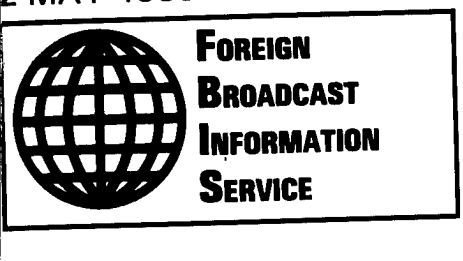
JPRS-UST-88-007
2 MAY 1988



JPRS Report

Science & Technology

USSR: Science & Technology Policy

Science & Technology

USSR: Science & Technology Policy

JPRS-UST-88-007

CONTENTS

2 MAY 1988

Organization, Planning, Coordination

Experience, Problems of Establishing Interbranch Complexes

18140197 Moscow PLANOVOYE KHOZYAYSTVO in Russian No 1, Jan 88 pp 45-54

[Article by Doctor of Economic Sciences A. Leybkind, head of a sector of the Scientific Research Institute of Planning and Norms attached to the USSR State Planning Committee, and Candidate of Economic Sciences Ye. Rudneva, senior scientific associate of the Central Institute of Economics and Mathematics of the USSR Academy of Sciences, under the rubric "Scientific and Technical Progress": "Interbranch Scientific Technical Complexes (Experience and Problems)"]

[Text] The accomplishment of the strategic task of intensifying the socioeconomic development of the country on the basis of the acceleration of scientific and technical progress, the attainment in the shortest time of leading levels, and major changes in the direction of the sharp increase of the production of science-intensive products require the use of new efficient organizational economic forms of management. One of them is interbranch scientific technical complexes (MNTK's), which have been established in the main directions of scientific and technical progress and are oriented toward the performance of the entire cycle of operations on the development and the assimilation of the production of highly efficient types of equipment, technology, and materials of new generations.

Thus far more than 20 interbranch scientific technical complexes, which include about 500 organizations and enterprises and more than 60 ministries and departments, have already been formed. In the annual plan of economic and social development for 1987, 78 new developments of engineering and technology, which have been completed by interbranch scientific technical complexes, have been included for introduction.

The interbranch scientific technical complexes have considerable potentials for the increase of the quality of developments and the speeding up of the introduction of new generations of equipment. The allocation in a priority manner of the resources, which are necessary for the development of interbranch scientific technical complexes, and the establishment of centers of the collective use of instruments are expanding the material and technical supply of scientific research. The inclusion within interbranch scientific technical complexes of well-equipped pilot plants is creating the prerequisites for the acceleration of the processes of bringing models of new equipment up to production use. The performance in accordance with a unified plan under unified supervision of all the stages of the work—from basic research to assimilation in production—is making possible to reduce the expenditures of time on the transfer and coordination of results and so forth.

The majority of complexes have been operating for about 2 years. However, both positive changes and significant difficulties in their work, which are due, in our opinion, to substantial shortcomings in the methods of the organization and management of interbranch scientific technical complexes, have also appeared in such a short time.

The results of the work of such complexes as the Rotor, Institut elektrosvarki imeni Ye.O. Patona, and Mikrokhirurgiya glaza complexes are significant.

In accordance with the developments of the Rotor Interbranch Scientific Technical Complex in 1987 more than 400 automatic rotary and rotary conveyer lines were produced, the increase of the output by 2.1-fold is envisaged in the plan for 1988. In all during the 12th Five-Year Plan about 6,300 such lines will be produced. The planned economic impact from their introduction comes to 409 million rubles, the anticipated number of conditionally freed workers comes to about 77,000. Among the major achievements of the past year, for example, is the development by this complex of a rotary conveyer line for the injection molding of items made of thermoplastic materials, which ensure an increase of productivity by more than tenfold with a substantial decrease of the production areas. The use of a new technology of performing operations (by the conveyer method) at the Mikrokhirurgiya glaza Interbranch Scientific Technical Complex is making it possible to increase by several fold the quality of operations and to shorten substantially the time of treatment.

At the same time in the activity of these complexes a number of factors, which slowed the pace of their development, particularly the petty tutelage on the part of superior organs, which created difficulties in the work of the Mikrokhirurgiya glaza Interbranch Scientific Technical Complex, the substantial lag in the development of the experimental base of organizations, the shortage of designers and process engineers (at the Rotor Complex), and insufficient rights in the area of the financing of scientific research and experimental design work (at the Institut elektrosvarki imeni Ye.O. Patona Interbranch Scientific Technical Complex), came to light. In case of the establishment and operation of a number of other interbranch scientific technical complexes even more substantial problems arose: the determination of the composition of the participants (at half of the complexes this question was inadequately studied); the formulation of unified plans of the work of interbranch scientific technical complexes; the establishment of effective contacts with partners; the determination of the place of interbranch scientific technical complexes and the procedure of interaction with the ministries and departments, to the systems of which the complexes belong.

The emerged problems are connected not last of all with the novelty of this organizational form and the lack of adequate experience in establishing effective intersectorial contacts at specific complexes. Here it is possible to

name the standardized approach to the determination of the peculiarities of specific interbranch scientific technical complexes, their functions, rights, and duties in case of the substantial differences in the goals and conditions of the activity of the complexes. Another negative thing is the inclusion of the complexes, which are objects of an intersectorial type, in the systems of sectorial ministries and departments, as well as the poor effectiveness of the forms, which have been adopted for interbranch scientific technical complexes, of plan coordination, the stimulation of the participants, and the procedure of allocating resources for accomplishing the tasks which have been set for the complexes.

Acquaintance with the goals of establishment, the composition of the participants, and the nature of the end results of the work of the complexes shows that at present three types of the integration of the scientific research organizations and enterprises of various sectors, which have been united in interbranch scientific technical complexes, are in effect.

The first type, which encompasses the majority of operating interbranch scientific technical complexes, is an association of scientific research and planning and design organizations and pilot plants of several sectors for the purpose of the development and, as a rule, the introduction in the national economy of fundamentally new types of equipment, technology, and materials (for example, technology, equipment, and means of mechanization and automation for the low-waste, large-tonnage industrial production of high-quality powders, materials, and items, which determine the object of the activity of the Poroshkovaya metallurgiya Interbranch Scientific Technical Complex, diagnostic aids, which make it possible to ensure the increase of the reliability and life of machines and components—the Nadezhnost mashin Interbranch Scientific Technical Complex, high-performance membrane separators—the Membrany Interbranch Scientific Technical Complex). The work at these interbranch scientific technical complexes is performed from the phase of basic research to the stage that precedes the mass production of the new equipment. This also predetermines the internal structure of the complex, in which the leading role is assigned to scientific research institutes, planning and design bureaus, and scientific production associations. The pilot works and experimental enterprises, which have been involved in their work, perform in a certain sense a subordinate function, by producing prototypes for the checking of new technical solutions or carrying out the production of small batches of new equipment, having in mind their transfer to the producer sectors or consumer sectors for the purpose of subsequent large-scale introduction.

Along with the tasks, which are being worked on at the interbranch scientific technical complexes of the first type, the organization of the production of the corresponding equipment and new materials on the scale of the entire nature economy is assigned to complexes of the second type. For example, the organization of the industrial production of highly productive equipment for welding, heat treatment, the hardening of tools, and dimensional machining is assigned to the Tekhnologicheskiye lazery Interbranch Scientific Technical Complex, the organization of the production of new types of biological substances and preparations for the needs of medicine, plant growing, and veterinary medicine is assigned to the Biogen Interbranch Scientific Technical Complex. The inclusion of specialized works and enterprises for the series output of products within complexes of this type is proposed. Here the novelty of the developed equipment and technologies (as is evident from the example of the Sibelektroterm Production Association, which is a part of the Tekhnologicheskiye lazery Interbranch Scientific Technical Complex, does not have enough trained personnel, and is experiencing difficulties with the development of new production in connection with the lack of specialized capacities) to a significant extent limits the possibilities of the efficient modernization of operating enterprises and requires the mandatory establishment of new ones.

The Mikrokhirurgiya glaza Complex belongs to the third type. The goal of the formation of such complexes is the production of new generations of equipment and the performance of a specific type of services on a fundamentally new technological basis, by means of advanced equipment which has been developed by the scientific organizations of the complex.

Without belittling the importance of the stage of scientific development at interbranch scientific technical complexes and the proportion of the expenditures on its performance in the total amount of spending on the functioning of the complex, the aim of the end results of its work has a substantial influence on the relations between the scientific and production subdivisions of interbranch scientific technical complexes. In the complexes of the first type production, as was noted above, plays a supporting (for the interbranch scientific technical complexes) role, in the complexes of the second and third types, on the contrary, the scientific subdivisions directly "work for production."

Examining the complexes of the second and third types, it is possible to draw the conclusion that with respect to the tasks, the peculiarities of activity, and the composition of the participants they are a new type of scientific production associations—intersectorial scientific production associations. Their emergence is natural and reflects the direction of the development of advanced technology, which has been restricted by sectorial boundaries and, as a rule, needs intensive scientific updating. Such interbranch scientific technical complexes depending on the goals of their establishment, the scale of the tasks being worked on, and the prospects of development of corresponding works can hold a different place in the system of management of the national economy. Thus, being intersectorial in its essence, the Mikrokhirurgiya glaza Interbranch Scientific Technical Complex by the nature of the services being rendered

should be included in the system of the USSR Ministry of Health. At the same time the development of laser equipment and technology and the extensive prospects of its introduction in the national economy make it possible to speak of the advisability of giving the Tekhnologicheskiye lazery Interbranch Scientific Technical Complex the status of an All-Union Scientific Production Association.

At the same time the complexes of the first type, which are oriented toward specific goals that are connected with the attainment in the shortest time in specific scientific and technical directions of leading levels in the world, are an organizational form of the implementation of all-union intersectorial scientific and technical programs. The program of the solution of a major scientific and technical problems, which is of great national economic importance, by means of an interbranch scientific technical complex specifies the concept of its establishment and functioning, the basic tasks of development, the time of performance, the end results, and the need for resources of individual stages of the solution of the problem. At present such an approach, which presumes the use of the principles of program planning (the formulation of an all-union program, of which the interbranch scientific technical complex serves as the organizational form of implementation, or the use of program methods of planning and management when performing specific groups of research and development and work on the introduction of their results), is already being used at a number of interbranch scientific technical complexes, for example, at the Rotor and Institut elektrosvarki imeni Ye.O. Patona complexes. The achieved positive results of the activity of these complexes testify to the effectiveness of such an approach.

Obviously, the differences in the goals of establishment and the nature of the activity of the types of interbranch scientific technical complexes in question cannot but lead to certain distinctions in the forms of the organization and the methods of the planning and management of them. Thus, the stable relations between the scientific and production subdivisions in the complexes of the third type and their work mainly or only "for the interbranch scientific technical complex" make it possible to infer the advisability of the use in their management of linear functional structures, that is, the subordination of all or the majority of enterprises and scientific research institutes, which belong to the interbranch scientific technical complex, to the main organization of the complex. The tasks, which have been posed for interbranch scientific technical complexes of the second type, require for their successful accomplishment the subordination to the main organization of the complex of not only pilot enterprises, but also enterprises which are capable of rapidly assimilating the series output of a new product. On the other hand, in interbranch scientific technical complexes of the first type such an organizational solution, as a rule, is inefficient. The enterprises, scientific research institutes, and scientific production associations, which are a part of the complex and participate in its work, as the Model Statute on the Interbranch Scientific Technical Complex requires, should retain their subordination. This presumes the granting to the main organization of the complex of a number of rights in the area of plan coordination, stimulation, and the management of resources, by the exercise of which it will be able to manage efficiently the organizations that belong to the interbranch scientific technical complex.

The nature of activity determines, obviously, the differences in the composition of the centrally planned indicators, the forms of the disposal of resources, and the methods of distributing the revenues from the activity of the interbranch scientific technical complex. Therefore, the elaboration of common methods of the management of such objects, which are different with respect to the tasks, the directions of work, and the composition, as intersectorial scientific production associations and complexes, which are established for the implementation of all-union scientific and technical programs, is hardly possible. The examined circumstance, thus, do not give sufficient grounds for an identical approach to or the "standard regulation" of the activity of all types of interbranch scientific technical complexes.

Within the still prevailing economic mechanism, in which intrasectorial relations have priority, the inclusion of interbranch scientific technical complexes in the systems of main ministries and departments complicates their work. Thus, the difficulties, which arose when implementing during the 11th Five-Year Plan the comprehensive goal program on technological lasers (many performers of which belonged to the Tekhnologicheskiye lazery Interbranch Scientific Technical Complex), did not make it possible to fulfill a number of program assignments. They arose precisely due to the inclusion of enterprises and organizations in the systems of the main organs. In the indicated comprehensive goal program there were three of them: the USSR Academy of Sciences, the USSR Ministry of the Electrical Equipment Industry, and the USSR Ministry of the Machine Tool and Tool Building Industry. Such a situation has also remained since the establishment of the Tekhnologicheskiye lazery Interbranch Scientific Technical Complex. Many other interbranch scientific technical complexes, which are subordinate to the USSR Academy of Sciences, were also in a similar situation, and they did no succeed in involving all the members of the complex in the work. As a result decisions were made on the resubordination to sectorial ministries of the academic Svetovod, Personalnyye EVM, and Nadezhnost mashin interbranch scientific technical complexes. At the same time the corresponding ministries were attached to other interbranch scientific technical complexes (Termosintez, Biogen, and Katalizator). Along with the general problems of the inclusion of interbranch scientific technical complexes in the system of the main departments the indicated changes were also due to a certain reevaluation of the possibilities and experience of academic organizations in the coordination of a significant number of

enterprises which belong to complexes. Although sectorial ministries also have great opportunities for the fulfillment of work on coordination, the subordination of interbranch scientific technical complexes to them also does not make it possible to solve all the problems of the functioning of complexes. Thus, at the Rotor Interbranch Scientific Technical Complex of the USSR Ministry of the Machine Tool and Tool Building Industry difficulties are arising with the reflection of the assignments on the output of the components, which the interbranch scientific technical complex needs, and on the production of equipment in the plans of enterprises from other ministries, with the assurance of deliveries in accordance with cooperations, and so on. A similar situation also exists at the Antikor, Nefteotdach, and other interbranch scientific technical complexes.

The cited examples give grounds to assume that many interbranch scientific technical complexes as objects of an intersectorial type should be established within organs of intersectorial management. For example, it would be advisable to subordinate the group of complexes of the machine building type, particularly the already mentioned Rotor and Nadezhnost mashin interbranch scientific technical complexes, directly to the Bureau for Machine Building of the USSR Council of Ministers. In our opinion, this will make it possible to create the prerequisites for the drafting of unified plans of interbranch scientific technical complexes and their better supply with resources.

Since the organizations, which belong to interbranch scientific technical complexes, will retain their subordination, the granting to the management organ of the interbranch scientific technical complex of a number of rights and powers in the area of the planned coordination of the activity of these performers and their stimulation and financing is necessary for the assurance of the necessary degree of their integration in the complex. For example, the introduction of a procedure, in case of which the assignments of the interbranch scientific technical complex would have for the organizations, which belong to it, the status of a state order and would be liable to mandatory inclusion in their plans and to fulfillment in a priority manner, is advisable. Accordingly, the limits of state capital investments and the amounts of centrally distributed material resources, which are necessary for the fulfillment of the assignments of the complexes, should also be reported to these performers by the management organs of the interbranch scientific technical complexes. The most important operations, which are performed by the organizations that belong to interbranch scientific technical complexes, should be financed from the centralized funds of the complexes and the giving of incentives to the performers should be carried out from the centralized stimulation funds.

As to the scientific research institutes, scientific production associations, and enterprises, which are participating in the work of the complexes, their "involvement" can be accomplished in accordance with generally accepted procedure on the basis of the conclusion of contracts with the management organ of the interbranch scientific technical complex or the main organization of the complex. At the same time owing to the particular importance of the tasks, which are being worked on by the interbranch scientific technical complexes, the creation of the conditions for the great economic interest and responsibility of their participants for the performance of work on the assignments of the complex is necessary. Such conditions can be created, for example, by the giving of certain privileges to these organizations in the area of management, the imposition of more tough sanctions on offenders, the additional stimulation of performers from the centralized funds of the interbranch scientific technical complexes, the granting to them of the right of access to the centers of the collective use of instruments, which are being established at a number of complexes, and so forth.

The enlistment of organizations and enterprises in the work of interbranch scientific technical complexes should be carried out first of all not by administrative means, but on the basis of the holding of competitions of plans of the solution of scientific and technical problems and competitions of inventions and innovations.

The establishment of efficiently operating interbranch scientific technical complexes is possible and necessary only given a specific set of prerequisites. The importance and national economic significance of the problems being solved are the basic prerequisite. But a developed, at least in general outline, strategy of the solution of the corresponding scientific and technical problem and sound indicators of the evaluation of the activity of the complex are also necessary. Otherwise new difficulties, which it will be hard to overcome, will arise. Suffice it to say that without such a strategy it is impossible to substantiate an efficient composition of the complex, to draft a long-range plan of its development, and to establish stable economic relations among its participants. Thus, precisely the lack of a common understanding of the directions of the solution of the problem of the increase of the quality and the development of reliable methods and means of testing machines and mechanisms, which was posed for the Nadezhnost mashin Interbranch Scientific Technical Complex, significantly complicated its operation. Planning and accounting indicators were not specified for 1987 for the Nefteotdach Interbranch Scientific Technical Complex, for which the task of developing hydrodynamic, thermal, and physical chemical methods of increasing the ultimate petroleum recovery of formations by 6-12 percent was set. However, the formation of the stimulation funds and the nature of the relations among the participants in the interbranch scientific technical complex depend on what indicators are chosen as the evaluation indicators in case of the operation of the complex and the fulfillment of the assignments on the development of new equipment and technology or on the additional recovery of petroleum, which the new equipment, which is produced in accordance with developments of the complex, will provide.

The inadequate analysis of the strategic directions, which were set for interbranch scientific technical complexes, was also one of the reasons for the revision of the personnel composition of a number of complexes. At the same time their formation is a dynamic process which depends on the course of the fulfillment of scientific and experimental design operations. Now, however, the quite strict regulation of both the composition of the participants in interbranch scientific technical complexes and the procedure of its change exists. It seems that with the formation of complexes and the development of economic methods of management the management organs of interbranch scientific technical complexes should be granted rights with regard to the independent formation of the compositions of their participants.

In speaking about the formation of a specific composition of complexes, one must not fail to notice one of the most important factors that have a decisive influence on it—the level of the scientific and economic organizational reserve. Thus, in case of the establishment of the Mikrokhirurgiya glaza Interbranch Scientific Technical Complex a powerful scientific reserve in the form of methods and a technology of the treatment of a number of eye diseases, which had been developed by this time and in quality and efficiency surpass the world level, already existed. The strategy formulated here of solving the problems, which had been set for the interbranch scientific technical complex, made it possible to specify both precise demands on the composition of the complex and the dynamics of its development. The formation over the course of many years of the Institut elektrosvarki imeni Ye.O. Patona Complex, which was formed on the basis of the institute by the same name, differs substantially from the majority of interbranch scientific technical complexes. Along with the institute strong design subdivisions, experimental works, and pilot plants were gradually set up and relations were established with the users of the new equipment and technology. As the complex developed a "chain" of the rapid passage of new equipment from the stage of development to the stage of the prototype was established. Thus, only 2 years were required for the development and introduction of the Sever complex, which increases labor productivity by six- to eightfold in the welding of pipelines under the difficult conditions of Siberia. Thus, along with a scientific reserve economic organizational prerequisites in the form of the associated capacities of the scientific research and experimental design organizations, which constitute the nucleus of the complex, also exist at the Institut elektrosvarki imeni Ye.O. Patona Interbranch Scientific Technical Complex.

