Komsomol or trade-union sponsorship.<sup>19</sup> It should be noted in this context that in recent years many research institutes, e.g., the Novosibirsk Computer Center, have been supplementing their regular research program with work for industry on a contract basis.

*Planning:* Scarcely any aspect of the current drive to foster technological progress has been more discussed than steps to bring about "improved planning." The All-Union Conference on the Improvement of Economic Planning and Administration, held in Moscow in May 1968, devoted much of its attention and a major section of its recommendations specifically to planning for scientific and technological progress.<sup>20</sup> The party-government

decree of October 1968 elaborated on these recommendations and instructed the State Committees for Science and Technology, for Planning, and for Construction Affairs, together with the USSR Academy of Sciences and other interested agencies, to prepare scientific and technical forecasts looking ahead for a period of 10-15 years or more. The decree also ordered responsible bodies at all levels to draw up detailed five-year plans for scientific and technical development in each branch of industry and each sector of the economy, with relevant portions of these five-year plans to be incorporated in the annual plans for such development.

Further, the Committee for Science and Technology, the State Planning Committee, the Central Statistical Administration, the Ministry of Finance, and the Academy of Sciences have been directed to work out a system of planning, statistical and accounting indexes for science and technology that will (1) measure the extent of technological progress in each plant, industry and sector of the economy, and (2) make it possible "to determine actual savings from the application of scientific and technological development and to evaluate the correctness of technological policy in the branches of the national economy." Soviet press accounts indicate that these agencies have set about their task with zeal, directing the various individual ministries to work on specific problems of forecasting, planning, and "index construction" for their respective branches of industry.<sup>21</sup>

Soviet press discussions concerning preparation of the annual plan for 1970 and the Ninth Five-Year Plan (for the years 1971-75) make it evident that the sections dealing with the development and introduction of new products and technologies have been greatly upgraded in importance.<sup>22</sup> The binding force of these sections is being strengthened, and additional agencies (the State Planning Committee, for one) have been enlisted to "control" (i.e., monitor) plan fulfillment. Finally, these sections are being made not only more detailed and complex but also much more oriented toward calculations in value terms. Presumably the new indexes of technological progress that are being developed will ultimately be made obligatory plan targets.

*Price Fixing:* For at least a decade, Soviet economists have argued over the question of how to set

<sup>17</sup> *Pravda*, Oct. 23, 1968.

<sup>18</sup> *Planovoe khoziaistvo*, No. 8, 1968, p. 88.

<sup>19</sup> *Literaturnaia gazeta*, No. 4, 1970, p. 10.

<sup>20</sup> *Planovoe khoziaistvo*, No. 8, 1968, pp. 71-96.

<sup>21</sup> *Ibid.*, No. 7, 1969, pp. 25-30; No. 5, 1970, pp. 79-86.

<sup>22</sup> *Ibid.*, No. 7, 1969, pp. 22-32; *Voprosy ekonomiki*, No. 3, 1969, pp. 39-45.

prices for new products and new technologies so as to encourage their production and application. Following the establishment of the State Committee on Prices in 1965 and the introduction of revised industrial wholesale prices in 1966-67, press discussions on this theme reached veritable flood proportions. Both price-setters and academic econo-

mists were clearly dissatisfied with the new price structure as a stimulator of technical progress almost from the start.<sup>23</sup> Participants in two mammoth conferences, the May 1968 conference on planning and another on price-fixing held in February 1969, made various recommendations on this score.<sup>24</sup> The pricing problem could be "solved," they said, (1) if prices of new products and new technological processes were set high enough to induce producers to generate them, but not so high as to discourage their purchase; and (2) if prices of old products and outmoded technologies were automatically adjusted in such a way as to encourage their replacement with new ones. These are appropriate objectives, but their implementation by price-fixers is another matter.