Unfortunately, in case of the formation of the composition of many interbranch scientific technical complexes such opportunities are lacking. Moreover, this concerns the joining of the capacities of both scientific and design organizations and pilot and series-producing works. In particular, the Metallurgmash Interbranch Scientific Technical Complex, on the basis of the specific nature of activity, should produce single machines, but the enterprises, which were included in this complex, are oriented toward series production. Another example is the Tekhnologicheskiye lazery Interbranch Scientific Technical Complex. The enterprises belonging to it (the Novozybkov Induktor Plant, the Kaliningrad Elektrosvarka Plant, and the Sibelektroterm Production Association) do not have specialized assembly capacities for the production of laser equipment. Moreover, the creation of new capacities of this sort at these enterprises presents substantial difficulties, since the specification of the time and resources for the designing and construction of new buildings does not depend on them. Moreover, they also do not have the necessary personnel. The Sibelektroterm Production Association is oriented toward the production of electrothermal equipment with dimensions of tens of meters and a weight of hundreds of tons. However, in case of the production of laser equipment, which requires precision equipment, completely different production skills of all the personnel and a higher level of the organization of production are necessary.

It seems that in the future more attention should be devoted to the questions of the formation of the composition of interbranch scientific technical complexes, envisaging the gradual expansion and specification of the composition of the complexes with allowance made for the work on the change of the specialization of operating enterprises and the establishment of new ones.

The established procedure of planning and managing the activity of interbranch scientific technical complexes envisages the formulation of unified five-year and annual plans of their development and the priority allocation by the participating ministries of manpower, material and technical, and financial resources, limits of capital investments, and planning, surveying and contracting work, which are necessary for the fulfillment of the assignments of the unified plans. The establishment of the complexes was also accompanied by certain changes of national economic planning. Thus, in the state plan for 1986-1990 the special subsection "New Generations of Equipment, Technology, and Materials, Which Are Developed by Interbranch Scientific Technical Complexes" was inserted for the first time in the section "The Development of Science and Technology." However, as the experience of the work of interbranch scientific technical complexes shows, these important and timely steps still inadequately contributed to the complete assurance of the necessary organizational economic unit of the complexes and did not eliminate a number of typical difficulties in their work.

Here it is possible to name the serious difficulties with the drafting of the unified plans of development and with the reflection of their assignments in the plans of the participants in the interbranch scientific technical complexes.

The prevailing forms of the planning of the development of interbranch scientific technical complexes envisages a multistage procedure of the coordination and approval

of the unified plans of the complexes and their delivery to the performers. The unified plans of its development (five-year and annual), which have been drafted by the main organization of the complex, are submitted for approval to the USSR State Planning Committee, the USSR Academy of Sciences, and the ministry (department), to which the complex is subordinate, and are approved by the State Committee of the USSR Council of Ministers for Science and Technology. The approved plans are then sent by the management organ of the interbranch scientific technical complex to the participating ministries, which report the assignments of these plans to the institutions, organizations, and enterprises, which are the performers of the work. As practical experience shows, such a procedure creates opportunities for numerous adjustments of the unified plans in the process of their coordination, as well as for deviations from the assignments of these plans in case of their inclusion in the plans of the performers. Moreover, the duration of the multistage procedure of coordination hinders the realization of the basic goal of the interbranch scientific technical complex—the acceleration of the processes of developing and introducing innovations.

An efficient economic mechanism of interaction between the complexes and the participating ministries, including the main ones for the corresponding problems,[1] and between the interbranch scientific technical complex and its partners has not been set up. The certain difference in direction of the interests of the interbranch scientific technical complexes, the organizations, to which they are subordinate, and the enterprises and organizations, which supply the complexes with resources, has not been eliminated. Thus, for the designing of new types of equipment the complexes need equipment that has been produced in accordance with custom orders. However, the designing and production of such equipment are often unprofitable for the performers. Considerable time is required for the inclusion of these orders in the plans of the performers.

The procedure of allocating material resources also does not conform to the tasks of the development of interbranch scientific technical complexes. The bulk of the resources are allocated to the performers by the corresponding ministries in case of the inclusion of the assignments of the unified plans of the interbranch scientific technical complexes in the plans of the organizations and enterprises that are subordinate to them.

On the basis of the generalization of the experience of the functioning of the complexes and the analysis of the prevailing procedure of their management and the results of developments on questions of programming planning and management, it is possible to formulate a number of suggestions on the improvement of the forms and methods of planning and managing interbranch scientific technical complexes. First of all the experience of the work of the complexes shows that the interbranch scientific technical complexes should in practice become independent objects and specific "addressees" of national economic planning. This presumes that the state orders for the development, introduction, and assimilation in production of new types of equipment, technology, and materials and for the performance of basic and fundamental scientific research work should be established not for each of the ministries and departments, which are participants in interbranch scientific technical complexes, but for the specific complex as a whole. Accordingly the limits of resources, which are allocated in the state plan for the solution of one scientific and technical problem or another, "for" which the complex is set up, should be established for the interbranch scientific technical complex. Here the management organ of the complex acts as the holder and manager of the allocated resources.

At present the following procedure of planning and managing the activity of the interbranch scientific technical complexes, which are established for the implementation of long-term all-union scientific and technical programs, is possible. With allowance made for the target indicators of these programs for the period of the next five-year plan the USSR State Planning Committee formulates a 5-year state order for the interbranch scientific technical complex, which specifies the basic assignments on the conducting of basic research and on the development, introduction, and assimilation of equipment of new generations, as well as limits of the resources that are centrally allocated to the interbranch scientific technical complex. On the basis of state orders and the economic contracts between the organizations, which belong to the complex, and the users of its product the main organization of the interbranch scientific technical complex drafts a unified five-year plan of the operation of the complex and annual plans, which include the assignments of the five-year plan. Then the management organ of the interbranch scientific technical complex or, on its instructions, the main organization of the complex concludes with the institutions and enterprises, which are a part of the complex and are participating in its work, contracts for the performance of scientific research work, the delivery of the necessary equipment and materials, the making of an evaluation, and so on. The specific duties of the parties, the deadlines and specific results of the performance of the work, the contract prices, and the forms of liability for the violation of the terms of the contracts should be specified in them.

Since interbranch scientific technical complexes are established for the solution of especially important, priority scientific and technical problems in the shortest time, the management organs of the complexes should be given adequate and real rights and powers. In the area of the disposal of resources it is advisable to give the management of the interbranch scientific technical complex the rights of the establishment of centralized funds and reserves and the acquisition of the necessary types of materials and equipment from foreign firms by means of the assets of the currency funds that are formed at the interbranch scientific technical complex. Moreover,

owing to the considerable national economic importance of the tasks facing interbranch scientific technical complexes, it is advisable to grant the management organs of the complexes the right of direct appeal to the permanent organs of the USSR Council of Ministers, to the USSR State Planning Committee, and to the USSR State Committee for Material and Technical Supply for the consideration of arising problems, which require solution and the rendering of prompt assistance, particularly with regard to the allocation of assets for materials, equipment, and components.

It is also necessary to grant the management of the interbranch scientific technical complex the right of: the stimulation of the participants, the enlistment in the work on the accomplishment of the tasks, which have been set for the complex, and the evaluation of materials of any organizations, subdivisions, and individual specialists on terms that are of mutual interest, and the establishment of wage increments for the workers of the organizations that belong to the complex, as well as bonuses for all the participants in developments that significantly surpass the level set for the national economy. The only restriction here consists in the establishment of a direct dependence between the amounts of the remuneration of labor and the bonuses and the amount of the actual economic impact from the use of the developments of the interbranch scientific technical complex in the national economy.

At present the question of the financing of the activity of complexes is acquiring particular importance. In case of the changeover of scientific organizations to cost accounting and self-financing the revenue from the sale of scientific and technical developments and models of new equipment and from the rendering of scientific and technical services should become the basic source of assets for the development and functioning of interbranch scientific technical complexes. At the same time the allocations from the state budget and the deductions from the centralized funds of interested ministries and departments are being retained as one of the most important sources of the financing of basic and fundamental research, the construction of new enterprises, and the establishment of centers of the collective use of instruments within interbranch scientific technical complexes.

The sale to consumers of the scientific and technical developments and other products and services of interbranch scientific technical complexes should be carried out at contract prices. The contract price includes the standard expenditures and the profit, the standard of which should be differentiated subject to the level of novelty of the developments and the amount of the economic impact in the national economy from their use.

After the recovery from the receipts from the sale of the scientific and technical product of the complex of the material expenditures, the payment for services, which are carried out in accordance with contracts with organizations of the interbranch scientific technical complex, and the meeting of the obligations to the budget, the bank, and the superior management organ deductions will be made from the revenues for the centralized funds of the interbranch scientific technical complex.

The centralized funds of the complex are established for the assurance of the necessary concentration of resources, the shifting of assets, the carrying out of the special-purpose financing of work, and the stimulation of the performers for the achievement of high end results of the work of the complex as a whole.

The formation of centralized funds of the complexes is a new feature of management within the interbranch scientific technical complexes. However, the presently accepted procedure of their formation does not seem efficient. First, the amount of the deductions for the funds is not directly connected with the amount of the economic impact in the national economy of the activity of the interbranch scientific technical complexes, that is, with the indicator of the economic impact from the production and use of the new equipment and technology, which have been devised in accordance with the developments of interbranch scientific technical complexes. Second, not the assets of the users of the "results" of the work of interbranch scientific technical complexes, but the assets, which are deducted by the organizations and ministries, which are participants in the complexes, from their own bonus funds (moreover, such deduction is not of any mandatory nature and is carried out by each participant and in each case voluntarily), serve as the sources of these funds. Thus, the basic principle of stimulation—the connection of the amounts and forms of the incentive with the end result of the work—is not being observed.

The analysis of the experience of the work of interbranch scientific technical complexes and the results of developments with respect to the problems of program management makes it possible to distinguish four types of centralized funds of the complexes, which are intended for the financing of new construction and modernization (the centralized investment fund) and scientific research and development, the centralized currency fund, and the centralized economic stimulation fund.

The centralized investment fund is intended for the financing of new construction and the modernization and retooling of production. Its possible sources are budget allocations, the shares of interested ministries, and deductions from the revenues of the interbranch scientific technical complex. In case of a shortage of assets of the fund for the implementation of planned investment measures credit can be granted to the interbranch scientific technical complex. Its repayment and the payment of interest should be carried out from the profit which is derived by the interbranch scientific technical complex from the sale of scientific and technical products and the rendering of services.

The fund for the financing of scientific research and development should be created from deductions from the revenues of the interbranch scientific technical complex on the basis of the centralization of a portion of the funds for the development of production, science, and technology of the enterprises and organizations, which belong to the complex, budget allocations, and receipts from the centralized funds of the ministries, which "form" the interbranch scientific technical complex and are interested in its developments. This fund is intended for the financing of expenditures on basic and fundamental development and for the holding of competitions of designs, inventions, and innovations. If the series production of new equipment, which has been devised in accordance with developments of the complex, is carried out at the enterprises that belong to the interbranch scientific technical complex, the expenditures on the assimilation of the equipment and the increased costs of the first 2-3 years of its production are compensated from the centralized fund for the development of production, science, and technology.

It is necessary to form the centralized currency fund from the revenues from the sale of the products of the complex abroad, it is intended for the acquisition from foreign firms of new equipment and materials, the purchase of licenses, and so on.

The centralized economic stimulation fund will have as a goal the giving of additional incentives to collectives and individual workers, the payment of rewards to inventors, the payment for services of experts, and the payment of bonuses to the workers of the management staff of the interbranch scientific technical complex. The deductions from the profit of the interbranch scientific technical complex, as well as from the additional planned profit, which is derived by the producers and users of the new equipment that was developed by the complex, should enter it.

The experience of establishing interbranch scientific technical complexes and the diversity of the goals and conditions of the activity of the organizational forms of intersectorial integration, which are similar to them, are posing with utmost urgency the problem of the forecasting of the development of systems of intersectorial management and the further search for and careful substantiation of the most effective systems of the management of scientific and technical progress.

Footnote

1. For example, the USSR Ministry of the Electrical Equipment Industry, to which (equally with the USSR Academy of Sciences) the Tekhnologicheskiye lazery Complex is subordinate, did to free the proper production capacities from the output of products that are not characteristic of the interbranch scientific technical complex. Due to this the plants cannot properly direct attention to the retooling and preparation of production.

7807

Progress of Organized Scientific, Technical Creativity of Youth

18140054 Moscow NTR: PROBLEMY I RESHENIYA in Russian No 18, 22 Sep-5 Oct 87 p 2

[Article by V. Polukhin: "Separately or United"; first paragraph is source introduction]

[Text] On 14 September 1987, a meeting was held of the All-Union Coordination Council of Scientific and Technical Work of Youth, which discussed the work of the system of scientific and technical creativity of youth.

More than a year has passed since the creation of a unified public state system of scientific and technical creativity of youth. It is still too early to summarize the concrete results of its work. But there can be no doubt that it is bound to make a substantial addition to the achievements of scientific and technical progress. This was stressed by B.L. Tolstykh, chairman of the USSR State Committee for Science and Technology, in his opening address.

Thirty centers of scientific and technical creativity of youth have begun operation. They have concluded approximately 150 economic contracts with enterprises involving a sum of more than 3.5 million rubles. The chief distinctive feature of creative youth collectives is the speed of completing orders with minimal outlays. For example, the Nikolayev Center of Scientific and Technical Creativity of Youth will do work for the Zaliv Shipbuilding Plant (Kerch) in the amount of 9,300 rubles in the course of 6 months. If that were to be done by a scientific-research institute, the cost would add increase to 90,000 rubles, or three- to fourfold.

With the creation of 2,000 centers of scientific and technical creativity of youth, the national economic effect from the introduction of such developments would total about 2.5 billion rubles.

But this year has shown that the actual work of creating centers of scientific and technical work of youth is being conducted unsatisfactorily. The mechanisms of bureaucratic dawdling and inertia of thinking have not yet been destroyed. A number of state organs have avoided resolving questions relating to the development of scientific and technical creativity of youth, other decide on them formally. Thus the USSR State Committee for Science and Technology has not started to carry out the functions incumbent on it within the framework of the system of scientific and technical creativity of youth. Several months were required, for example, for it to convince the Moscow City Soviet of Workers and Deputies of the need of resolving questions relating to the creation of a center.

The work of existing centers of scientific and technical work of youth has raised a number of quite contradictory questions. For example, how should planning, financing and organization of material supply be organized in them. The meeting's participants unanimously replied that as little as possible formalization [sic] should be engaged in, not to manufacture paper work but to be more guided by common sense and not to ask for permission for what has already been permitted. Heads of councils of scientific and technical creativity of youth should more boldly display initiative and enterprise.

Since the system of independent technical creativity of workers is being created in parallel with the youth system of technical creativity, some members of the coordination council of scientific and technical work of youth have proposed to unite them in order to prevent an unjustified growth of the number of organizations engaged in the same pursuit.

Many of the meeting's participants saw a rational element in this thought. A decision was adopted to prepare materials for discussion at a meeting of the presidium of the All-Union Coordination Council which will be held 19 October.

7697

Updating of Industrial Products

18140024 Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 8, Aug 87 pp 53-56

[Article by Candidate of Economic Sciences V. Samoletov under the rubric "Questions of the Intensification of Production" (Lvov): "Organizational Economic Questions of the Updating of Industrial Products"]

[Text] The decisions of the 27th CPSU Congress direct the national economy of the country and first of all machine building toward the intensive updating of products and the quickest development and assimilation of the production of equipment of new generations, which makes it possible to increase labor productivity by many fold, to improve working conditions, and to decrease substantially the materials-output ratio of products. These decisions are all the more urgent as the average annual indicators of the development of models of new types of machines, equipment, and instruments decreased during the past decade both for the Ukraine and for the USSR as a whole (see table). The number of new types of industrial products, which were assimilated by enterprises of the Ukrainian SSR, also decreased.

The Development and Assimilation of New Types of Industrial Products, Thousands of Units*

Name of Indicator	1971-1975		1976-1980		1981-1985	
	Total	Average a year	Total	Average a year	Total	Average a year
Number of developed models of new types of machines, equipment, apparatus, instruments, and automation equipment for the USSR	20.0	4.0	18.5	3.7	17.4	3.5
for the Ukrainian SSR	4.3	0.9	4.0	0.8	4.0	0.8
Number of assimilated new types of industrial products for the USSR	16.6	3.3	17.5	3.5	19.3	3.9
for the Ukrainian SSR	4.9	1.0	4.8	1.0	5.2	1.0
Number of obsolete designs of machines, equipment, apparatus, instruments, and automation equipment (descriptions), which were removed from production, for the USSR	7.5	1.5	9.1	1.8	12.0	2.4
for the Ukrainian SSR	1.7	0.3	2.1	0.4	2.7	0.5

*See "SSSR v tsifrakh v 1985 godu" [The USSR in Figures in 1985], Moscow, "Finansy i statistika", 1986, p 78; "USSR v tsifrakh v 1985 g." [The Ukrainian SSR in Figures in 1985], Kiev, "Tekhnika", 1986, p 48.

At a number of enterprises and associations of Lvov Oblast the rate of updating of items comes to nearly a third of all the output. Its technical level and competitive ability rose, the quality and reliability were increased. In all at enterprises of Lvov Oblast in 1985 the production of 56 new types of products was assimilated; 7 obsolete designs were removed from production. However, the technical level of machine building products still lags behind the increasing demands of the national economy. The time of the development and assimilation of new models of equipment is intolerably long. The tendency for products to grow old has emerged in machine building of the oblast. In 1976 the average age of products of machine building enterprises came to 4.3 years, in 1980—5.7 years, and in 1985—6.3 years. There are many reasons for such a situation. As is known, the updating of products requires frequent readjustments of production and the making of a large quantity of machine tool attachments and nonstandard equipment.

Large amounts of work on the preparation of the production of the models being assimilated, the shortage of production capacities of tool and machine repair shops, and their loading with uncharacteristic operations lead to the upsetting of the deadlines and the decrease of the

quality of production of the necessary technological equipment, which in the end affects the time of the assimilation of new products and decreases the effectiveness of this measure. Frequently the inadequate level of the organization of production, which is manifested in the failure to observe technological discipline, errors and miscalculations in the technical specifications, and incomplete manning with skilled specialists, also makes itself felt. The lack of organized pilot experimental production and its dissociation from other stages of the cycle of the development and making of new equipment do not make it possible to test it in the necessary time, which is one of the main causes of both the dragging out of the time of the assimilation of new products and their low quality. All the subsequent changes and modifications in the technical specifications and operational development in the process of series production require enormous expenditures, which greatly exceed the expenditures on the development of experimental bases.

Thus, a number of unsolved problems at all stages of the "research-production-use" cycle exist in the organization of the process of updating. It is a question not of organizational economic difficulties of the development of a new product (the lack of developed pilot experimental works and a modern standard base and shortcomings in material, technical, and information supply), but of the methodology of realizing the process of updating products and the search for means of its acceleration.

The departmental isolation of the participants in the development of new equipment (SNT) is one of the causes of such a situation. The connection between scientific research institutes, design bureaus, producer plants, and users already during the initial period of the process of updating—during the compilation, coordination, and approval of the plan of scientific research work on the designing of new equipment—is not being realized at the proper level. This leads either to the dragging out of the time of the appearance of new equipment in the national economy or to the fact that the results of one scientific research effort (experimental design effort) or another are not used and, perhaps, will not be used in the spheres of production and consumption due to their obsolescence.

The lack of constant contact between performers in the process of the development of new equipment and its assimilation and use has already become traditional. In the "scientific research institute-design bureau-producer plant-user" chain cooperation takes place mainly during the completion and delivery of one or another independent stage of the work (scientific research work, experimental design work, approval tests of the first commercial batch, and others). The consequences of such isolation in the development of new equipment especially affect the period of the output of commercial batches, their delivery to the user, and use itself.