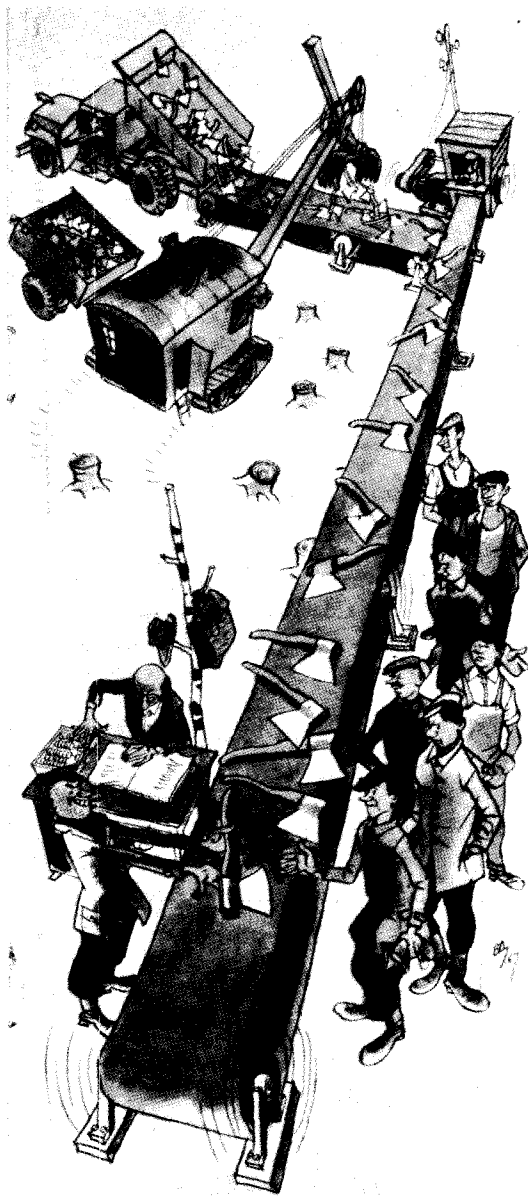
The near chaotic state of pricing in this area was evidenced by frequent instances of the purchase of new equipment that either yielded no savings at all or resulted in savings far too small to justify the cost of the new equipment. A typical complaint was the following:

In a number of cases, the increasing cost of new machines has considerably exceeded the increase in their productivity. One hundred fifty-one new machines were installed at the Yegorev knit goods plant. They cost more than twice as much as the old machines, but their output is the same.<sup>25</sup>

Another writer described the state of affairs in this fashion:

Under these conditions only two variants are possible. Either, the price of the new product is so low that it does not cover all the costs of production, does not compensate [the producer] for the possible risks and does not guarantee extra income for the enterprise. Such "administered" prices are usually backed up by the "mastery" fund, credit, etc. Or the price is too high, so that [prospective] users are not interested in the new technology. This leads to administrative pressure in the form of a campaign against technological conservatism, along with direct or concealed subsidies to buyers of the new equipment for financing their investment.<sup>26</sup>

More generally, Soviet critics see the problem in terms of fixing "right" prices for new products—i.e., prices which would in fact induce producers to introduce new designs. Actually, many so-called



Механизация лесозаготовок.

Рисунок Вл. ДОБРОВОЛЬСКОГО

#### Mechanization of Timber-Cutting

—From Krokodil (Moscow), No. 26, September 1967.

<sup>23</sup> For a discussion and evaluation of the 1966-67 price reform in general, see: Gertrude E. Schroeder, "The 1966-67 Soviet Industrial Price Reform: A Study in Complications," *Soviet Studies*, Vol. II, No. 4, April 1969, pp. 462-77.

<sup>24</sup> *Planovoe khoziaistvo*, No. 8, 1968, pp. 71-96; No. 4, 1969, pp. 89-95.

<sup>25</sup> *Ibid.*, No. 10, 1969, p. 26.

<sup>26</sup> *Voprosy ekonomiki*, No. 2, 1968, p. 153.



new products are merely old ones with insignificant modifications.