The lack of interest of the producer enterprise in the assimilation of the production of a new item is another reason. Indeed, any updating objectively has an adverse effect on the economics of the enterprise, for it leads to the decrease of profitability, the reduction of the production volume, the decrease of labor productivity, and the increase of expenditures per ruble of output. As a result of the assimilation of innovations the risk of a decrease of product quality arises—defective output appears, the guarantee of the fulfillment by the enterprise of contractual obligations on product deliveries declines. The rejection of the production of a new, just assimilated product in favor of the latest product is the rejection of the earned material stimulation funds. Here the amount of the profit and the output-capital ratio decrease, disruptions of the plan and socialist obligations, defeat in socialist competition, and the loss of prestige by the enterprise with all the ensuing consequences up to the "recognition of the inadequacy" of precisely those economic managers, who contribute to the acceleration of scientific and technical progress, are possible. That is why it is often unprofitable for the enterprise to assimilate something new.

At present a number of radical steps, which are aimed at changing the traditional means and methods of managing the processes of updating in various sectors of the national economy and in the country as a whole, are being taken. First of all they are aimed at the elimination of the noted isolation of the performers in the process of the development of new equipment. Interbranch scientific technical complexes (MNTK's) have already been established. Scientific production associations (NPO's) are being reorganized. Temporary scientific technical laboratories (VNTL's), of which the prompt introduction of completed research and development is the main task, are being established at many scientific research institutes. In addition to organizational changes significant economic changes are also being accomplished. A number of enterprises have been changed over to the new conditions of management. Additional deductions for the material incentive fund for the increase of the profit, the exceeding of the plan of the profit, and the increase of the proportion of products of the highest quality category in the total production volume are being introduced in practice. Fines for the nonfulfillment of the cited indicators are also being used. The rights of producer enterprises in the formation of a number of indicators of the five-year and annual plans of production, including on new equipment, have been broadened significantly.

However, the further improvement of the process of updating industrial products requires more substantial steps, which are aimed at the quickest solution of the problem. Here science should play the main role. The careful study on the basis of a comprehensive systems approach of the situation, which has formed in the "science-production-consumption" cycle, is necessary in order to formulate a modern strategy of the management of the process of updating products under the conditions of scientific and technical progress.

The necessity of the development and assimilation of new production is objectively predetermined by the

demands of society for new products, which have the maximum possible conformity to its needs. The maximum possible conformity is the main and a necessary criterion of the evaluation of the advisability of assimilating a new product. When the "maximality" is determined by the perfection of new equipment—by its conformity to the best models or the exceeding of them, while the "possibility" is determined by the degree of adaptation to immediate and effective use, the prerogative of establishing the former belongs to science and the developers of what is new, while that of the latter belongs to the workers of the sphere of production and consumption. If when evaluating the advisability of producing something new it turns out that only the first condition has been observed, its development can be sanctioned, but the work should be halted at the stage of experimental design work or even scientific research work until the necessary conditions arise in the spheres of production and especially consumption, in order to avoid unjustified expenditures in industry. The final decision on the advisability of the inclusion in the plan of the development and assimilation of the new product in accordance with this criterion should be made by the appropriate planning and economic organs on the basis of the thorough analysis of the requirements and suggestions of all the participants in the development of new equipment.

Given the main criterion of advisability (GKTs) it makes sense to take into account additional ones, which are responsible for the time of the development, assimilation, and production and, in the end, the "life cycle" of a new product in the sphere of consumption. Among them are the indicators of the expenditures on the development of the latest product and the increase of its quality. At the very start of the planning period of the "research-production-use" cycle a clear idea of what the development of an innovation will cost and how it will be rated in the sphere of consumption is necessary. An exception can occur here only in case of the accomplishment of an especially important state task on the development of new equipment, when questions of the expenditures on assimilation and production are of secondary importance.

Any stage of the cycle of updating has an influence on the price of a new item: scientific research work—the standardization of layout solutions, the complexity, the novelty, the use of not very scarce and inexpensive materials; experimental design work—the standardization and unification of materials, parts, assemblies, and type sizes, once again the complexity and novelty of the new design, its technological feasibility and maximum "coupling" to the production conditions of the future producer plant and to its technological possibilities and equipment; the preparation of production and its assimilation—the standardization of machine tool attachments and tools and nonstandard production equipment, the maximum conformity to established facilities in the sphere of use of the innovation in the national economy. All this should be taken into account and observed at all stages of the process of assimilation with allowance made for the basic tasks of the new product, that is, with the mandatory observance of the requirements of the main criterion of advisability. Only after a positive conclusion of competent organs on the conformity of innovations to the indicated criteria can the development of new equipment be included in the "research-production-use" cycle.

On the basis of the ever increasing demands of scientific and technical progress under present conditions the basic tasks of the updating of industrial products can be formulated as follows:

—the first is that new equipment should ensure the systematic, steady, and significant increase of the efficiency of social production in the sphere of its use;

—the second is that in the process of updating one should strive for the assurance of the output of a new product in an amount, which meets social needs, with a high quality and the minimum costs in the sphere of its production;

—the third is that it is necessary to strive for the maximum shortening of the time, during which an impact should be obtained, by the quickest development, assimilation, production, and sale of qualitatively new equipment within the entire national economy.

In the updating of industrial products it is advisable to distinguish five stages: the planning period, scientific research work, experimental design work, production, and use. The responsible performers in the development of new equipment are: planning and economic organs, scientific research institutes, design bureaus, producer plants, and users (or the sphere of sale). In our opinion, it is advisable to assign to planning and economic organs not only duties on the drafting of plans, the issuing of assignments, and the monitoring of their fulfillment, but also direct participation (of a specific contingent of their staff) in the development of new equipment throughout the cycle of updating.

At the early stages of the planning period it is advisable to establish a competent commission for the supervision of work, as members of which it is advisable to include responsible representatives of all performer organizations in the development of new equipment. This commission on the basis of the study and analysis of the socially necessary needs, the requirements of consumers, the achievements of science, the best analogs of a product, and completed experimental design work and scientific research on one specific problem or another makes the decision on the advisability of developing and assimilating a specific new item. Then the specific performers in the development of new equipment and the users of the innovation should be determined. Then a comprehensive (as a rule, interdepartmental) program for the entire set of operations, the deadlines of their fulfillment, and the people responsible for their completion is formulated; an interdepartmental working commission

made up of representatives of specific performer organizations, which carries out work at all the stages of the process of updating, is established.

Within the above-indicated interbranch scientific technical complexes, temporary scientific technical laboratories, and others the organization of the planning and implementation of work is greatly simplified. During the planning period the commission coordinates and approves the final phase of the planning period—the technical assignment for scientific research work. The scientific research work is performed in close contact with representatives of the working commission with its direct participation, with the maximum linking to the conditions of the specific design bureau, to which the performance of the subsequent experimental design work has been assigned. At the stage of theoretical and experimental research it is advisable to include several workers from among designers and researchers directly on the staff of personnel of the scientific research institute.

An important unit of the stage of scientific research work is its acceptance in accordance with the results of interdepartmental tests of the experimental prototype. Here the actual performance indicators are compared with the anticipated indicators, the price of the item is adjusted, and the first evaluation of the scientific research work is made. It is advisable to classify the completed scientific research work and to turn over the corresponding information to the All-Union Scientific and Technical Information Center for the purpose of its registration on an all-union scale.

The experimental design work should be carried out with the maximum coupling to the conditions of the producer enterprise, while starting with the stage "The Contractor Design" it is advisable to include on the staff of the design bureau workers of the design and technical services of the enterprise, to which the organization of the production assimilation and commercial output of the new product will be assigned. This practice, which already exists at a number of Lvov enterprises, in spite of its obvious advantages, has not received proper dissemination due to difficulties, which are connected with the payment of wages, bonuses, travel expenses, and leaves, questions of a social nature, and others. On this level interdepartmental associations also have substantial advantages.

The experimental design work is accepted by the interdepartmental commission in accordance with the results of tests of the prototype. Then the price is again adjusted, the anticipated economic impact is calculated, and the first evaluation of the experimental design work and the second evaluation of the scientific research work are given with an official opinion at the scientific research institute of the previously performed scientific research work. The performed experimental design work should also be classified, while the basic characteristics of the developed item in accordance with the results of the experimental design work should be turned over to the All-Union Scientific and Technical Information Center.

It is advisable to begin the first substage of the process of the assimilation and production of a new item—the technical preparation of production—jointly with the workers of the design bureau, who performed the corresponding experimental design work. The process of assimilation and production concludes, as a rule, with the output of the first industrial batch and industrial tests of the new product with respect to all the items of the specifications for the item, after which the price of the item and the economic impact from introduction are again adjusted and the evaluation of the results of the assimilation of the new product, the third evaluation of the scientific research work, and the second evaluation of the experimental design work are given with the corresponding opinions of the interdepartmental commission at the scientific research institute and design bureau. The new industrial item is classified at the All-Union Scientific and Technical Information Center, after which the sale of the new product begins.

The use of new equipment, when the interdepartmental commission specifies the period, which is necessary for the final evaluation of the new equipment, its advantages, the national economic impact, the life span of the item, the demand for it in our country, and its competitive ability abroad, is the most important stage which summarizes the completed cycle of updating. Precisely during this period the final evaluation of the performed scientific research work and experimental design work and the process of industrial assimilation and production is given. An objective qualified determination of the contribution of each participant in the development of new equipment to the matter of the effective implementation of the innovation is necessary. At this stage it is advisable to use fully the system of the stimulation of the collectives, which took part in the development of new equipment, and to establish the skills level of each of them and their prestige, significance, and place in the national economy of the country as a whole. The conclusions on the introduction of a new thing should serve as recommendations for the planning of development and the production of the latest thing with regard to one specific scientific and technical problem or another.

The organization of a system of the development of new equipment, the regulation of whose work would be clearly stipulated by the corresponding directive documents on the scale of sectors and on a statewide scale, is necessary for the purpose of creating the conditions for the efficient development of new equipment and its introduction in industry and the sphere of consumption. Within this system a management organ and working organs should operate in each specific case.

For the effective process of updating it is necessary to specify clearly the advisability of developing a new thing and the priority of the inclusion in the plan of new

equipment of one or another type of innovations in conformity with the above-identified "criteria of advisability." These are the functions of the management organ of the development of new equipment, within which competent representatives of directive and planning organs and workers of science, production, and the sphere of consumption have been included. The information on domestic and foreign achievements in science and technology, as well as on the sales market should be the basis for this work. For the named purpose it is necessary to establish at the All-Union Scientific and Technical Information Center and in the process of the current updating of one product or another to constantly supplement the systematic catalog on scientific research work, experimental design work, and industrial products with respect to each type of items.

For the effective management of each specific process of updating it is necessary to specify in good time during the planning period all the specific performers of the "science-production-use" cycle, to formulate a unified comprehensive program of the development of new equipment with the specification of the amounts of operations, the deadlines of their fulfillment, and the results with respect to each type of operations, as well as to form a working organ of the management and coordination of all types of operations for the entire period of the process of updating industrial products. The interdepartmental associations, which have already been organized in a number of sectors of the national economy, should be used more extensively.

Economic levers should also be used to a greater degree. It is necessary to make not departmental subordination or interdepartmental subordination, which is established by directive, but the status of contractual obligations, which are mutually advantageous for all the participants in the development of new equipment, the basis for them. Especially as any integration, in spite of its indisputable advantages (particularly during the given period), sooner or later will be a kind of obstacle for the further development of scientific and technical progress in general and the process of updating in particular. This objective regularity has already occurred more than once in the history of the development of the national economy. At a specific stage the time of the differentiation of various scientific production associations, all-union industrial associations, and so forth will come. The economic essence of one problem or another will remain unchanged.

In this connection the creation of the additional conditions, which the producer enterprise needs during the period of the assimilation of a new product, is of no small importance. For example, the granting to the enterprise of the right to sell a product, which has an obsolescence of type 1, at the old price, if this product continues to enjoy an increased demand of the consumer (especially if it has the highest quality category), as well as if the enterprise is actively participating in the assimilation of new equipment. Thus, the producer enterprise will compensate for the losses and will be interested in the introduction of innovations. In addition to this other measures of economic stimulation, which especially concern the revision of the percentage of deductions to material stimulation funds at enterprises that are in the forefront of scientific and technical progress, are also possible.

The comprehensive planning and management of scientific and technical progress should be aimed at the assurance of the unity between science and production, the constant interconnection of the preindustrial and industrial stages, and the strict observance of sychronism between the process of the development of equipment, the preparation of its mass production, and its use.

7807

Management Of Science By State Committee For Science, Technology

18140005 Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Aug 87 pp 1-2

[Interview with Deputy Chairman of the USSR Council of Ministers and Chairman of the USSR State Committee for Science and Technology Boris Leontyevich Tolstykh by D. Pipko under the rubric "The Restructuring of the Economy: The Highest Level of Management": "Scientific Research: Checking by Deed"; date, place, and occasion not given; first two paragraphs are SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] The acceleration of scientific and technical progress is one of the fundamental issues. And one of the most difficult ones. As was noted in the decisions of the party, the country has also not avoided retardation in this sphere. In a number of leading directions of science and technology a lag behind the world level has been allowed. The instances, when the most advanced ideas for years and even for decades do not find practical application, are frequent. While having our own developments, which are capable of ensuring a high technical level and competitive ability of our products, we resorted to purchases abroad.

To change the course of events and to turn scientific and technical progress into the main factor of economic growth—that is how the task is being posed today. For this, in particular, the party and government have adopted a decree, which is aimed at increasing the role of the USSR State Committee for Science and Technology in the management of scientific and technical progress. Today Deputy Chairman of the USSR Council of Ministers and Chairman of the State Committee for Science and Technology B. Tolstykh tells about the basic directions of restructuring, which has been outlined by them:

[Answer] The combination of the planned element with economic methods of management have been made the basis of the restructuring of the management of scientific and technical progress. There are no longer so-called plans on new equipment. The planning of scientific and technical progress is becoming an integral part of the plans of economic and social development. While their drafting is concentrated entirely in a single organ—the USSR State Planning Committee.

One would like to know: What and how in this situation can the State Committee for Science and Technology manage? I will answer. But I will begin by recalling the well-known words of Lenin: the entire art of management is to take into account in good time and to know where to concentrate one's main forces and attention. Thus, the specialists of the State Committee for Science and Technology and their partners should "take into account in good time and know," while working on one of the main "products" of the activity of the committee—the Comprehensive Program of Scientific and Technical Progress for the Next 20 Years.

Having joined in itself the forecasts of scientists with specific needs of the national economy, the Comprehensive Program is now turning into the most important preplanning document, the basis for the drafting of long-term and five-year plans. And, hence, into one of the main channels for advancing major achievements of science and technology into practice. Does it look like the directive method of introduction, which is familiar to everyone? But the essence is different. Inclusion in the plan, as a rule, signifies that work will be performed on the basis of state orders, which give the performers significant economic benefits.

In order for the client to have opportunities for maneuvering and for the choice of a performer, several versions, ways, and means of accomplishing the posed tasks will be envisaged in the program. It is planned to revise and update it every 5 years. Here it should be submitted to the USSR Council of Ministers, its permanent organs, and the union State Planning Committee no later than 3 years before the start of the next five-year plan.

The dialectics of the formulation of the Comprehensive Program consists in the fact that it should encompass or, at the least, take into account all promising ideas—be it developments of leading scientific research institutes or proposals of individual inventors. But, on the other hand, it is clear to everyone that even the most developed country cannot hold leading positions in all directions of science and technology. Hence, it is necessary to learn to choose from them precisely those, by having concentrated forces and resources on which it is possible to make a breakthrough to leading levels.

The choice and substantiation of such priority directions of scientific and technical progress is one of the main tasks of the State Committee for Science and Technology. Moreover, in each of them the committee is obliged to organize in good time research and development, which make it possible to achieve leading results. The advantages of interbranch scientific technical complexes and other forms of the integration of science and production and international cooperation can be used for this. The possibility of organizing work within the framework of state scientific and technical goal programs is also envisaged.

[Question] But the experience of past years showed that goal programs did not completely justify the hopes placed in them. Is it necessary to return again to this form of interaction?

[Answer] Not the form, but the content is to blame. In pursuing the number of programs we devalued their essence: many of them, while called all-union programs, solved exclusively sectorial problems. Accordingly, by "taking care" of them, the committee replaced ministries. Meanwhile a comparison should have been made already then with foreign experience. And we would find that in the United States, for example, only 10 national programs are in effect. Among them are the notorious Strategic Defense Initiative, the program of biomedical research, which includes the combating of AIDS, and the so-called strategic computer initiative. There are a few more—14 programs—in Japan. One of them is connected with the development of a fifth-generation computer, another, which is called "Sunlight," is aimed at the development and extensive use of alternative sources of energy.

The list of state scientific and technical goal programs, each of which is approved by the government, will also be limited. They should be of an intersectorial nature and envisage the development of fundamentally new equipment, technology, and materials and the solution of major problems, which are of revolutionizing importance for the economy. Or ensure the attainment of the world level of the development of production. For the timely assimilation of these innovations the State Committee for Science and Technology has been given the right jointly with the USSR Academy of Sciences, the USSR Ministry of Higher and Secondary Specialized Education, ministries, and departments to draw up state orders for the development of science and technology and to go to the State Planning Committee with suggestions on their inclusion in the state plans.

Similar privileges are being extended to the most important developments of interbranch scientific technical complexes and academic and VUZ science and to major inventions that are of statewide importance. Moreover, the State Planning Committee and the State Committee for Science and Technology are obliged to draw up state orders for the development of the pilot experimental bases of interbranch scientific technical complexes and those collectives that are participating in state goal programs.

[Question] Boris Leontyevich, how will the scientific research institutes, design bureaus, and academic, VUZ, and plant laboratories, which did not come to be in the priority directions, live and work? What stimuli and guarantees of the introduction of developments will they receive?

[Answer] Only such conditions, under which each enterprise and each collective will be vitally interested in the use of the achievements of science and technology, can become a guarantee. The creation of such conditions is the most important task of restructuring. Its accomplishment involves the systematic improvement of the economic mechanism.

It is a question of the changeover to economic methods, which stimulate an interest in the increase of the technical level of production and product quality and in the shortening of the time of the development of innovations. We should judge the work of scientific collectives from the impact from the use in the national economy of the results of their theoretical and applied research and engineering developments. Only advanced technologies, equipment of new generations, and new materials with preset properties are capable of maintaining today the reputation and confirming the necessity, I emphasize, the necessity of the existence of one institute or design bureau or another.

The development of cost accounting principles in the interrelations between scientific research, planning and design, and technological organizations and enterprises will be an important step in this direction. Here it is envisaged to use contract prices for scientific and technical developments and services. As well as to increase the mutual responsibility "by the ruble" both for the technical level, efficiency, and quality of developments and for the timely development, assimilation, and introduction of new equipment and technology in production.

Such steps will make it possible to accomplish the gradual changeover of our scientific research institutes, design bureaus, technological organizations, and scientific production associations to full cost accounting, self-support [samookupayemost], and self-financing with the use of the standardized method of the distribution of the profit. Moreover, it is planned to change in principle the procedure of the financing of scientific research and experimental design work. We should change over from the financing of the maintenance of organizations to the financing of specific operations in accordance with contracts with clients, who are interested in their performance.

[Question] How will our scientific production associations and interbranch scientific technical complexes feel under the new conditions of management, what lies ahead for sectorial scientific research institutes and design bureaus?

[Answer] Now in industry nearly three-fourths of the former independent scientific research institutes and design bureaus have already been transferred to scientific production and production associations and large enterprises. It is planned to complete this transfer process by the end of the five-year plan, having retained independence only for those leading collectives, which are elaborating problems of a sectorwide nature. Here it is important not to allow the transferred scientific research institutes to cease to be scientific collectives and to be converted into a permanent reserve for the sending of people to a kolkhoz or a vegetable base.

Everything is clear with scientific production associations. They have demonstrated their efficiency both on the level of the significant shortening of the time of the development and introduction of new equipment and technology and from the standpoint of the increase of the level of developments. Whereas 5 years ago we had 211 such associations, now there are about 400 of them. While by the end of the five-year plan there will already be nearly 500. True, as was noted at the June CPSU Central Committee Plenum, the process of establishing new scientific production associations in our country has slowed down—ministries are not displaying activity here. For the present several questions in the planning and stimulation of the activity of scientific production associations as a unified economic complex have also not been settled. In order to eliminate these difficulties, the State Committee for Science and Technology is now drafting the necessary standard documents.

MNTK's—interbranch scientific technical complexes—are a very promising form of the integration of science and production. In spite of all the difficulties of their formation, it is now already clear that they are capable of accomplishing the task set for them—to attain and consolidate their hold on the foremost levels of scientific and technical progress. It is another matter that the standard documents, in accordance with which interbranch scientific technical complexes operate, were written prior to the June Plenum, and the changeover to economic methods of management to some extent took the complexes by surprise.

[Question] Boris Leontyevich, the responsibility for the organization of the work on the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000 has been assigned to the State Committee for Science and Technology. How do you grade the activity of our main organizations in its implementation?

[Answer] Several get a C-. In many respects through their fault the organizational period was dragged out unjustifiably, there are still many elements of formalism in work with partners. The inability to do business on the basis of the principles of the international division of labor also has an effect. But, it seems, these "childhood" diseases will soon be conquered. We are now concentrating the main attention on the coordination of the

detailed plans of the stage-by-stage development and industrial assimilation of new products. The Soviet Union proposed to assign the 25-30 most important projects to the level of the state plan. Among them are the questions of the development of supercomputers, automated plants, and a ceramic engine.

[Question] Among the problems, which are checking the pace of scientific and technical progress, which ones, in your opinion, are having the most appreciable effect? How is their impeding effect to be reduced?

[Answer] One should first of all group with such problems the weakness of the pilot experimental base—in our country only about 37 percent of the scientific institutions have it. For a long time no one even attempted to decrease this shortage: during the past five-year plan the annual investments in the development of pilot experimental bases of scientific research institutes came to only 0.5 percent of the expenditures on the building of production facilities.

A no less urgent question is the instrument supply of science, the need for which in our country at times is met at the level of only 20-25 percent. Only a few of our institutes, laboratories, and design bureaus have systems of the automation of scientific research and designing. A paradoxical situation has arisen: the researcher in our country is equipped twofold worse than the worker. While in the United States, on the contrary, the capital-labor ratio of the scientist is 1.75-fold greater.

In order to use our scientific and technical potential more fully, we should declare mortal war against the focus on petty topics. As checks showed, even at the leading scientific research institutes themes of statewide importance frequently account for only a fourth of the total amount of work. Too little attention is still being devoted to the creation of reserves for the future, which guarantee the attainment of the world level. At scientific research institutes and design bureaus of industry only 30 percent of the developments are performed at the level of inventions.

I will make no secret of it: many of our problems are connected with the human factor. In particular, we are worrying too little about the attraction of talented young people to science. But meanwhile nearly 40 percent of our doctors of sciences are already over 70. In the past 15 years the proportion of scientists at the most active age of 30 to 40 has decreased from 40 to 33 percent. While in the United States they make up a good half. Now attempts are being made to "rejuvenate" science. In particular, age limits for the managers of scientific institutions have been introduced in the system of the USSR Academy of Sciences. Much difficult work lies ahead here. It is necessary to perform it.

Incidentally, in the planned radical restructuring there can be no simple matters.

7807

Improvement of Statistics of Science

18140189 Moscow EKONOMICHESKAYA GAZETA in Russian No 43, Oct 87 p 17

[Article by Candidate of Economic Sciences O. Savelyeva and Candidate of Technical Sciences G. Khramov under the rubric "Scientific and Technical Progress: Economics and Management": "The 'Secrets' of Bulky Volumes. Reflections on the Statistics of Science"; passages in boldface are as published]

[Text] "The main factor of economic growth"—that is how the June CPSU Central Committee Plenum defined the role of scientific and technical progress under present conditions. In this connection the necessity of the improvement of the sphere of scientific and technical development and its cardinal restructuring is increasing immeasurably. It should be based on a serious socioeconomic analysis and a competent approach to the problems of the development of science and technology. All this presumes the availability and extensive use of reliable information, which characterizes the scientific and technical potential of the country, the amount and direction of scientific research and experimental design work, and its results.

The importance of accurate information on the sphere of research and development is especially increasing now in connection with the changeover of scientific organizations to self-support [samookupayemost] and self-financing.

It would seem that there are comprehensive statistics—there are rather many than too little data on science. A number of scientific organizations fill out on the order of 10 forms of statistical accounting and reporting. Just the report of the scientific institution (form 5-nk) contains about 70 indicators, "The Report on the Activity of the Scientific Research, Design, Planning and Design, and Technological Organization" (form 15-nt) contains more than 120 indicators.

And still the state of the statistics of science is such that the aggregate data, which are made available by it, in practice cannot be used when substantiating major decisions on the management of the scientific sphere of the country.

The authors were faced with this situation, in particular, when drafting the consolidated plan of the development and distribution of the sector "Science and Scientific Service" for the period to 2005, which should be included as a component in the master plan of the development and distribution of productive forces of the USSR for the same period. While having in our hands tens of bulky volumes with the most diverse data, we experienced an information famine.

Here, for example, is how things stand with one of the basic indicators of the statistics of science—the number of people employed in the sector "Science and Scientific Service." This sector appears as a separate line in the all-union classifier of sectors of the national economy and includes organizations, which are carried on an independent balance sheet and the basic activity at which is scientific research work, experimental design work, and scientific service. At the beginning of 1986 the number of workers employed in it came to 4,554,000. **This is the only official figure which characterizes the total amount of scientific and technical labor in the country.** However, the sector "Science and Scientific Service" is not equivalent to the entire sphere of science. It, for example, does not take into account the large number of scientists of higher educational institutions, a portion of the plant sector of science also remains overboard. As a result the difference between the sector "Science" and the sphere of science is quite substantial. According to our calculations, the number of people employed in the latter at the beginning of 1986 is significantly larger—about 8 million.

The lack of an accurate statistical indicator does not make it possible to judge reliably the total amount of scientific and technical activity in the country and to take it fully into account in official forecasts. Meanwhile the trend is such that in the future the indicators, which characterize the sector "Science and Scientific Service," will reflect to a smaller and smaller degree the real picture, since a significant portion of the scientific research work and experimental design work will be performed at enterprises, higher educational institutions, and other organizations, which have not been included in this sector. This process will especially intensify in connection with the transfer of a portion of sectorial science to associations with the loss of economic independence by the scientific subdivision. The drafters of the plan of the development and distribution of the sector "Science and Scientific Service" were also faced with such a situation during the simultaneous forecasting of the number of people, who are engaged in scientific and technical activity, and the number of scientific and technical organizations. The comparison of the forecasts on these two indicators loses all real meaning beyond the 12th Five-Year Plan.

Therefore, we believe that the comprehensive statistical **accounting of the entire sphere of science,** and not just the sector "Science and Scientific Service," is necessary for the efficient management of scientific and technical progress. And such accounting should be organized by statistics organs. The attempts to broaden independently the group of organizations, which are taken into account when analyzing and forecasting the scientific and technical potential (which occurred when drafting the plan), lead to the incompatibility of materials with respect to individual ministries and departments.

Another problem of the statistics of science is the classifications of consolidated information. Today the basic peculiarities of the management of science are the orientation toward the solution of priority scientific and technical problems and the accomplishment in the shortest possible time of a breakthrough in a limited number of directions, which ensure scientific, technical, and economic progress; the assurance of the continuity of the scientific and technical cycle—from basic research to the dissemination of an innovation in the national economy. The statistics of science is not tailored to these peculiarities.

Thus far we cannot say what proportion of the scientific and technical potential, scientific labor, and its results is aimed at basic science, applied scientific research work, and development. Moreover, it is practically impossible to separate the expenditures and results of scientific research work and experimental design work. There is no information for the combined characterization of the scientific and technical potential and the results with a breakdown by priority scientific and technical directions and programs on the solution of the most important scientific and technical problems. Statistics does not classify the indicators with regard to the three sectors of science: sectorial, VUZ, and academic.

As was already noted, in the statistics of science the share of incomparable indicators is high. Due to the fact that there are at least six types of organizations, which perform scientific research work and experimental design work and report back with respect to various programs, nearly all the basic indicators of science have their own, individual limits of observation. Strictly speaking, it is impossible to compare the total expenditures on science with the number of scientists, this number with the number of people employed in science and scientific service, and so on. All this decreases the information content of the data and the possibilities of their use for a comprehensive analysis.

The method of calculating a number of basic indicators also needs improvement. Thus, now all people with academic degrees and titles and practically all science teachers of higher educational institutions are grouped with scientists. "Degreed" librarians and archivists and economic and other managers are attached to science. Of course, this overstates the number of people who are professionally engaged in scientific work. Therefore, in the process of working on the plan it was necessary even to calculate an absurd indicator—"scientists who do not perform scientific work." At the beginning of 1986, according to our calculations, there were 116,500 of them, or 7.8 percent of the total number. On the other hand, in the method there is no clear answer to the question of whether specialists, who perform experimental design work, are considered scientists.

The vagueness of the instructions, which exists in a number of forms of statistical reporting, leads to considerable sectorial differences when calculating several indicators. This also makes incomparable the materials on individual ministries and departments. Such sectorial

differences in the determination of the economic impact from completed scientific research work and experimental design work are especially great, which in practice deprives the corresponding indicator for the national economy of a real economic meaning.

It is easy to increase the number of examples which testify to the lack of conformity of the statistics of science to the tasks and technology of the management of this sphere. Thus, it is possible to mention the poorly standardized terminology in this field of statistics, the obvious weakness in the classification of the various components of the sphere of science, the lack of an adjusted mechanism of the statistical observation of experimental forms of the organization of research and development, the lack of elaboration of questions of comparisons between countries, and the difficulty of the access of specialists to information.

Thus, it is possible to formulate the fundamental shortcomings of the statistics of science as follows: the object of management is not taken fully into accounting by statistics; the used system of classifications does not make it possible to analyze the object in the most important contexts for management; the organization of the gathering of information on individual indicators leads to their incomparability; the methods of calculating a number of indicators and of filling out reporting forms lead to the loss by these indicators of qualitative certainty and, consequently, to the unreliability of information; the existing system of accounting and reporting is not flexible and is being poorly adapted to the changes of the organizational structure and the economic mechanism in science.

There is one way out of the formed situation—the cardinal restructuring of the statistics of science.

Taking into account that the activity of scientific institutions under the conditions of cost accounting will be carried out in conformity with the provisions of the USSR Law on the State Enterprise (Association), we propose a model of the new system of the statistics of science, which, in our opinion, will make it possible to make it more capacious with a smaller amount of "documents."

Here are its basic features. All independent scientific and technical organizations should fill out several basic accounting and reporting forms, which have been adopted for all objects of the national economy. These are forms 1-t, the balance sheet on basic activity, 4-ks, and the like. They contain general information on the organizations and are used for the calculation of such national economic indicators are the number of employees, the amount of fixed capital, and the average wage.

We propose to replace all reporting on scientific and technical activity proper with a single form, which is filled out by all organizations that have a plan on scientific research work and experimental design work, which has been approved in accordance with established procedure. In this reporting there should be recorded with a breakdown by scientific and technical themes such indicators as the cost of the work; the labor expenditures (standard man-years) with the singling out of the share of the labor of researchers, engineering and technical personnel, and attendants; the fulfillment of the plan; the scientific and technical level of completed research and development; the duration of completed research and development; the type of obtained impact (economic, scientific, social); the amount of the impact.

For the processing of these data it is necessary to design a system of the coding of themes, which would make it possible to classify the information by attributes: the field of science; the type of research; the orientation of this work toward the solution of the problems of one sector or another of the national economy; the basis for the performance of the work; affiliation with a scientific and technical program of one level or another; the sources of financing.

The development of a classifier of institutions and organizations, which perform scientific research work and experimental design work, is also a necessary element for the implementation of the proposed approach. The possibility of the submitting of reporting on science by any organization should be envisaged in this classifier. For this it is necessary to orient the system of coding toward the classification of the data in accordance with such attributes as the sector of the national economy according to the all-union classifier, the ministry, the territory, and the type of organization.

The simple and combined classifications of the data of reporting in accordance with the attributes, which are indicated in the classifier of research and development and the classifier of organizations, which conduct research and development, will make it possible to obtain valuable information for the preparation of decisions on the management of science.

In case of the introduction of such a standardized form, in our opinion, the need for common annual specialized statistical reporting of organizations, which conduct research and development—5-nk, 10-d, 10-prk, 2-nt (NPK), and several others—disappears.

For the determination of the number of scientists, their skills, sex, age, the availability at a scientific institution of pilot bases, and a number of other indicators of the scientific and technical potential it is advisable to switch from reporting to one-time accounting, which is carried out as needed, as well as to sample surveys, which at present are rarely used in practice.

The passports of scientific and technical organizations and subdivisions, which are kept at the organizations themselves, can be the basis for the filling out of the forms of such accounting. The passports should repeat as little as possible the data of the annual reporting and should accumulate information mainly on the scientific

and technical potential of the organization. The superior organization, all-union organs of the management of science, and local and republic organs of management can use these data in an effective manner. The idea of establishing for the needs of the USSR State Committee for Science and Technology an automated data bank of such passports has already been implemented in part on the basis of the All-Union Scientific and Technical Information Center.

The restructuring of the statistics of science requires great efforts of organizers, scientists, and experiences workers of statistics. However, without cardinal changes of the principles, mechanism, and practice of the management of science the fundamental acceleration of the pace of the scientific and technical development of the country will not be achieved. We believe that our suggestions will interest the USSR State Committee on Statistics: for the question of the information support of the management of science requires immediate settlement.

7807

Profit, Self-Financing of Production Associations

18140174 Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 4, Apr 87 (manuscript received 16 Oct 86) pp 5-16

[Article by V.R. Praude, the Lavtian Order of Labor Red Banner State University imeni P. Stuchka, under the rubric "Economics": "The Distribution of the Profit and the Self-Financing of Production Associations"]

[Text] The accomplishment of the new tasks in the economy, which were posed by the 27th CPSU Congress, presumes the thorough restructuring of the economic mechanism and the development of an integrated, effective, and flexible management system, which makes it possible to realize more completely the creative potentials of socialism. "...Now the situation is such," it was noted in the Policy Report of the CPSU Central Committee to the 27th party congress, "that one must not limit oneself to partial improvements—radical reform is necessary."[1]

More than 2.5 years ago a group of sectors began a large-scale economic experiment. Since 1985 its conditions have been extended to enterprises[2] and associations of union machine building ministries and to a number of union republic ministries, while by early 1987 the changeover of all industry to the new conditions of management had been completed in practice.

The analysis shows that the economic experiment increased the responsibility of production associations and enterprises for the fulfillment of delivery contracts in conformity with the orders of consumers. The new conditions of management are contributing to the implementation of the adopted plans with a smaller number of personnel. For example, in our republic labor productivity for the production associations and enterprises, which are conducting the economic experiment, increased in 1985 by 4.5 percent, while for republic industry as a whole it increased by 3.6 percent. Economic work, which is aimed at the development of internal cost accounting in shops and brigades, has become animated in labor collectives. The independence of enterprises in the use of economic stimulation funds was broadened.

At the same time the achieved results are far from the desired results. The experiment did not ensure substantial changes in the acceleration of the growth rate of production and the retooling of enterprises. The attention to product quality and the constant updating of the list (assortment) of products at the level of the highest world achievements did not increase. The materials-output and power-output ratios are decreasing slowly, the output-capital ratio is increasing weakly. So far it has not been possible to create an anti-expenditure economic mechanism, to overcome excessive regulation and the petty guardianship of enterprises, and to improve substantially the methods of planning at the sectorial, territorial, and national economic levels. The sphere of material and technical supply and the marketing of products, the financial and credit system, and pricing have remained as before.

The expansion of the boundaries of independence of production associations and enterprises and their changeover to genuine cost accounting, so that the level of revenues of labor collectives would directly depend on the efficiency of work—such is one of the main directions of the next stage of the radical reform of the economic mechanism. The transition of the economy to the path of intensification requires that indicators, which would be coincident with the formula of efficiency: the maximum result with the minimum expenditures, be used for the evaluation of the economic activity of enterprises. In particular, the profit, which in case of well-founded distribution in combination with the cost accounting principle of self-support [samookupayemost] and self-financing is called upon to orient labor collectives toward the increase of production efficiency and product quality with the least expenditures, fully satisfies this requirement.

The Functions of the Distribution of the Profit and Their Implementation Under the Conditions of the New Methods of Management

Being a component of the proportionate, balanced movement of physical and material resources in the process of expanded reproduction, the distribution of the profit performs at the same time essential stimulating functions. The interest of collectives and individual workers in the results of labor in many respects is

determined by the extent to which the amount of the profit, which is left at their disposal for the purposes of stimulation and further development, depends on the real labor contribution.

The structure and the sequence of distribution of the profit should conform to the objective economic nature of the elements contained in it, ensure economically sound financial interrelations of the primary, intermediate, and highest levels of management of the sector with the state budget, and promote the consistent observance of all the principles of cost accounting and centralized planning. The comprehensive consideration of the interaction of the subsystems of centralized planning and cost accounting stimulation serves as one of the basic requirements for the system of distribution of the profit, which in the economic mechanism is called upon to perform the following basic functions:

—to stimulate the increase of socioeconomic efficiency;

—to promote the coordination of the economic interests of society, regions, collectives, and individual workers;

—to equalize the economic conditions of the management of collectives, eliminating to a certain extent the effect of factors of the formation of the profit, which do not depend on their activity;

—to aid the accomplishment of the task of the self-financing of production economic complexes within centralized planning;

—to ensure the accumulation of monetary resources in the state budget in adequate amounts and the realization of the reproduction proportions envisaged by the five-year plan.

Such diverse functions of the system of the distribution of the profit bring about the need for the use of various types of financial payments, which have a nonuniform economic nature. This methodological principle is underestimated at times, as a result of which the role and significance of first one, then another function of the distribution of the profit are unduly exaggerated. Thus, the opinions that it is necessary to introduce payments for all types of resources (funds, credit, and others) and to accumulate the portion of the profit, which is to be allocated to the budget, only by means of them, are encountered. However, the system of deductions from the profit for the budget only by means of a fee for resources does not ensure the formation of the optimum planning proportions between statewide funds, since the change of the amount of various payments for resources is relatively independent of the movement of the amount of profit. For example, the amount of the fee for funds can be reduced in case of an increase of the profit, if the efficiency of the use of funds increases, and vice versa. This will inevitably result in the deviation of the amount of assets, which are left at the disposal of collectives, from the planned needs for them. Some enterprises will experience a shortage of assets, while their surplus will form at others. As a result the function of the stimulation of the increase of the efficiency of the use of productive capital is taken into account and at the same time the function of backing the systematically established proportions in the national economy with monetary resources is ignored. In order to avoid such contradictions, it is necessary to combine the payments for resources with the standard of the proportionate distribution of the profit between society and individual production economic complexes.