In July 1969, the State Committee on Prices issued a new set of rules for fixing prices on new products and new technologies with a view to bringing order to existing practices. The revised procedure makes a novel concept—the “limit price”—one of the “most important technical-economic parameters of a given task” and requires all design organizations to employ it.<sup>27</sup> This rule means that products must be designed and priced so as to yield some net cost savings to the prospective purchaser of the new technology. The actual prices for new products intended for serial production and designed to replace existing ones are to be set within a defined range. The upper limit of the range is the price at which the purchaser is “indifferent” as to choice between the new and the old technology; the lower limit is the price at which the producer is “indifferent” as to whether to make the new or the old product. How the bureaucrats mediate producer and consumer interests and set a final price somewhere in this range is not specified.

Different methods are established for setting prices on other categories of new products, such as those produced in the USSR for the first time. Finally, the new methodology provides for the establishment of “graduated prices” that decline automatically over a set period in accordance with either the planned rate of decrease in production costs or the estimated obsolescence of the product. Based on these general guidelines, the ministries are supposed to work out detailed methodologies, taking into account the price and product peculiarities found in each industry. Evidently not much has been done along these lines as yet, for energetic discussion continues in the Soviet press concerning the problem of setting prices so as to stimulate innovation.<sup>28</sup>

*Return on Investment:* In addition to the new price-fixing procedures, a new methodology for determining the efficiency of capital investment and new technology has also been published recently.<sup>29</sup> These rules, announced in September 1969, replace earlier ones that had been adopted in 1959. They explicitly set for the first time a standard minimum

rate of return on capital investment (12%) and redefine the method of calculating the rate of return to conform with the concepts of the economic reform. The ministries are to draft detailed instructions for their respective branches of industry on the basis of the new guidelines. The return on investment for the economy as a whole, and for its branches, is henceforth to be calculated as the ratio of “profits” to the total value of fixed assets and working capital. As defined, total profits include payment of the capital charge established by the reform (usually 6 percent), interest on bank loans, and planned allocations to the three incentive funds (bonuses, production development, and social welfare) set up by the reform. Allowances are to be made for construction and installation lags, with norms to be set for permissible delays.

The new rules represent a redefinition of the much-discussed “coefficient of relative effectiveness” (CRE), or “recoupment period,” long used by Soviet planners in project-selection. The old CRE was calculated as the *savings* in production costs per ruble of investment cost; the new CRE is defined as *profits* per ruble of investment cost. Finally, the new rules specify that only in exceptional cases should an investment yielding less than 12 percent per annum be undertaken. Soviet economists seem to regard this new methodology as a great step forward toward rational investment choice.

## Unabated Criticism

Nevertheless, judging by the criticisms that have continued to flood the Soviet press in the last year,<sup>30</sup> the regime’s multiple approaches to the problem of fostering technological innovation have thus far failed to bring about the desired improvement and may even be creating new deterrents to progress. During the first four years of the current 1966-70 five-year plan, the average annual rate of productivity gain in Soviet industry has actually been below the poor record of 1961-65.<sup>31</sup> The volume of unfinished construction relative to investment also remains high—at a level roughly two-thirds above

<sup>27</sup> *Ekonomicheskaja gazeta*, No. 31, 1969, p. 11.

<sup>28</sup> *Kommunist Ukrainy*, August 1969, p. 51; *Ekonomicheskaja gazeta*, No. 40, 1969, pp. 5-6; No. 11, 1970, pp. 5-6; No. 20, 1970, pp. 5-6; No. 22, 1970, pp. 5-6.

<sup>29</sup> *Ibid.*, No. 39, 1969, pp. 11-12.

<sup>30</sup> *E.g.*, *Izvestia*, Feb. 13, 1970; *Pravda*, July 29, Oct. 31, Dec. 21, 1969, Feb. 6 and 21, and March 30, 1970; *Sovetskaja Belorussia*, March 12, 1970; *Politicheskoe samoobrazovanie*, No. 1, 1970, pp. 34-41; *Planovoe khoziaistvo*, No. 9, 1969, p. 35; No. 10, 1969, pp. 44, 65.