The adopted model statute for production associations and enterprises, which are operating under the conditions of the new methods of management,[3] is a definite step forward in the dissemination of the standardized method of the distribution of the profit. The key change in the methods of management consists in the fact that not the balance sheet profit, but the accounting profit becomes the object of standardized distribution. Stable standards, which are established for a year, of the division of the accounting profit between the budget and the enterprise's own needs are approved for enterprises (see Figure 1). Here the differences in the methods of use of the planned and above-planned profit are eliminated. As the analysis shows, these steps had an effect on the strengthening of the stimuli of the growth of the profit and on the inclusion in the plan of all the reserves of the increase of production efficiency.

However, the analysis of the activity of production associations and enterprises under the conditions of the large-scale economic experiment also made it possible to note a number of negative aspects in the mechanism of the distribution of the profit. First of all the very method of forming the standard of the profit, which is left for internal needs, is imperfect. This standard is determined by adding up the planned expenditures of the enterprise from the profit for its own needs, which are envisaged in accordance with the financial plan, and dividing this sum by the amount of the accounting profit according to the plan. Thus, enterprises are interested in including in the plan somewhat more expenditures from the planned profit. Consequently, the amount of the profit, which the enterprise can get at its disposal, is determined not so much by objective criteria as by the ability of economic services to compile plans with the maximum expenditures from the profit. As the experience of the Belorussian SSR Ministry of Light Industry showed, the range of fluctuations of the proportion of the profit for internal needs for individual enterprises is very broad, which does not properly conform to the principles of full cost accounting.[4]

Another drawback of the new procedure of distributing the profit consists in the fact that the principle of the unity of the use of the planned and above-planned profit is being inconsistently implemented at enterprises. It actually turns out that many items of expenditures, in which enterprises are especially interested, have as their

Figure 1

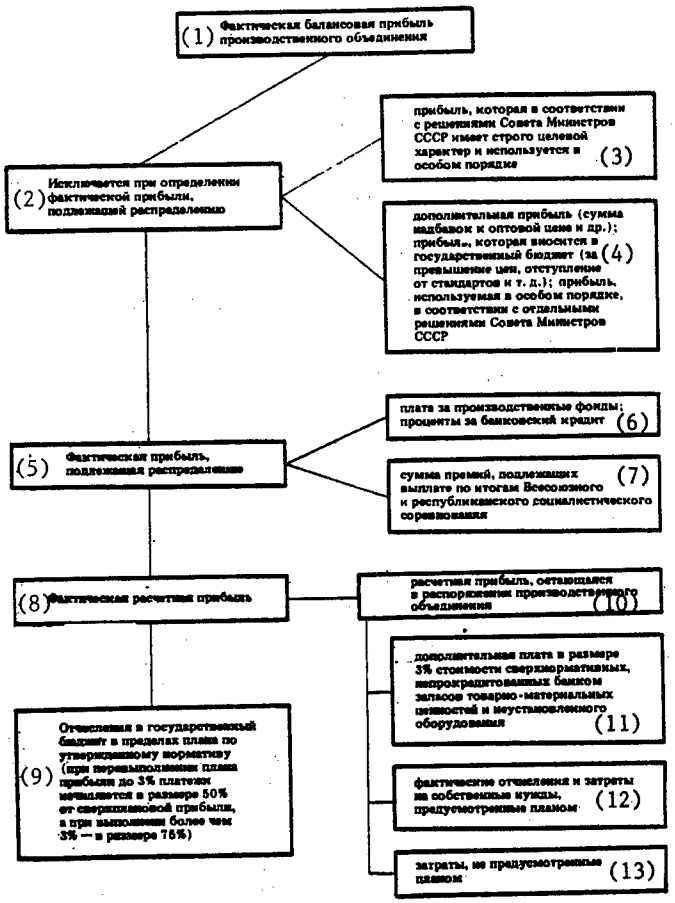


Figure 1

Key:

1. Actual balance sheet profit of production association
2. Excluded in case of the deermination of the actual profit to be distributed
3. The profit which in conformity with decisions of the USSR Council of Ministers is of a strictly special-purpose nature and is used in a special manner
4. The additional profit (the sum of wholesale price markups and others); the profit which is paid to the state budget (for the exceeding of prices, deviation from standards, and so on); the profit, which is used in a special manner, in conformity with individuald decisions of the USSR Council of Ministers
5. Actual profit to be distributed
6. The fee for productive capital; interest on bank credit
7. The amount of bonuses to be paid in accordance with the results of the all-union and republic socialist competition
8. Actual accounting profit
9. Deductions for the state budget within the plan according to approved standards (in case of the exceeding of the plan of the profit by up to 3 percent the payments are calculated in the amount of 50 percent of the above-plan profit, with in case of its exceeding by more than 3 percent—in the amount of 75 percent)
10. Accounting profit left at the disposal of the production association
11. Additional fee in the amount of 3 percent of the value of the above-standard reserves of commodity stocks, for which credit has not been extended by the bank, and uninstalled equipment
12. Actual deductions and expenditures for internal needs, which are envisaged by the plan
13. Expenditures not envisaged by the plan

source precisely the above-standard profit: the additional deductions for the material incentive fund, the financial reserve, and so on. Under these conditions collectives, as before, are not interested in striving for the adoption of stepped-up plans on the profit in order to create a reliable source of the financing of the expenditures necessary for them. The procedure of approving the standard of the deduction of assets for the budget, which is established as stable only in the annual plan, also aggravates this trend. The annual reapproval of the standard harbors the danger of a subjective approach on the part of financial organs.

Finally, another drawback of the mechanism of the distribution of the profit consists in the fact that it affected only to a small degree the system of the financing of capital investments and the development of production, which existed back before the experiment. The procedure of forming sectorial sources of financing (the redistribution of the profit and amortization deductions among enterprises of the sector) was retained, the budget source of financing was also left. As a result of such an approach labor collectives in essence are not the managers of their own earned assets, which can be confiscated, and at the same time unearned assets can be allocated, moreover, in unknown proportions. Under these conditions enterprises worry only about proving the necessity of new construction and the creation of new capacities. Capital investments for these purposes are allocated, sources of financing will always be found—such is the logic of thinking of managers.

One should also note the lack of coordination of the established procedure of forming assets for internal needs and the possibilities of their use. Even after obtaining a significant amount of profit, which is left at their disposal in accordance with the established standard (see Figure 2), enterprises cannot use it for deductions for the economic stimulation funds and for the financing of capital investments (in excess of the established standards and limits). It turns out that labor collectives as a result of successful work can obtain significant monetary assets, but do not have real rights with respect to their complete use. It is not surprising that in a number of cases these assets remain unused, the ministry after a year confiscates them in the form of a surplus of internal working capital.

Full Cost Accounting on the Basis of Self-Financing: Experience and Problems

The changeover of production associations and enterprises to full cost accounting on the basis of self-financing is the basic direction of the elimination of the shortcomings of the use of the economic category of the profit. In our opinion, self-financing is a further development of the cost accounting principle of self-support [samookupayemost] under the conditions of the intensive development of the economy. In other words, self-financing is a cost accounting principle of management, which presumes the self-support [samookupayemost] of current and capital expenditures and the assurance of the expanded reproduction of production associations and enterprises (including the consumption fund and the accumulation fund) by means of internal and borrowed monetary assets. Thus, under the conditions of self-financing only internal and borrowed assets are the sources of the covering of the expenditures on the retooling, modernization, and expansion of operating enterprises, the formation of wage funds, the development of science and technology, and other planned needs.

There is a fundamental difference between the organization of cost accounting on the basis of self-financing and on the basis of self-support [samookupayemost]. The organization of cost accounting on the basis of the principles of self-support [samookupayemost] allows the possibility of the redistribution of the assets of enterprises within the sector, as well as the attraction of sectorial and budget sources for the financing of capital investments on the retooling and the expansion of the capacities of operating enterprises. The organization of cost accounting on the basis of the principles of self-financing, although fundamentally including the self-support [samookupayemost] of current and capital expenditures, excludes the attraction of sectorial and budget sources of financing.

The system of self-financing, which is used at the Avto-VAZ Production Association and the Sumy Machine Building Association imeni M.V. Frunze, can serve as an example of the consistent use of the standardized distribution of the profit in conformity with the principles of full cost accounting. "It is necessary to give enterprises the opportunity—following the example of the Volga Motor Vehicle Works and the Sumy Machine Building Plant—to earn themselves assets for the expansion and technical modernization of production,",[5] it was stated at the 27th party congress.

The Sumy Machine Building Association imeni M.V. Frunze has been changed over to the self-financing of not only simple, but also expanded reproduction. The financing of capital investments in the retooling and modernization of production, as well as new construction, which is connected with the expansion of operating works, is carried out exclusively by means of internal and borrowed sources of the profit, amortization deductions, and long-term credit of the All-Union Bank for Financing Capital Investments. The profit is the basic evaluation indicator of the five-year and current plans. A direct link is established between the level of efficiency of the work of the association and the deductions for the state budget and economic stimulation funds by the determination of the amounts of these deductions in accordance with stable standards as a percentage directly of the profit for the entire 5-year period of time (see Figure 3).

Figure 2

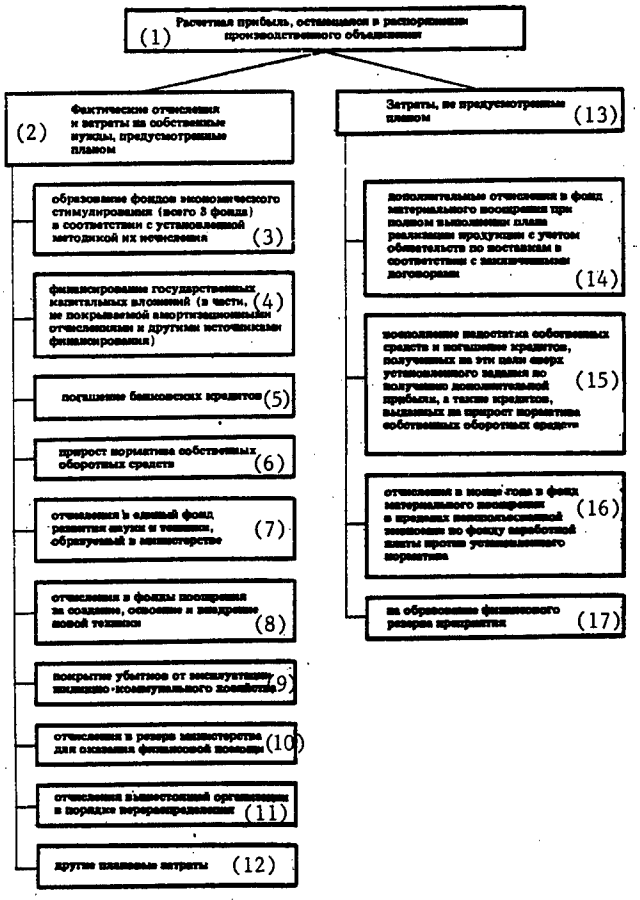


Figure 2

Key:

1. Actual profit left at the disposal of the production association
2. Actual deductions and expenditures for internal needs, which are envisaged by the plan
3. The formation of economic stimulation funds (three funds in all) in conformity with the established method of their calculation
4. The financing of state capital investments (in the area not covered by amortization deductions and other sources of financing)
5. Repayment of bank credits
6. The increase of the standard of internal workding capital
7. Deductions for the unified fund for the development of science and technology, which is formed in the ministry
8. Deductions for incentive funds for the development, assimilation, and introduction of new equipment
9. The covering of losses from the operation of housing and municipal services
10. Deductions for the reserve of the ministry for providing financial assistance
11. Deductions for the superior organization by way of redistribution
12. Other planned expenditures
13. Expenditures no envisaged by the plan
14. Additional deductions for the material incentive fund in case of the complete fulfillment of the plan of the sale of products with allowance made for obligations on deliveries in conformity with concluded contracts
15. The making up of the shortage of internal capital and the repayment of credits, which were obtained for these purposes in excess of the set assignment on the obtaining of the additional profit, as well as credits which were issued for the increase of the standard of internal working capital
16. Deductions at the end of the year for the material incentive fund within the unused saving on the wage fund as against the established standard

Figure 3

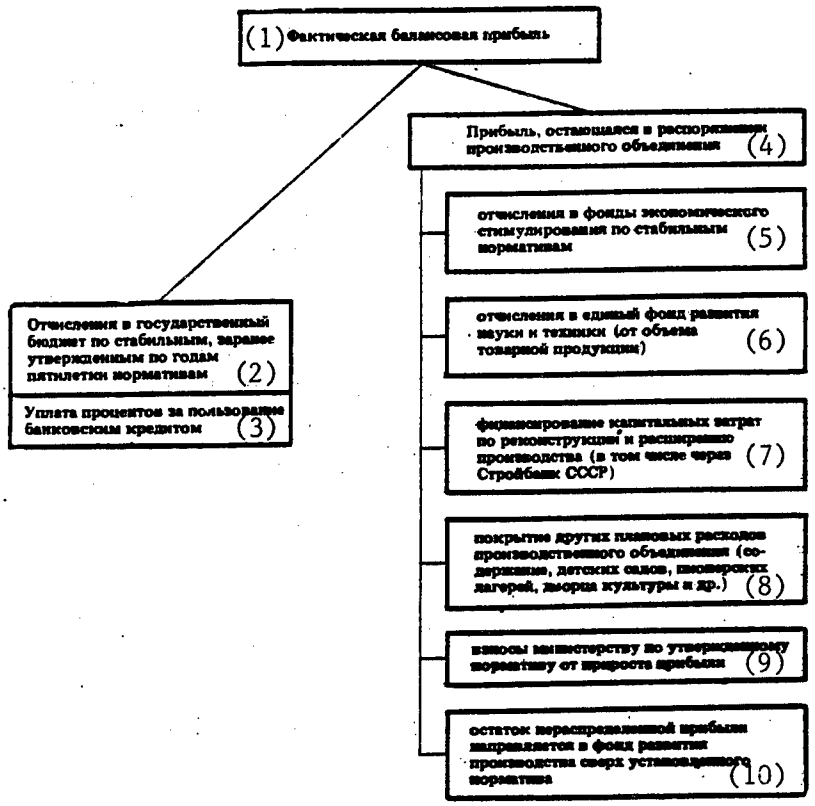


Figure 3

Key:
1. Actual balance sheet profit
2. Deductions for the state budget in accordance with stable standards, which have been approved in advance by years of the five-year plan
3. Payment of interest for the use of bank credit
4. Profit left at the disposal of the production association
5. Deductions for economic stimulation funds in accordance with stable standards
6. Deductions for the unified fund for the development of science and technology (from the volume of commodity production)
7. The financing of capital expenditures on the retooling and expansion of production (including through the All-Union Bank for Financing Capital Investments)
8. The covering of other planned expenses of the production association (the maintenance of kindergartens, Pioneer camps, the palace of culture, and others)
9. Payments to the ministry in accordance with an approved standard for the increase of the profit
10. The balance of the undistributed profit is channeled into the production development fund in excess of the established standard

As is known, under the conditions of the large-scale economic experiment the increase of the profit and other indicators is still being stimulated. However, the standards "for growth," although containing a progressive element, do not take into account the previously achieved level of the results of activity and thereby place under better conditions the enterprises which have comparatively large reserves. The standards for the actual level of achievements are more economically sound, since they take into account both the results, which were previously obtained, and the increases, which it is proposed to obtain during the period being planned. At the Sumy Machine Building Association imeni M.V. Frunze the standards of the deductions for

the profit are established as a percent of the total amount of profit (regardless of whether it is planned or above-planned), while the standards of the deductions for economic stimulation funds are established as a percent of the amount of the profit, which is left at the disposal of the association. The sphere of application of standards has been broadened. Stable standards of the formation of the Unified Fund for the Development of Science and Technology are approved for the association, a standard of deductions for the ministry from the increase of the profit of the association is established.

The main thing is that the association has a standard, which is stable by years of the five-year plan, of deductions from the profit for the state budget in the form of a tax payment with a progressive increase by years of the five-year plan. A constantly increasing share of the profit, which is obtained from the results of the activity of the association, which, in turn, knows in advance the planned relative and absolute amounts of the payment, is thereby turned over to society itself. An important distinction of the Sumy Association from the statutes, which have been adopted under the new conditions of management and in which in practice there is no guarantee of payments to the state budget, which have been stipulated in advance, lies in this. The amounts and proportions of the distribution of the profit in the association by directions of its use in conformity with the standards, which were established for 1985, are presented in the table.

As is evident, the mechanism of the distribution of the profit is quite simple and is clear and comprehensible to each member of the labor collective. Thus, from each ruble of profit, for example, in 1985, 29 kopecks were deducted for the budget and the ministry, 71 kopecks were deducted for internal needs. Moreover, the standards have been formed in such a way that the bulk of the assets left at the disposal of the association (45 of the 71 kopecks per ruble of profit) is allocated for capital construction and long-range development.

Under the conditions of self-financing the methods of formulating the plan indicators on the production volume and capital investments change radically. It is well-known that one of the methods is based on the substantiation of the combination of that amount of the capital investments, which is necessary for the fulfillment of the increased production program, which has been approved from above. Another method presumes the allocation of a limit of capital investments to the enterprise, which determines by how much the production volume can be increased due to this. There is used in case of self-financing a third, more advanced method, in accordance with which the enterprise first of all calculates to what extent it is possible to increase production and to improve product quality on the available production capacities, for their expansion is carried out at the expense of its own assets. When monetary reserves have been exhausted, while the needs of consumers for products have not been met, the necessity of expanding operating capacities arises. The system of self-financing gave greater dynamism to the work of the collective, unleashed initiative, and contributed to the increase of production efficiency.

Distribution of the Profit at the Sumy Machine Building Association imeni M.V. Frunze According to the Plan for 1985

Directions of deductions from the profit	Total, millions of rubles	Percent of total
Profit, total	60.8	100.0
Deductions for the state budget from the balance sheet profit	15.9	26.2
Payment of interest for use of bank credit	4.3	7.1
Profit left at the disposal of the association	40.6	66.7
including deductions:		
for the material incentive fund	7.3	12.0
for the fund for sociocultural measures and housing construction	3.2	5.3
for the production development fund	12.2	20.0
for the unified fund for the development of science and technology	5.9	9.7
to the ministry from the increase of the balance sheet profit	1.5	2.4
for the financing of capital investments through the All-Union Bank for Financing Capital Investments	10.5	17.3

The following facts testify to this. Given the significant changes of the range of items in the direction of the increase of the specific labor-output ratio the production volume and the increase of labor productivity, which were specified by the control figures of the five-year plan, were exceeded at the Sumy Machine Building Association imeni M.V. Frunze. It is planned to increase these indicators during the 12th Five-Year Plan by 1.6-fold; the profit—by 2.5-fold; the deductions for the state budget—by 2.9-fold. Capital investments in the amount of more than 330 million rubles are being financed by means of internal and borrowed assets, moreover, 70 percent of the borrowed credits will be repaid during the 12th Five-Year Plan. Capital investments in the amount of 35 million rubles a year are being channeled into retooling, 10-12 million rubles a year—into nonproduction construction. The task is merely to obtain for them limits of noncentralized capital investments, equipment, and material resources.[6]

The results of the work of the Sumy Machine Building Association during 1985 confirm the positive effect of the methods of management being used there on the increase of production efficiency. Thus, labor productivity during 1985 increased by 13.6 percent (as against 10 percent on the average during 1981-1984), the average monthly wage of industrial personnel engaged directly in production increased by 6.1 percent (for workers it came to 223 rubles); the profit increased by 32.4 percent (as against 18.4 percent on the average during 1981-1984), the profitability increased to 24.8 percent (18.4 percent), the deductions for the state budget as against the average annual deductions in 4 years of the 11th Five-Year Plan increased by 3.6-fold, the deductions for stimulation funds increased by 2.5-fold. The quality of the produced output improved, its technical and economic level increased, and several types of it surpass foreign models. The proportion of products with the State Emblem of Quality in the total volume of commodity production came to 60 percent. The expenditures were reduced by 3.1 percent, which exceeds the planned decrease.[7]

The aspiration for more efficient retooling and expansion arose in place of the aspiration for new construction. Nearly 75 percent of the total amount of capital investments were spent for these purposes in 1985 at the Sumy Machine Building Association. In all 80 percent of the capital investments were channeled into the retooling of the AvtoVAZ Production Association. The principle of the self-financing of expanded reproduction made it possible to change the ratio of the internal, budget, and borrowed assets which are being channeled into the production and social development of the association. Thus, whereas during 1981-1984 of the total amount of these assets internal assets made up on the average in a year 31.2 percent, in 1985 with allowance made for the borrowed assets, which are repaid by means of internal sources, they came to 89.5 percent. Given a total increase of the profit in 1985 by 32 percent the deductions for the budget increased by 38.2 percent. At the same time the deductions for economic stimulation funds increased. The number of workers, who receive supplementary payments and wage increments, increased substantially: from 494 in 1984 to 1,416 in 1985. The spending on the social development of the collective increased significantly during the year.[8]

A new situation is also arising with the conclusion of contracts. Now they are "running" not away from them, but after them and, of course, are fulfilling all the contractual obligations.

The increase of the revenues of the enterprise is contributing to the speeding up of the settlement of many questions of a social nature. Thus, during the past year nearly 17,000 square meters of housing, a children's combine with space for 280 children, and other facilities were built in Sumy. And here are a few figures on subsidiary farms: 7 duplex houses for machine operators, 2 livestock farms and a hothouse with 15,000 square meters of indoor ground were built. In 1985, 405 tons of meat, 150 tons of vegetables, and 15 quintals of honey were produced at the subsidiary farms of the association.

In 1986 the positive results were consolidated at the Sumy Machine Building Association. Whereas the output of industrial products during the first half of the year for the Ministry of Chemical and Petroleum Machine Building as a whole increased by 7 percent, at the association it increased by 11.7 percent. The ministry completed 98.8 percent of the deliveries in accordance with contracts, at the association they completed 100 percent of them. The ministry as a whole reduced the expenditures per ruble of commodity production by 1.6 percent, at the same time the Sumy Machine Building Association reduced them by 4.4 percent. The profit during this period in the sector increased by 13.2 percent, while at the association it increased by 17.5 percent. Here for the 2d year now the collective of the Sumy Machine Building Association is working and developing entirely at the expense of earned assets.[9]

In a speech at a meeting with workers in the city of Togliatti M.S. Gorbachev noted that the system of self-financing at the AvtoVAZ Production Association and the Sumy Machine Building Association imeni M.V. Frunze had given greater dynamism to work, had unleashed initiative, and had increased the efficiency of labor and that the interest and activity of people in the achievement of high indicators had increased. Experience "once again has shown that the system of self-financing is an effective method of combating the notorious gross. It acts as an anti-expenditure mechanism."[10]

Since the beginning of 1987 all the production associations and enterprises of a number of union ministries: the Ministry of Chemical and Petroleum Machine Building, the Ministry of Instrument Making, Automation Equipment, and Control Systems, the Ministry of the Petroleum Refining and Petrochemical Industry, the Ministry of the Automotive Industry, the Ministry of the Maritime Fleet, and the Ministry of Light Industry, as well as 36 associations and enterprises of other sectors have been changed over to the conditions of self-financing. Among them are 41 associations and enterprises of industry of the Latvian SSR: Rigakhimmash, Sarkanays kvadrats, Straume, RAF, Avtoelektropribor, and others.

As is evident, the sphere of application of self-financing is developing "in breadth," but it is no less important to analyze the principles of its development "in depth." In the draft of the Law on the State Enterprise (Association) it is stated that "the enterprise operates on the principles of full cost accounting and self-financing."[11] As the analysis shows, the standard of the deductions for the state budget is determined according to the ratio, which was established in the plan of the base year, between the amount of the profit and the amount of the deductions for the budget with respect to the fee for productive capital and the payments of the net surplus of the profit.

However, it seems that this method, although more advanced than the one which is used for other enterprises under the conditions of the new methods of management, nevertheless is still insufficiently sound. First, it is well known that the norm of the fee for capital in essence does not conform to its functional purpose—to link the distribution of the profit with the efficient use of productive capital. Second, the former net surplus of the profit is not linked at all with any standard. When both component parts are made the basis of a whole, that is, a new standard, it is natural that the latter will reproduce many shortcomings of its components.

For the purpose of eliminating the noted shortcoming it seems advisable to use another method of calculating the standard, which is based on the combination of the "resource" and "proportionate" principles of the distribution of the profit. Its essence consists in the following.

First of all the sum, which is to be deducted from the profit for the budget, is determined on the basis of scientifically sound norms for the fee for capital, which should correspond to the standard coefficient of efficiency of capital investments. Further, another sum, which is also to be deducted from the profit for the benefit of society, is determined on the basis of scientifically sound norms of the payments for other types of resources (including rent payments), as well as deductions for the local budget. Then the planned amount of the expenditures on the internal needs of enterprises is determined with allowance made for the principle of the self-financing of current and capital expenditures and the possibilities of the fulfillment of the production program, which is backed by orders. Finally, the sum total, which has been obtained as a result of adding up the totals of these calculations, is compared with the amount of the planned profit during the base year and, if it exceeds this amount, is adjusted in the direction of the reduction of the planned expenditures on internal needs. In case of the excess of the amount of the planned profit over the preliminary calculation the latter is adjusted in the direction of the increase of the payments to the budget. Thus, this obtained sum of deductions for the budget according to the plan is compared with the planned amount of the profit during the base year and as a result the standard of the deductions for the base year of the five-year plan, which then increases progressively subject to the increase of the profit according to the plan for each year, is obtained.

The change of the standards of the proportionate distribution of the profit should be not the rule, but the exception. Confidence in the future distribution of the profit increases the interest of all cost accounting units of the management of the sector in the increase of production efficiency. A scientifically sound system of the distribution of the profit will make it possible to eliminate its strong-willed redistribution. Within ministries and other production economic complexes of the sector it will be possible to centralize a portion of the assets, having established cost accounting funds, and by means of them to redistribute the profit in a well-founded manner among individual enterprises in case of financial difficulties for objective reasons.

Another problem, which requires solution when disseminating the experience of the Sumy Machine Building Association imeni M.V. Frunze, is the need for the reduction of the number of planned indicators (of which even under the conditions of the experiment there are more than 200). The decree of the CPSU Central Committee and the USSR Council of Ministers "On the Improvement of the Planning, Economic Stimulation, and Perfection of the Management of Consumer Goods Production in Light Industry" envisages their sharp reduction in this sector of the national economy.[12] It is necessary to implement in practice the decision made by directive organs, which previously was not always done after the promulgation of similar decrees on the economic mechanism.

The reform of pricing is one of the basic conditions of the changeover to genuine self-financing. When prices are of an expenditure nature, they cover overstated amortization, excessive expenditures on raw materials and materials, excessive wage funds, and so on. The price also sets the profit too high. However, genuine self-financing is incompatible with such distortions of the expenditures and results. Its essence lies in the earning of any portion of the receipts from the sale of products, and not only the profit. In this connection, in addition to new prices, which are oriented toward the socially necessary expenditures of labor and the consideration of product quality, the changeover to the formation of the wage fund subject to the end results of labor is of particularly great importance. However, the cost accounting principle of self-financing, even at the Sumy Machine Building Association imeni M.V. Frunze and the AvtoVAZ Production Association, has not been carried through, since at them not the entire wage fund, but only its increase depends on the actual revenues of labor collectives. In this connection the mechanism of self-financing on the basis of the distribution of surplus income merits attention.

Self-Financing on the Basis of the Distribution of Surplus Income

In case of self-financing on the basis of the distribution of the profit the autonomous formation of the wage fund according to standards from the increase or volume of output is presumed. Such a method does not stimulate the increase of product quality and the saving of material resources. Moreover, the existing procedure of forming in essence a unified fund for the remuneration of labor from various sources (the wage fund—in accordance with the expenditures on production, the material incentive fund—from the basic profit and the additional profit by means of incentive markups on prices, special-purpose bonus systems) is a restrictive factor of the increase of production efficiency.

The mechanism of self-financing on the basis of the distribution of the surplus income starting in early 1987 was established as an experiment at enterprises of light industry and personal service of Belorussia, as well as in trade. Its essence consists in the following.

Production associations and enterprises (organizations) by means of the obtained receipts from the sale of products first of all cover material expenditures and make amortization deductions. Here a portion of the amortization deductions, which are intended for the renovation of fixed capital, are placed entirely at the disposal of associations and enterprises for the financing of capital investments. The surplus income is also formed with the deduction of the indicated expenditures. In accordance with stable standards there are made from it first of all: deductions for the budget; the meeting of obligations to banks; deductions for superior organs of management for the formation of centralized reserves and funds; deductions for the meeting of other planned expenses.

The revenue, which is left at the disposal of the production association and enterprise after the indicated mandatory deductions and payments, is allocated for the formation of: the fund for the remuneration of labor (instead of the wage fund, the material incentive fund, and special-purpose bonus systems) and the fund for production and social development (instead of the production development fund, the fund for sociocultural measures and housing construction, and other sources of assets for production and social needs). The complete independence of labor collectives in determining the specific directions of the use of internal assets for production needs, the construction of housing, social, cultural, and personal service facilities, and the implementation of sociocultural measures should be ensured. The assets of these funds cannot be withdrawn without the consent of the labor collectives. Only the new construction of large facilities, which are of intersectorial, sectorial, regional, and interregional significance, is financed by means of centralized assets and assets of the state budget. Thus, the labor collective becomes the full owner of earned assets, and at the same time the opportunity appears to ensure a connection between the meeting of social needs and the reproduction (including the social development and the increase of the monetary income of workers) of these collectives.

The effectiveness of self-financing increases, when partners also participate in the distribution of income. For example, the AvtoVAZ Production Association turns over to related industries and contracting organizations a portion of its wage fund for the early delivery of raw materials and the acceleration of retooling. While the Sumy Machine Building Association imeni M.V. Frunze can allocate a portion of the material incentive fund to institutes for the high-quality fulfillment of developments.

The fund for the remuneration of labor, which is created from the actual income of collectives, should be regulated by means of, for example, a progressive tax. It would also be advisable to create special-purpose reserves: when the wage fund is excessive—to deduct from it, when it is insufficient—to take from the reserve. These economic regulators are called upon to smooth out the inevitable unrhythmical nature of the expenditures and results, which in case of self-financing can influence the conditions of management.

The granting of broad independence in planning should create a new economic situation, the responsibility for the drafting of the plan will be assigned entirely to the very producers of the product and will not be shifted to superior organs. Are enterprises ready for such conditions, when the results become entirely a consequence of the quality of the work of collectives and the ability and initiative of managers? It seems that far from all of them are. For the habits of not studying themselves the demand and market conditions, but of waiting for instructions on this account; of not updating periodically the assortment of products, but of "pushing" unmarketable items, knowing that they will be counted toward the plan; of not seeking users of the product, counting on instructions from above, are too strong. But every person knows from experience how difficult it is at times to break old habits. Therefore, it seems, the costs of switching to radical reform are inevitable. And here it is important not to retreat, not to get under the thumb of those enterprises, which do not wish to reorganize, and not to constantly give them "injections" from centralized funds, concealing mismanagement. At the same time it is no less important not to emasculate the spirit of independence and initiative of those, who are on the proper path, to help them if necessary, and, what is the main thing, to develop various forms of the participation of the masses in management.

Footnotes

1. M.S. Gorbachev, "Politicheskiy doklad Tsentralnogo Komiteta KPSS XXVII syezdu Kommunisticheskoy partii Sovetskogo Soyuza" [Policy Report of the CPSU Central Committee to the 27th Congress of the Communist Party of the Soviet Union], Moscow, Politizdat, 1986, p 41.

2. Here and later in the article there are meant enterprises, which have an independent balance sheet and have the rights of a legal entity.

3. "The Model Statute on the Standardized Method of the Distribution of the Profit of Production Associations (Enterprises) Which Are Operating Under the Conditions of the New Methods of Management," *Ekonomicheskaya Gazeta*, No 2, 1986.

4. V.I. Kletskiy, "What Should Be Included in the Economic Mechanism of the 12th Five-Year Plan?", *Ekonomika i Organizatsiya Promyshlennogo Proizvodstva*, No 1, 1985, p 40.

5. M.S. Gorbachev, "Politicheskiy doklad Tsentralnogo Komiteta KPSS XXVII syezdu Kommunisticheskoy partii Sovetskogo Soyuza," p 45.

6. V. Moskalenko, "Self-Financing as a Method of Efficient Management," *Voprosy Ekonomiki*, No 1, 1986, p 34.

7. "Self-Financing Is a Means to the Development of Initiative," *Ekonomicheskaya Gazeta*, No 18, 1986, p 14.

8. P.P. Bunich, "For the Radical Restructuring of the Economic Mechanism," *Kommunist Sovetskoy Latvii*, No 6, 1986, p 72; *Ekonomicheskaya Gazeta*, No 18, 1986, p 14.

9. *Pravda*, 22 September 1986.

10. M.S. Gorbachev, "Speech at a Meeting With Workers of Togliatti," *Pravda*, 9 April 1986.

11. *Pravda*, 8 February 1987.

12. *SP SSSR*, No 20, 1986.

7807

Decree on Changeover of Science to Cost Accounting, Self-Financing

18140157 Moscow SOBRANIYE POSTANOVLENIY PRAVITELSTVA SOYUZA SOVETSKIKH SOTSIALISTICHESKIKH RESPUBLIK in Russian No 48, 1987 pp 1011-1024

[Decree No 1102 of the CPSU Central Committee and the USSR Council of Ministers of 30 September 1987, "On the Changeover of Scientific Organizations to Full Cost Accounting and Self-Financing"]

[Text]

Article 158. On the Changeover of Scientific Organizations to Full Cost Accounting and Self-Financing

The CPSU Central Committee and the USSR Council of Ministers note that the consistent pursuit of the policy of the 27th party congress of the acceleration of socioeconomic development requires the utmost increase of the pace and the maximum use of the achievement of scientific and technical progress and the radical restructuring of the activity of scientific research, planning, design, and technological organizations.

The scientific and technical potential, which has been created in the country and makes it possible to accomplish important national economic tasks, is not being used effectively enough. A lag in a number of most important scientific directions has been allowed, the leading development of science and technology with allowance made for the scientific and technical revolution, which is occurring in the world, is not being ensured.

The development of science has been accomplished in recent times not by the increase of the efficiency of the activity of scientific organizations, but mainly due to the establishment of new institutions and the increase of the number of their personnel. The level and quality of scientific research and development often do not conform to the present scientific and technical requirements and to the prospects of development of the national economy.

The activity of many institutes and planning and design organizations does not have a substantial influence on the increase of the technical level of production, the dispersal of forces and assets for the performance of operations, which are of neither scientific nor practical value, is being allowed.

The proper responsibility and interest of scientific collectives in the accomplishment of the tasks facing them and in high results of the research being conducted are lacking. Creativity and initiative and the search for new nontraditional solutions are being poorly stimulated.

The methods of management of scientific organizations have become obsolete and rely mainly on administration by mere decree and directivity. The economic approach to the management of science is not being used, the necessary dependence between the revenues of collectives and the results of research is lacking.

The formed methods of management at scientific organizations and the practice of their interrelations with clients, as well as with superior organs of management do not satisfy the present requirements. They are not ensuring the proper responsibility for the technical level, quality, and rate of updating of products and for the decrease of expenditures and the time of development of new equipment, technology, and materials. The system of planning, financing, and economic stimulation at scientific organizations is poorly linked with the interests of enterprises and is not aimed at the achievement of high end results of production.

The USSR State Committee for Science and Technology, the USSR Academy of Sciences, USSR ministries and departments, and the councils of ministers of the union republics in their practical activity have tolerated a low

technical level of the scientific research and development, which are being conducted, are not ensuring the concentration of the forces and resources of scientific organizations on the priority directions of scientific and technical progress, which make it possible to bring the national economy to leading positions in the world, are not carrying out the necessary monitoring of the activity of subordinate scientific research and planning and design organizations, and often keep them busy with work on the drawing up of all kinds of references, reports, and papers.

For the purposes of the radical improvement of the activity of scientific research, planning, design, and technological organizations, the increase of their role and responsibility in the accomplishment of the tasks of the acceleration of scientific and technical progress, and the increase of the efficiency of social production and to execute the decisions of the June (1987) CPSU Central Committee Plenum on the carrying out of scientific research and development on the basis of the principles of cost accounting and self-financing the CPSU Central Committee and the USSR Council of Ministers resolve:

1. To consider it necessary to accomplish the changeover to full cost accounting and self-financing of scientific research, planning, design, and technological organizations (hereinafter called "scientific organizations"), using the new economic mechanism in science and scientific service as the main economic lever of the acceleration of scientific and technical progress in the national economy and the basis of the vital activity of the collectives of these organizations. To proceed from the fact that their activity should be carried out in conformity with the provisions of the USSR Law on the State Enterprise (Association).

2. To establish that the consistent implementation of the strategic policy of the party of the acceleration of the socioeconomic development of the national economy, the assurance of leading levels in scientific and technical progress, the complete mobilization of the scientific potential, and the creation of an atmosphere of creativity in scientific collectives are the main task of scientific organizations under the new conditions of management.

To devote foremost attention to the strengthening of the contacts of science with production, to envisage the direct inclusion of scientific collectives in operations on the entire "scientific research, development—production—marketing—service" cycle. To increase the pace and level of research in all directions of the development of Soviet science and technology, to increase sharply the practical return of the labor of scientists, designers, and process engineers. To ensure the constant readiness of science for the realization of the requirements of present-day life and the practice of the revolutionary changes, which are occurring in the country, and for the attainment of the world technical level of production and product quality.

To develop actively the priority directions of scientific and technical progress, to ensure the completion of the work on state scientific and technical goal programs and the plans of interbranch scientific technical complexes, to speed up in practice the development of fundamentally new equipment, technology, and materials, which revolutionize production and make it possible to ensure the highest world level and the competitive ability of the products being developed.

In the shortest time to reorganize the work of interbranch scientific technical complexes. To regard as the most important task of the scientific organizations, which support the activity of these complexes, the USSR State Planning Committee, the USSR State Committee for Science and Technology, USSR ministries and departments, and the councils of ministers of the union republics the manifold shortening of the duration of the cycle of operations on the development, assimilation, and large-scale production of highly efficient types of equipment, technology, and materials of new generations in the main directions of scientific and technical progress.

To ensure the unconditional completion of the operations, which are specified by the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000, to actively develop and intensify integration and cooperation in the sphere of research and development with scientific organizations and enterprises of the socialist countries.

2. To increase the responsibility of scientific organizations for the scientific and technical level and quality of the products (operations, services), which are being produced in the national economy in accordance with their type of activity.

To use fully the extensive possibilities of the development of the initiative and enterprise of scientists and engineers, to increase substantially the quality and creative return of the intellectual personnel potential, so that the effectiveness and the recovery of the expenditures being made would become the norm of the activity and the main criterion of the evaluation of the results of the labor of both the scientific collective as a whole and each worker of it.

To establish that scientific organizations bear all of the responsibility for the realization in research and development of the long-range demands on the technical level and quality of products (operations, services), their conformity to world standards, and competitive ability. They are obliged to ensure the satisfaction of the requirements of clients, profitable work, and the meeting of obligations to the budget, banks, and superior organs.