<sup>31</sup> Joint Economic Committee, *Soviet Economic Performance, 1968-69*, p. 21.

that in the United States. Finally, implementation of the measures provided for in the October 1968 party-government decree is proceeding slowly at best, suggesting the persistence of strong psychological barriers to change in the Soviet bureaucracy.

As a consequence of this evident lack of progress, there has been a spate of new proposals by both officials and academic economists centering on problems of planning and restructuring incentives for the development of new technology and products. In the main, however, the changes currently being proposed would have the effect of weaving around the producing enterprises an even tighter and more tangled web of rules, directives and controls.

Recent critiques of the regime's planning for innovation in the economy repeat already familiar complaints of fragmentation, inconsistency and lack of coordination.<sup>32</sup> In view of the fact that plans for the production of new products and for the introduction of new technology continue to be significantly underfulfilled, some critics have recommended that their fulfillment should be made a precondition for payment of any bonuses and that indexes of the economic effectiveness of new technology should be made obligatory plan targets.<sup>33</sup>

Sharp criticism has also been leveled at the multiple incentive arrangements aimed at promoting innovation. The system of special bonuses for introducing new technology has been assailed as largely ineffective,<sup>34</sup> and the rules for forming the three enterprise incentive funds established under the economic reform have been continually criticized from their inception because of their complexity and their contradictory and inconsistent provisions.<sup>35</sup> The only significant change in these rules since the inception of the reform, however, complicates them even more by ordering that—effective January 1, 1971—the size of the incentive funds be related to enterprise performance in fulfilling plans for increasing labor productivity as well as in fulfilling plans for sales or for profits and profitability.<sup>36</sup>

One group of critics urges that the incentive system as a whole be drastically simplified by combining all of the separate funds into one—an enterprise incentive fund formed from profits—with the payment of bonuses for innovation to come from this fund.<sup>37</sup> They also continue to urge—as they have in the past—that the present extremely complicated formula for establishing the incentive funds be replaced by one based on a straight percentage deduction from profits. Another group of critics would retain the existing multiplicity of bonus arrangements, but would increase the amounts of the bonuses and attempt to relate them more sensibly to the economic benefits actually derived from innovations.<sup>38</sup> Other proposals would relate allocations to incentive funds more directly to enterprise success in introducing new products and new technology.<sup>39</sup>

The methods of financing the development of new products and new technology have likewise come under increasing attack, particularly on account of their complexity. Multiple sources of financing can now be tapped—i.e., the new production development fund formed out of enterprise profits, the “mastery” fund, funds released through permission to include the cost of research in production costs, bank credits, and budget financing. Some critics have urged merging the “mastery” fund into the production development fund and enlarging this fund in various ways.<sup>40</sup> Others recommend retention of the two separate funds but would change the rules governing their formation and expenditure so as to heighten their impact on innovation.<sup>41</sup> With respect to bank credits, even though the economic reform has extended the permissible amounts and terms of bank loans, broadened the range of projects for which credit may be extended, and given both banks and enterprises greater discretionary authority, the size of loans to finance new technology is presently restricted to amounts that can be

<sup>32</sup> *Pravda*, Sept. 16, 1969; *Kommunist Ukrainy*, Aug. 1969, p. 55.

<sup>33</sup> *Planovoe khoziaistvo*, No. 7, 1969, p. 31; No. 8, 1968, p. 38; No. 3, 1969, pp. 54, 60; No. 10, 1969, pp. 65-66; *Voprosy ekonomiki*, No. 7, 1968, p. 110; *Izvestia*, Jan. 18, 1970.

<sup>34</sup> *Izvestia*, July 24, 1969; *Planovoe khoziaistvo*, No. 8, 1968, p. 39; *Voprosy ekonomiki*, No. 7, 1968, pp. 109-10; *Pravda*, March 30, 1969; *Finansy SSSR*, No. 9, 1969, p. 52.