I. The Basic Principles of the Economic Activity of Scientific Organizations

4. The USSR State Committee for Science and Technology, the USSR State Committee for Construction Affairs, the USSR State Agroindustrial Committee,

USSR ministries and departments, and the councils of ministers of the union republics are to ensure the radical restructuring of the activity of scientific organizations under the new conditions of management. To proceed from the fact that scientific organizations along with production enterprises are socialist commodity producers and the principles of full cost accounting and self-financing should be the basis for their work. They ensure their own scientific, technical, and social development by means of the assets, which have been earned by the sale of developments to consumers, and bear full responsibility for the results of their own economic activity.

The scientific and technical product of scientific organizations is a commodity. Completed scientific research, planning, design, and technological operations and services, produced prototypes or test runs of items (products), which have been made in conformity with the requirements, which are stipulated in the economic contract, and have been accepted by the client, are grouped with the scientific and technical product.

5. To establish that the basic source of the scientific, technical, and social development and the material stimulation (the remuneration of labor) of the scientific organization is its profit (revenue).

To change over to the special-purpose financing of specific scientific research and planning and design operations in accordance with contracts with clients, who are interested in these operations, instead of the financing of the maintenance of the organization. Mainly the assets of associations, enterprises, and organizations, as well as the assets of the centralized funds and reserves of ministries and departments and the credits of banks and, in necessary instances, budget allocations should be the sources of financing of such operations.

6. Ministries and departments are obliged to concentrate the scientific and technical potential on the solution of important scientific and technical problems in the priority directions of scientific and technical progress and on the timely development of new equipment, technology, and materials, which in their parameters and indicators surpass the world level.

The USSR State Planning Committee and the USSR State Committee for Science and Technology jointly with the USSR State Agroindustrial Committee, the USSR State Committee for Construction Affairs, USSR ministries and departments, and the councils of ministers of the union republics are to specify the amounts of assets of the centralized funds for the development of production, science, and technology, which are being allocated for the financing of the most important sectorial scientific research and experimental design operations and economic research, which are being performed by scientific, including sectorial, organizations, for the 5-year period (with a breakdown by years), as well as for 1988-1990.

USSR ministries and departments, the USSR State Agroindustrial Committee, the USSR State Committee for Construction Affairs, and the councils of ministers of the union republics independently determine the specific themes of these operations and conclude contracts for the fulfillment.

To increase the responsibility of ministries and departments for the efficient spending of the assets of the centralized fund for the development of production, science, and technology.

USSR ministries and departments, the USSR State Committee for Construction Affairs, the USSR State Agroindustrial Committee, and the councils of ministers of the union republics are to establish strict control over the use of the assets of the centralized funds for the development of production, science, and technology, which are being allocated for the financing of research and development.

The USSR State Committee for Science and Technology, the USSR State Committee for Construction Affairs, and the USSR State Agroindustrial Committee are to make periodic checks of the actual spending of the indicated assets by ministries, departments, territorial organs, and scientific organizations and are to report on the results of these checks to the USSR Council of Ministers.

7. For the purposes of the increase of the responsibility of scientific organizations in the timely satisfaction of the requirements of clients and the increase of the role of consumers in the determination of the themes, the scientific and technical level, the quality, and the time of completion of research and development to increase radically the role of contractual relations.

To establish that the contract is the basic document which regulates the relations of the scientific organization (association) with the client of the scientific and technical product, including ministries and departments. Contracts are concluded for the performance of scientific research, planning, design, and technological operations on the development of new equipment, technology, and materials, for the production, testing, and delivery of prototypes or test runs of items (products) and their assimilation in production, for the rendering of scientific and technical services, and for the performance of other operations in accordance with the type of activity of the scientific organization.

In case of the failure to meeting the obligations, which are stipulated by the contract, the scientific organization, association, or enterprise, which is the developer, bears material liability: it returns to the client the received assets and pays fines in conformity with the conditions of the contract and prevailing legislation.

8. To implement the changeover to the payment for the scientific and technical product at contract prices. The prices for scientific research, planning, design, and technological operations, the pilot product, scientific and technical services, and other types of operations are coordinated by the scientific organization with the client before the start of the operations subject to the required efficiency, quality, and time of completion of the operations. The exceeding of the expenditures as compared with the contract price, which has been allowed by the performer without consultation with the client, is offset by him by means of his own assets.

If the work is halted through the fault of the client, it is paid for by him in accordance with the actually made expenditures with the level of profitability, which is envisaged in the price for this work.

9. To ensure the extensive introduction of competitive principles in the scientific and technical sphere, including basic research, the conducting of parallel development on the most important problems of science and technology, the elimination of the monopoly position of individual main institutes, and the utmost encouragement of the creative scientific and technical work of workers.

10. To establish that in case of the lack of clients for research and development and lengthy fruitless work of a scientific organization and in the case, when the steps taken by this organization and the superior organ on the assurance of efficient work have not yielded positive results, the scientific organization halts its activity.

II. Scientific Organizations Within Production Associations and Enterprises

11. The scientific organizations, which belong to production associations and enterprises, are obliged to ensure the increase of the technical level and the improvement of the organization of production, the perfection of technological processes, the increase of the quality, the assurance of the competitive ability of products, and their timely updating.

To aim the activity of scientific organizations mainly at the meeting of the internal needs of production associations and enterprises, while to attribute their outlays in this case to the product cost of the association or to recover them at the expense of the assets of the fund for the development of production, science, and technology of the association.

To take into account the operations, which are performed in accordance with contracts with other enterprises and organizations, as the scientific and technical product in the overall results of the activity of production associations.

To include the profit (revenue) of the scientific organization, which belongs to a production association, in the total amount of its profit (revenue) and to distribute it in accordance with established procedure.

12. Scientific organizations operate within production associations and enterprises on cost accounting principles as structural units in conformity with the statutes on them, which are approved by the associations. They can have an individual balance sheet and individual accounts at institutions of banks.

III. Scientific Organizations Within Scientific Production Associations

13. To increase the efficiency of the work of the scientific organizations that belong to scientific production associations. To proceed from the fact that they should ensure the accomplishment of the basic tasks, which have been set for the associations on the development in the shortest time of highly efficient complexes, machines, instruments and materials, and technological processes, which govern scientific and technical progress of the sector.

The activity of the indicated scientific organizations should be aimed, as a rule, at the fulfillment of the contracts of associations with clients. Their scientific and technical product is taken into account along with the product for production engineering purposes in the overall results of the work of the scientific production association. The association plans the joint activity of the scientific and production subdivisions on the basis of the conditions of its own functioning as a unified scientific production complex. State orders on the development of science and technology can be reported to production and scientific production associations at the same time as the state order.

14. Scientific organizations operate within scientific production associations as structural units or independent organizations, which enjoy the rights that are envisaged by the USSR Law on the State Enterprise (Association).

The scientific production association supervises the independent scientific associations which belong to it, implementing with respect to them the functions of a superior organ in conformity with prevailing legislation.

IV. Scientific Organizations Which Are Directly Subordinate to Ministries and Departments

15. To establish that the scientific organizations, which are directly subordinate to ministries and departments, should ensure the conducting of research and development of a general sectorial nature and actively promote the extensive use in the sectors of the national economy of advanced technologies and new forms and methods of

the management of production. They are fully responsible for the high technical level of production and the products of the sector and ensure the pursuit of a unified science and technology policy.

16. Ministries and departments are to report to the scientific organizations:

—the state orders on the development of science and technology;

—the limits of state centralized capital investments for the development of pilot experimental works, new construction and the accomplishment of especially important tasks in conformity with the list of objects, which have been included in the state plan, the amounts of construction, installation, and contracting work, and centrally distributed material and technical resources.

The amount of work is determined by the scientific organizations independently as the sum of the contracts with clients for the development, production, and delivery of new equipment, technology, and materials and the rendering of scientific and technical services.

17. The scientific organizations with the permission of the superior organ can use forms of cost accounting, which are based on the standardized distribution of the profit or revenue.

To approve for scientific organizations the following economic standards:

—the fee for fixed production capital and manpower and natural resources;

—the deductions from the accounting profit (revenue) for the state (including local) budget;

—the deductions from the accounting profit (revenue), as well as from the amortization, which is intended for the complete replacement of fixed capital, for the centralized fund for the development of production, science, and technology and the reserves of the ministry;

—the formation of the fund for scientific, technical, and social development;

—the formation of the material incentive fund and the total wage fund for scientific organizations which use a form of cost accounting, which is based on the standardized distribution of the profit;

—the formation of the fund of currency deductions.

At the scientific organizations which use a form of cost accounting, which is based on the standardized distribution of the revenue, the unified fund for the remuneration of labor is formed as the balance of the cost accounting revenue of the collective after the formation from it of the fund for scientific, technical, and social development.

The scientific organizations are to ensure the proper sequence of the distribution of the derived profit (revenue) and the direction of the use of the fund for scientific, technical, and social development and the material incentive fund (for the scientific organizations which use a form of cost accounting, which is based on the standardized distribution of the profit) in the manner that has been established for associations and enterprises of the corresponding ministries.

To grant the scientific organizations the right to use the assets of the fund for scientific, technical, and social development for the financing of basic research and operations on the creation of a scientific reserve.

18. Ministries and departments when establishing economic standards for scientific organizations:

a) are to ensure the close connection of statewide interests with the cost accounting interests of scientific organizations and the interest of the workers of these organizations in high results of labor and in a creative approach to the accomplishment of the tasks facing them;

b) are to envisage as the basic criterion of the evaluation of their activity the economic and social significance for the national economy and the effectiveness of research and development, their promise, and the scientific and technical level as compared with world achievements;

c) are to take into account the specific nature and type of scientific organizations and to increase the interest of labor collectives in the latest research, which ensures nontraditional approaches to the accomplishment of arising tasks.

V. Academic and VUZ Scientific Organizations

19. To establish that academic and VUZ scientific organizations are obliged to focus basic attention on the utmost development of basic research in the most important directions of the natural, technical, and social sciences as the basis for the steady movement of the country along the path of progress.

On the basis of these basic operations they should ensure the development of the theoretical principles for fundamentally new types of equipment and technologies, which revolutionize social production, and their quickest transfer to the national economy, as well as the

performance with the participation of sectorial and plant science of basic and highly efficient applied operations of a sectorial and intersectorial nature.

20. To commission the USSR State Committee for Science and Technology jointly with the USSR Academy of Sciences to specify the procedure of the financing of basic research in the area of the social, natural, and technical sciences and operations on intersectorial scientific and technical problems of statewide importance, as well as on the development of fundamentally new equipment which revolutionizes production.

21. The USSR State Committee for Science and Technology, the USSR Academy of Sciences, and the USSR Ministry of Higher and Secondary Specialized Education are to specify the procedure and to ensure the active participation of academic and VUZ scientific organizations in the implementation of state scientific and technical goal programs of an intersectorial nature and the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000.

22. To establish that the scientific research and development, which are performed by academic and VUZ scientific organizations in accordance with contracts with ministries, departments, associations, enterprises, and organizations, are financed by means of the assets of the clients.

To extend to academic and VUZ scientific organizations the basic principles and conditions of the fulfillment of contractual operations, which are established by this decree.

23. The USSR Academy of Sciences, the USSR State Committee for Science and Technology, and the USSR Ministry of Higher and Secondary Specialized Education are to draw up and submit within a 6-month period the necessary suggestions on the gradual changeover of academic and VUZ scientific organizations to the new methods of financing and management with allowance made for the specific nature of their activity and the provisions which have been set forth in this decree.

VI. The Organization of the Work on the Changeover of Scientific Organizations to the New Conditions of Management

24. USSR ministries and departments and the councils of ministers of the union republics are to accomplish the changeover of scientific organizations to the conditions of work, which are envisaged by this decree, during the period which has been established for the changeover of associations and enterprises of the sectors of the national economy to full cost accounting and self-financing.

25. Ministries and departments when drawing up the master plans of the management of sectors are to ensure the efficient specialization of production and scientific production associations and the unification in them of all the units of production—from applied research to series production and maintenance. Here to proceed from the fact that scientific research, planning, design, and technological organizations for the most part should be included in associations and only in exceptional cases, if an overwhelming amount of their research and development is intended for the solution of intersectorial or sectorwide problems, can remain outside associations.

26. To abolish starting in 1988 the planning of allocations from the budget for the maintenance of scientific organizations in accordance with the base method and to establish that the budget assets in the estimates of these organizations are stipulated and taken into account separately with respect to each specific theme.

The USSR State Committee for Science and Technology is to carry out the distribution of the allocations for science, which have been earmarked from the budget, among national economic complexes and directions of the development of science and technology, on the basis of the need for the provision with budget financing of the operations on the most important theoretical research, on intersectorial scientific and technical problems, which are of statewide importance, and on the development of fundamentally new equipment and technology, which revolutionize social production. Jointly with the USSR State Planning Committee and the USSR Ministry of Finance to develop and approve the methodology of determining the amounts of allocations, which are earmarked from the budget, for specific themes of scientific research and development.

27. To establish that the remuneration of the labor of the workers of scientific research, design, technological, planning, surveying, and other scientific organizations, which have been changed over to full cost accounting and self-financing, is carried out in conformity with Decree No 462 of the CPSU Central Committee, the USSR Council of Ministers, and the All-Union Central Council of Trade Unions of 22 May 1985, Decree No 1115 of the CPSU Central Committee, the USSR Council of Ministers, and the All-Union Central Council of Trade Unions of 17 September 1986, and Decree No 1231 of the USSR Council of Ministers and the All-Union Central Council of Trade Unions of 17 October 1986.

To commission the USSR State Committee for Labor and Social Problems jointly with the All-Union Central Council of Trade Unions to specify the procedure of the application of the rates and salaries, which are envisaged by the indicated decrees, at these organizations.

To grant the managers of the indicated scientific organizations, which have been changed over to full cost accounting and self-financing, the right to enlist in necessary cases for specific period highly skilled specialists for work as consultants in accordance with the

procedure and on the terms, which are envisaged by Subparagraph "b" of Paragraph 2 of Decree No 85 of the USSR Council of Ministers of 20 January 1986.

28. The USSR State Committee for Labor and Social Problems jointly with the USSR State Committee for Science and Technology and the All-Union Central Council of Trade Unions is to revise with allowance made for the requirements of this decree the system of the certification of scientists, having increased its role in the development of an effective mechanism of the evaluation of their labor.

29. The USSR State Committee for Science and Technology jointly with the USSR State Committee for Labor and Social Problems is to continue the work on the improvement of the prevailing forms and the search for new forms of the organization of scientific labor, which are aimed at the increase of the dependence of its remuneration on the results of work.

To regard as the most important factor of the increase of the efficiency of the work of scientific organizations the formation of highly skilled scientific collectives, the extensive enlistment in development of talented scientists and experienced workers, the development of an effective system of the optimum updating of the collective, and the steady increase of the scientific and creative potential, which meets the present requirements. For this purpose to gradually introduce in the practice of the work of scientific organizations a system of the conclusion of contracts between the administration of the scientific organization and groups of scientists or individual specialists for the performance of scientific, technical, and experimental design work.

30. To deem it necessary to increase the responsibility of the USSR State Committee for Science and Technology, the USSR State Committee for Construction Affairs, the USSR State Agroindustrial Committee, ministries, and departments and to tighten up their monitoring of the activity of scientific organizations. Ministries and departments are to make a careful analysis of the activity of subordinate scientific organizations, to specify their type and specialization, to identify inefficient ones, to strengthen them, and, where necessary, to transform or eliminate them in consultation with local organs in conformity with the procedure established by the USSR Law on the State Enterprise (Association). On the basis of the tasks facing the sectors to establish engineering and service centers, introducing organizations, and other mobile and flexible collectives, which ensure the increase of the efficiency of the use of resources and the quality of the product (operations, services).

31. The USSR State Planning Committee, the USSR State Committee for Science and Technology, USSR ministries and departments, and the councils of ministers of the union republics are to make the changes in the indicators approved in the five-year plan, which follow from the conditions of the changeover of scientific organizations to full cost accounting and self-financing.

32. The USSR State Committee for Statistics and the USSR Ministry of Finance are to make the necessary changes in the accounting and statistical reporting of scientific organizations, which follow from this decree.

33. To commission the USSR State Committee for Science and Technology to perform the necessary organizing and procedural work with ministries and labor collectives of associations, enterprises, and organizations on the implementation of measures which are connected with the fulfillment of this decree. In necessary instances to give ministries and departments explanations on its application.

34. To establish that the economic mechanism of the management of scientific organizations, which is envisaged by this decree, is common to all the sectors of the national economy.

To grant the USSR State Committee for Construction Affairs, the USSR State Agroindustrial Committee, and ministries and departments of the nonproduction sphere in consultation with the USSR State Planning Committee and the USSR State Committee for Science and Technology the right to apply individual provisions of this decree with allowance made for the specific nature of the activity of subordinate scientific organizations.

The CPSU Central Committee and the USSR Council of Ministers express confidence that the scientists and engineering and technical personnel, workers and employees of associations and scientific research, planning, design, and technological organizations will do everything necessary for the successful accomplishment of the posed tasks on the increase of the efficiency of scientific research and development and will ensure the practical restructuring of the work on the acceleration of scientific and technical progress.

[Signed] Secretary of the CPSU Central Committee M. Gorbachev

Chairman of the USSR Council of Ministers N. Ryzhkov

Moscow, the Kremlin. 30 September 1987. No 1102.

7807

Profit of Scientific Production Associations Under New Conditions

18140087 Moscow EKONOMICHESKAYA GAZETA in Russian No 48, Nov 87 p 8

[Article by Candidate of Economic Sciences Yu. Brodskiy, deputy general director for economic questions of the LenNIIkhimmash Scientific Production Association, and Ye. Ryabkov, head of the laboratory of technical and economic substantiations: "A Leap Into the Unknown"; first two paragraphs as *Ekonomicheskaya Gazeta* introduction]

[Text] It is an amazing thing: for a long time we advocated the changeover of the scientific sector of social

production to cost accounting and the recognition of scientific research, planning, design, and technological developments as a commodity product that has a price. But now, when the decision has been made, bewilderment has appeared for several people: for starting already in January of next year scientific organizations are being deprived of financial maintenance from the state budget and are being changed over to full cost accounting and self-financing.

From where does such bewilderment come?

It is a question here not only of the ingrained habit of living at the expense of the state, but also of the poor conception of how it is possible to link cost accounting with the specific nature of scientific organizations.

We will not conceal the fact that in recent years, even decades the novelty, level, pace, and efficiency of the research of many scientific institutes, and especially sectorial institutes, did not satisfy the requirements of the times. Fundamentally new technologies found very slowly the way to production. The elements of monopolism, which give rise of complacency and an orientation toward the improvement of more and more obsolete equipment and technology, increased in the work of sectorial science.

True, attempts to eliminate these negative phenomena were also undertaken earlier. Let us recall, for example, the changeover to the comprehensive planning of the investment cycle, the system of settlements for completely finished work, the improvement of the system of the economic stimulation of research and development, and the organization of scientific production associations. However, they did not yield appreciable results, for they were not implemented everywhere and comprehensively and were often deformed by means of various ministerial instructions.

But still the main reason consists in the fact that the scientific organization, not being a commodity producer, in its activity was apart from the production process. Such a situation suited the dependents "on science" and enabled them to perform work which was of neither scientific nor practical value. Now the changeover of scientific organizations to full cost accounting and self-financing will make it possible to understand "who is who." And it is not frightening that the new conditions of economic activity will force the organizations, for whose products there will be no demand, to dissolve themselves.

As is known, the sector of chemical machine building was one of the first to begin the search for approaches to work on the terms of self-support [samookupayemost] and self-financing. Our LenNIIkhimmash Scientific Production Association also did not remain aloof. The association is a young one and was formed only in 1986. In addition to the Leningrad Scientific Research and Design Institute of Chemical Machine Building, another six plants were included in it. The basic task of the complex is the development of equipment for enterprises of the chemical, petrochemical, gas, metallurgical, and other sectors of industry. With the establishment of the association work in accordance with direct contracts became for us the main form of business cooperation with clients.