<sup>35</sup> For a review and analysis of these rules, see G. E. Schroeder, “The Soviet Economic ‘Reform’: A Study in Contradictions,” *Soviet Studies*, Vol. II, No. 1, July 1968, pp. 1-21.

<sup>36</sup> *Ekonomicheskaya gazeta*, No. 16, 1969, p. 11; No. 24, 1969, p. 11.

<sup>37</sup> *Planovoe khoziaistvo*, No. 12, 1968, p. 54; *Voprosy ekonomiki*, No. 11, 1968, p. 22.

<sup>38</sup> *Standarty i kachestvo*, No. 2, 1968, p. 69; *Finansy SSSR*, No. 9, 1969, p. 53; *Planovoe khoziaistvo*, No. 3, 1970, pp. 58-61; *Ekonomicheskaya gazeta*, No. 18, 1969, p. 20; G. D. Anisimov, Ed., *Nauchno-tekhnicheskii progress i ekonomicheskaya reforma*, Moscow, 1969, pp. 237-52.

<sup>39</sup> *Planovoe khoziaistvo*, No. 6, 1968, pp. 30-32; No. 8, 1968, p. 37; *Voprosy ekonomiki*, No. 7, 1968, p. 111; *Izvestia*, Jan. 18, 1970; *Pravda*, Sept. 16, 1969.

<sup>40</sup> *Planovoe khoziaistvo*, No. 10, 1969, p. 66.

<sup>41</sup> *Kommunist Ukrainy*, August 1969, pp. 50-51; *Voprosy ekonomiki*, No. 2, 1968, p. 154; No. 4, 1970, pp. 97-107; *Finansy SSSR*, No. 9, 1969, pp. 51-53; No. 1, 1970, pp. 39-42; *Planovoe khoziaistvo*, No. 2, 1969, p. 7; No. 3, 1969, p. 60; Anisimov, *op. cit.*, p. 203-36.

ment fund. Not only are these funds usually small, repaid from the enterprise's production development but their expenditure is circumscribed by a maze of rules and regulations, *e.g.*, use of the funds is limited to renovation and expansion of existing processes—it cannot be used to construct completely new production lines. Proposals for remedying these deficiencies are numerous and varied.<sup>42</sup>

## *The Prognosis*

Although the many-faceted drive to accelerate Soviet technological progress is still young, its present thrust seems unlikely to produce significant results, even if given a great deal more time. The main reason for this conclusion is that the Soviet leadership, as in the past, is still relying largely on administrative methods of resolving the problem. When the economic reform was introduced, it was supposed to provide the key to success in the form of “economic levers” that would automatically foster innovation. Instead, however, these new “levers” are being manipulated to an ever greater degree by the economic bureaucracy, which means that Soviet planners are now attempting to manage the process of technological change at a level of detail never before attempted. The result must surely be an intensified bureaucratization of Soviet economic life, precisely the danger to socialism predicted by Oskar Lange.<sup>43</sup> In other words, the more the planners seek micro-efficiency, the more bureaucratic the system becomes.

In reality, the provisions of the economic reform itself—as now constituted—are inimical to innovation. Even some Soviet economists have made this observation, although they have been excoriated for their views.<sup>44</sup> With bonuses geared to profits and return on capital, the enterprise manager now has to pay much more attention than before to production costs, including the costs of capital. In order to fulfill and overfulfill plans for profits and profitability, he will presumably try to keep the size of his capital stock as low as feasible so as to reduce the capital charge and to increase profits and the rate of profitability. Moreover, since enterprise success

is still measured by fulfillment of annual plans, managerial decisions will, as before, tend to give priority to short-run gains over possible long-run benefits. Hence, managers are likely to be reluctant to add new capital or to undertake equipment changeovers, because to do so would not only cause a temporary disruption of production but would also adversely affect the level of profits and profitability. In addition, the complex incentive and pricing arrangements make it more difficult for managers to calculate both the actual payoff of innovation and their personal stake in it. Finally, the reform is being carried out in an atmosphere of taut planning and a seller's market in producer goods. This is evident from the persistent pressure on enterprises to disclose “hidden reserves” and to submit “realistic” plans.

Thus, the current reforms retain all the features of the Soviet milieu that deterred innovation in the past, and they even add some new deterrents of their own. In electing to use prices and profit-related incentives to spur innovation in the economy, the planners have taken a “great leap forward” in their involvement in the minutiae of economic life. They are attempting not only to fix prices in sufficient detail to make them stimulants to innovation, but also to impart “flexibility” to these prices—not, however, in relation to consumer demand, but in relation to the administrators' notions of the degree of product obsolescence and “economically justified” reductions in production costs. The new “graduated prices” may well provide incentives for purchasing old machinery rather than new. And the mind boggles at the enormity of the task involved in the Soviet planners' declared intent to calculate the effectiveness of thousands of new machines and pieces of equipment. In effect, the price fixers are attempting to simulate the discipline over producers that is afforded by clamorous customers in a market system.

In short, the innovative process is not merely being “routinized,” to borrow the term of Gregory Grossman<sup>45</sup>; it is being rapidly “bureaucratized.” The difference is significant. It means multiplying the number of managers to a much greater degree than before, inasmuch as the detailed planning and management of the innovative process is being performed by an army of bureaucrats in the ministries and state committees in Moscow as well as in the

<sup>42</sup> *Planovoe khoziaistvo*, No. 8, 1969, p. 41; No. 10, 1969, pp. 67-68; *Kommunist*, No. 2, 1969, p. 67; *Sovetskoe gosudarstvo i pravo*, No. 11, 1969, pp. 82-86; *Dengi i kredit*, No. 3, 1970, pp. 84-87.

<sup>43</sup> *On the Economic Theory of Socialism*, New York, McGraw-Hill, 1966, p. 109.

<sup>44</sup> *Voprosy ekonomiki*, No. 11, 1968, p. 17.

<sup>45</sup> Gregory Grossman, “Innovation and Information in the Soviet Economy,” *American Economic Review*, Vol. LVI, No. 2, May 1966, pp. 117-30.

republic and provincial capitals. Small wonder that employment in the state apparatus has risen rapidly since 1965.

Furthermore, the detailed central planning of individual projects, of plan indicators of technological progress, of prices, of incentive funds, of product output and the product mix of producers' goods, of capital and material allocations, and of profits and the rate of return on capital—combined with unplanned shortages on all sides—means that the individual enterprise operates within an almost unbelievable number of constraints. These constraints, it should be noted, are not *economic* in any meaningful sense; rather, they are essentially *administra-*

*tive* in nature. The values (relative prices and pay-offs of innovation) that are embodied in them do not and cannot reflect relative scarcities of resources inasmuch as these values are not market-determined. The adverse impact of the constraints is further multiplied by their very complexity, by continuing changes, and by the fact that, despite talk about allowing initiative at the enterprise level, the bureaucracy feels compelled to provide multitudinous instructions and “norms” that tell the enterprises how to exercise delegated authority and how to use their supposedly greater freedom of decision-making. How real technological progress can ever flourish under such conditions is difficult to see.

# Politinformator or Agitator: A Decision Blocked

By Aryeh L. Unger

Only rarely are outsiders able to obtain a comprehensive view of decision-making processes in the Soviet Union, especially those which involve various groupings of the party *apparatus* in sharp confrontation with one another. In most instances, only the final outcomes of these conflicts become known in the form of policy pronouncements and statutes, while the elements of the processes them-

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selves—the opposing groups and individuals, the substance of their various positions, and the mode of reconciling their differences—remain obscure to the public at large. It is all the more illuminating, therefore, when a fairly detailed record becomes available concerning a major policy issue in the making, as is the case with the still ongoing and unresolved controversy in the USSR over the best method of conducting domestic propaganda.

To understand this issue, it might be useful to recall briefly the distinction made by the Soviets between propaganda and agitation. Following Georgi Plekhanov's definition, accepted by Lenin as early as 1902, propaganda is defined as the presentation of “many ideas to a few persons” and