We began with the changeover of the plants of the association to cost accounting. But already then life itself suggested the appropriateness and advisability of the changeover of the institute as well to cost accounting. The structure of the financing of the work of the institute, which had formed favorably, contributed to this, inasmuch as it performs 90 percent of the work on the basis of direct contracts with clients.

At the same time after the recognition of the scientific product as a commodity one must not simplify and mechanically carry over to the management of the scientific and technical sphere the decisions which have been formulated for production. In particular, the extension of the prevailing standards of the breakdown of the profit for the industrial product to the scientific product seems unjustified. In our opinion, there should not be a direct analogy in the amount and structure of the standards for industry and science. At present at the association the profit for the industrial product is broken down in the following manner: the fee for productive capital—19.6 percent, the payment to the state budget, including the local budget—26.5 percent, deductions for the ministry—7.5 percent, the deductions for the fund for the development of production, science, and technology—30.5 percent, the deductions for the fund for sociocultural measures and housing construction—7.5 percent, the deductions for the material incentive fund—8.4 percent.

In our opinion, it is illegitimate to introduce such a standard as the fee for capital for all scientific organizations, inasmuch as it will serve as an "antistimulus" of the use of advanced and often expensive means of conducting scientific research. Moreover, the utilization of instruments and equipment at scientific organizations, as a rule, is variable. But the advisability of introducing for scientific research institutes a fee for the use of manpower resources does not raise doubts.

The deductions for the centralized funds of ministries, in our opinion, are also not legitimate in all cases for scientific organizations. For the standard of the deductions for these funds for the industrial product were established on the basis of the amount of assets needed by ministries for the financing of work of a general sectorial nature, which is carried out by subordinate scientific organizations.

Is it perhaps more advisable when changing over to full cost accounting to establish for all scientific organizations a common standard, for example, 30 percent, of deductions for the budget? It is possible to break down

the remaining profit within the organization in accordance with stable standards. Thus, it is advisable, in our opinion, to break down the profit for the scientific and technical product in approximately the following manner:

Standards	Percent
The payment to the state budget, including the local budget, for used manpower resources	30
Deductions for the fund for the scientific, technical, and social development of the institute	55
Deductions for the material incentive fund	15

Such a breakdown of the profit would make it possible, first, to place all scientific research institutes under equal conditions when making settlements with the state and, second, to provide the necessary conditions for the development of the scientific base.

With the changeover of scientific organizations to cost accounting and self-financing the restructuring of the system of planning is of particular importance. The plans of scientific production associations under the new conditions will be formulated both on the basis of state orders for the industrial product and with allowance made for state orders with respect to the development of science and technology. Therefore, in our opinion, science and production should be planned in two directions: "Science and Scientific Service" and "Industry."

It should also be considered that the scientific organizations, which have been included in the scientific production association, turn the results of their labor over not only to enterprises of the association, but also to other enterprises. Here there must be reserved for the scientific production association the right to establish itself the directions and amounts of research, the number, and other indicators. The influence of ministries should find expression in the distribution and placement of state orders, that is, assignments that are especially important for the national economy.

As to the pricing mechanism, the model of the formation of the contract price for the scientific and technical product, which is based on a portion of the profit, which is anticipated by the consumer as a result of the use of the innovation, is apparently most acceptable. Under the conditions of self-financing the client will not pay for work of poor quality, while for needed work will also share the profit. True, the question of in what amount this proposed portion of the profit is to be included in the contract price for the scientific and technical product remains unclear. For if the profit is incorporated in the contract price in a one-time manner, this will relieve the scientific organization of responsibility for the high quality output of the product during the entire period of production. Moreover, scientific organizations will be little interested in the output of large series of a new product....

And there is another aspect: consumers are voicing the fears that the cost of the scientific product under the conditions of cost accounting will increase sharply. But prices are established in accordance with the mutual understanding of the parties!... Of course, we are trying to see to it that approximately 30 percent of the profit from the introduction of a development would remain on our credit side. Here, for example, every subdivision knows that if it does not yield a profit, the advisability of retaining this subdivision is put in doubt.

But at the same time the talk about a sharp increase of the cost of developments is evidently exaggerated. On the contrary, under the conditions of full cost accounting an interest in its decrease appears, inasmuch as the decrease of the cost of research and development within the contract price will increase the amount of profit. The inclusion in the contract price of the scientific product of a portion of the profit, which is anticipated (guaranteed) by the consumer in case of the use of the results of research and development, does not mean an increase of expenditures.

The changeover to full cost accounting and the emphasis on economic methods of management require the restructuring of interrelations at all levels of management.

Unfortunately, in practice one has occasion to be faced with cases of administration by mere decree when settling many questions of restructuring. For example, the Leningrad Scientific Research and Design Institute of Chemical Machine Building, which participated at one time in the experiment on the improvement of the organization and remuneration of the labor of scientists, designers, and process engineers, is performing today a significantly larger amount of work with a smaller number. This provided the department of manpower resources of the Planning Commission of the Leningrad City Soviet Executive Committee grounds to reduce the limit of the size of the institute with allowance made for the obtained saving. Such administrative techniques create the danger of the emasculation of the system of cost accounting.

7807

Improvement of Planning and Financing of Science Discussed

Moscow FINANSY SSSR in Russiasn No 7, Jul 87 pp 36-40

[Article by S.M. Aleshin, deputy chief of an administration of the USSR Ministry of Finance, V.M. Krasheninnikov, candidate of economic sciences, sector chief of Scientific-Research Finance Institute, and A.I. Konoshenko, candidate of economic sciences, deputy chairman of the scientific and technical council of the USSR Ministry of Higher and Secondary Specialized Education: "Certain Questions of Improving Planning and Financing of Science"]

[Text] Acceleration of the country's social and economic development, it was pointed out at the 27th CPSU Congress, is the key to the solution of all our problems: immediate and long-range, economic and social, political and ideological, internal and external. Only in this way can a new qualitative state of Soviet society be attained. The principal means of ensuring this goal is scientific and technical progress, which presupposes the development of new scientific and technical solutions realized on a wide scale in resource-conserving technological and highly efficient production systems and resulting in significant economy of live and embodied labor.

A big contribution to acceleration of scientific and technical progress should be made by higher school, which possesses a tremendous scientific potential and offers practically all branches of knowledge. In recent years, the total volume of scientific research conducted by higher educational institutions of the system of the USSR Ministry of Higher and Secondary Specialized Education has grown considerably.[1] Compared to 1981, it increased 18 percent in 1985, including 19.3 percent for economic contract work. Due solely to growth of the labor productivity of scientific personnel, 172 million rubles were made and due to the growth of their size—70.3 million rubles. This attests to the fact that science of higher school in the analyzed period developed on an intensive basis to a significant degree.

In higher school, not only did an increase in the volume of research occur, but what is especially important, here significant qualitative changes were to be noted in the structure of completed work (Table 1).

The data in Table 1 shows that in the VUZ sector of science progressive structural changes are taking place that are expressed in concentration of scientific resources in the basic directions of scientific and technical progress. The share of work performed on the most important topics amounted to 36.8 percent in 1985 and had grown 6.4 points compared to 1981. An increase in the relative share of such subject matter, first of all special-goal comprehensive programs attests in the total volume of scientific research to an improvement in the degree of coordination and control of this process on the part of the USSR Ministry of Higher and Secondary Specialized Education.

Within the framework of the comprehensive program worked out with the participation of VUZ's, it is possible to ensure:

actualization of the subject matter on the basis of its study, systematization and ranking in order of importance and urgency of solution of the problems facing sectors of the national economy in regard to acceleration of scientific and technical progress;

integrated implementation of scientific-research work through unification of the efforts of collectives (coexecutants) possessing the requisite scientific potential and scientific stock on the studied problem;

training of personnel for the introduction of completed developments into production from among one's own graduates or retraining of such specialists from among scientific and technical personnel of client enterprises.

During 1981-1985, a total of 256 higher educational institutions of the system of the USSR Ministry of Higher and Secondary Specialized Education took part in the development of 162 programs of the USSR State Committee for Science and Technology. In some programs, the participation of VUZ's was particularly significant. For example, in development of the "Robot Complex" program, 90 higher educational institutions were engaged. The annual volume of conducted research for the program amounted to 12 million rubles. Within the framework of the power program, there was carried out the inter-VUZ scientific-research program called "Power and Power Engineering" with annual scientific research amounting to 6.7 million rubles, for the Russian Federation, the "Nonchernozem Region" and "Food" programs with an annual amount of 11 million rubles and others. A prominent role in fulfillment of the targets of the all-union programs was played by scientists of Leningrad Polytechnic Insstitute (32 programs), the Moscow Power Engineering Institute (29 programs) and others. The time period for working out the comprehensive programs varies from 5 to 15 years. But it is important to stress that the results of the research are being introduced throughout the entire period of development of one or another problem solved within the framework of the comprehensive program.

However, despite certain positive changes in the structure of the performed work, it should be noted that it is far from an optimal level. The reasons for this in our view lie basically in the organization of scientific-research planning. At the present time, a situation has developed where plans of scientific-research work of the USSR Ministry of Higher and Secondary Specialized Education and the ministries of higher and secondary specialized education of union republics are in essence resumes of the plans of VUZ's. At the level of the higher educational institutions, the forming of such plans according to economic contract subject matter depends on the initiative of the scientist who has to find an ordering client for himself. The result is that the decisive factor in the selection of topics for the plan period in scientific-research sectors is the presence of accumulations for developers and financial resources for the client.

In our opinion, it is necessary to radically change this procedure of compiling plans inasmuch as it does not contribute to the solution of global economic problems and gives rise to topics of no special consequence. Scientists in such a situation expend their energies and

knowledge on the solution of petty tasks. It seems to us that in forming a plan of scientific-research work, it is necessary to proceed primarily from the need of solving the most important problems. The client for and the coordinator of the scientific-research work on intersectoral problems have to be the USSR State Committee for Science and Technology and the sector—essentially a ministry.

Traditional principles of concluding economic contracts lead to the fact that sectoral ministries frequently do not know of the subject matter of research performed by higher school for assignments by jurisdictional enterprises and organizations. For this reason, wide-scale introduction of scientific research into production is hindered. In the best scenario, isolated introduction takes place, that is, use of scientific and technical innovations developed by the VUZ for the enterprise ordering the work.

Scientific ties "Ministry of Higher and Secondary Specialized Education—sectoral ministries" or "leading VUZ—sector" in our view are more fruitful. Such contacts should be determined either by long-term contracts relating to scientific and technical cooperation or to a joint order of the two ministries. In documents, it is necessary to strengthen on a lasting long-term basis the subject matter of economic-contract work that will be done by VUZ's in the interest of the entire sector. It would make sense to indicate ahead of time those enterprises and associations at which it is proposed to introduce the obtained results.

The proposed principle of planning economic contract scientific-research work provides for increasing the responsibility of the USSR State Committee for Science and Technology and sectoral ministries and departments for economic substantiation and feasibility of developing this or that comprehensive program or research. Planning a topic at the considered level is important because these departments are implementing technical policy both in the country and in the sector and possess the financial means and limits on labor and material resources. This needs to be specially emphasized at this time because due to the lack of financial means at enterprises, economic contract research is frequently halted prematurely. Thus during 1983-1985, at 25 VUZ's checked by finance organs, 2.9 million rubles of so-called "throw-away" expenditures were found, particularly 1.5 million rubles at the Saratov Polytechnic Institute.

Sectors designate work limits for VUZ's in the performance of scientific-research work. The transmission of such limits is basically of a temporary character. When it is not expedient to continue research, they are returned to the client. We think that the technology of transmission of resources and limits ought to be significantly simplified. In order that sectoral ministries (the client) find a performer (contractor) for this or that scientific-research work, it makes sense to put informational support on a qualitatively new level. In the case of an interdepartmental organ (the USSR State Committee for Science and Technology), it is necessary to create an automated control system with a constantly renewing data bank in which exhaustive information is to be found on each problem, including such parameters as the degree (level) of its development, availability of leading specialists on this or that problem and so forth.

The change in the organization of planning economic contract work should result in the broader introduction of VUZ developments into production and consolidation of the subject matter of research, since work aimed at the solution of major intersectoral problems requires considerable outlays as a rule. The broader participation of VUZ's in conducting it affects such an indicator as the cost of development or the average annual cost of the work. In 1985, the average cost of economic contract work in the system of the USSR Ministry of Higher and Secondary Specialized Education amounted to 38,900 rubles. The relatively small cost of such work brings about its quantitative growth. For example, in the abovementioned year, 34,200 thousand rubles of work was completed (compared to 1981 its size increased by 5.5 percent). As a result, quality control over its performance is becoming difficult. We think that this is one of the chief reasons for the insufficiently high effectiveness of VUZ science.

The system of the USSR Ministry of Higher and Secondary Specialized Education possesses a significant potential for conducting research. The number of staff scientists and engineering and technical personnel in the scientific-research part (the scientific-research sector) in 1985 increased 9.6 percent versus 1981. In addition, in economic contract work, professor-instructor and auxiliary teaching personnel, graduate and undergraduate students of the VUZ, chiefs, engineers, instructor master mechanics, qualified workers of training shops, testing areas, laboratories and offices of the higher educational institution take part on conditions of holding two staff jobs (for additional pay not exceeding 50 percent of the salary of the second job). For the specified period, the number of professor-instructor personnel taking part in scientific-research work increased by 7.5 percent and that of graduate students was reduced by 6.8 percent.

In development of scientific research, an important role is played by the process of improvement of the professional and qualifications structure of scientific pedagogical personnel. The quality not only of the training of young specialists with a higher education but also of the conducted scientific research and consequently of their results depends on their qualifications level. In 1985, among the personnel taking part in research and development, there were approximately 13,000 doctors of sciences and more than 128,000 candidates of sciences (19.6 percent and 12.1 percent higher, respectively, compared to 1981).

The growth of size in the VUZ sector is occurring primarily because of recruitment of additional personnel, for the most part those who have not yet settled down. This phenomenon cannot be given a simple positive or negative evaluation. On the one hand, their recruitment in the presence of simultaneous underuse of the professor-instructor staff and graduate students is not a positive factor inasmuch as acceleration of scientific and technical progress requires mobilization of the country's entire intellectual potential. Wasteful use of specialists with the highest qualifications does not contribute to this. In 1985 in the system of the USSR Ministry of Higher and Secondary Specialized Education, the professor-instructor staff was involved in conducting scientific-research work only in the amount of 73 percent. On the other hand, growth of the number is due to a change in traditional structures that has developed in the VUZ sector of science. In recent years, these structures underwent significant changes. Specifically, pilot-design organizations began to be created and the experimental production base started to expand. Whereas in 1981 the relative share of this category of personnel amounted to 10 percent of the number of personnel in science and scientific services, in 1985 it was already 13 percent. Thanks to this, it was possible to significantly curtail the time periods of getting the results of research and development in certain work up to the industrial level.

Effectiveness of scientific work in higher educational institutions and intensiveness of the scientific search are all determined to a large degree by the state of their material and technical base. At the present stage of development of science, it is difficult to achieve significant results without further growth of the scientific and technical potential on a qualitatively new level. This presuppposes intensive development and moderniztion of the pilot and experimental base. By 1995, it is planned to increase its capacity three- to fourfold and to equip scientific units of VUZ's and inter-VUZ centers serving scientific research with new instruments and equipment.

In 1985, the balance value of educational scientific equipment for higher educational institutes of the system of the USSR Ministry of Higher and Secondary Specialized Education grew by 11 percent compared to 1984, which is accordingly connected to the increase in the amount of allocated funds. Let us examine the sources of financing of educational scientific equipment (Table 2).

The developed structure of financing educational scientific equipment for the Moscow Aviation Technological Institute imeni K.E. Tsiolkovskiy and the Moscow Geological Prospecting Institute imeni S. Ordzhonikidze is characteristic of the majority of VUZ's of the system of the USSR Ministry of Higher and Secondary Specialized Education. It can be seen from data in Table 2 that certain changes have taken place in the structure of equipment financing. For example, for the analyzed time, the share of funds included in the estimate cost of work increased for the Moscow Aviation Technological Institute by 6.7 points and for the Moscow Geologicaal Prospecting Institute by 5.5 points. This in our opinion is a positive tendency attesting to the fact that VUZ's are correctly oriented toward sectoral subjects and stabilization of relationships with the client. It should be noted that the money pledged for the estimated cost of the work is secured with funds by the client.

An important source of bolstering the material and technical base of higher educational institutions continues to be funds placed at the disposal of a VUZ in the form of excess of income over expenditures. In our view, this source of financing could create such a negative phenomenon as increasing the estimated cost of work. Checks of the USSR Ministry of Finance and its finance organs constantly reveal this violation. Thus in 1985, the Tula Polytechnic Institute allowed for 67 topics exceeding of income over expenditures in the amount of 20 percent to 55 percent of the volume of performed work, which made it possible for it to receive from the client on the large 1,049,600 rubles and to create a development fund in the amount of 787,200 rubles.

There are many such examples. For this reason we find it necessary to reject this source for financing the development of the material and technical bases of VUZ's. It is economically more expedient to cover a part of expenditures for the acquisition of equipment from profit. Of late, science has begun to take an active part in the creation of products, and sometimes it even produces them itself in the form of scientific developments or a pilot model. This means that the cost of development should be determined. Planned estimates of expenditures should serve as the basis of price for cost items (development cost) and profit, differentiated according to end results.

The principle of setting the price of a scientific development is cost plus a differentiated profit norm. Calculation items of the cost of expenditures should be grouped according to purpose and scientific organization in which these expenditures are made. It would be useful to show in the contract for scientific-research work: expenditures for raw and other materials, fuel and power for production purposes: basic and additional pay of scientific and technical personnel; deductions for social insurance for this category of personnel; costs of acquiring and operating equipment as well as maintaining the administrative apparatus of the scientific-research side. The last should be distributed in proportion to the amount of pay of scientific and technical personnel.

A normative base should be created for determining estimates of expenditures on calculation items. At the present time norms for expenditures have not been developed in principle with respect to economic contract work, although the idea of their creation in the VUZ sector of science is not new. It is considered by economist scientists essentially on the theoretical plane.

In creating norms, it is necessary to adhere to the most important demand made on them—stability. At the same time, the specific character of the science must be taken into account. In our view, the principle of average expenditures for a group of jobs of the same kind (for example, work of a technical, mathematical or social and economic character and so on) should serve as the basis of norm determination.

Scientific work, especially, economic contract work, should be profitable. Profitability (or remunerativeness) means that the earnings of an organization (institution) from the sale of scientific products compensate for expenditures and provide above that receipt of income for improving the scientific process, satisfying cultural and personal needs and stimulating scientific personnel materially.

Several points of view exists on determination of a profitability norm. We think that it would be useful to establish this indicator as a ratio of profit to the estimated cost of work. The norm of profitability should be differentiated depending on the priority of the work and its final result (effect) and is at the 15-20 percent level.

A legitimate question arises: why should the norm of profitability be at such a level? The calculations we carried out show that the profit should be sufficient for the formation of a material-incentive fund, the fund of social and cultural measures and housing development and the development fund. They all have a specific purpose, and each is meant to stimulate certain aspects of activity. The development fund is particularly important from the viewpoint of provision of the material and technical base of VUZ's. In particular, it is advisable to use the allocated money for the acquisition of scientific educational and special equipment (including hardware of computing and organizational equipment) and for the development, servicing and modernization of the experimental and production base, construction of VUZ and inter-VUZ laboratories (on a share basis) and compensation for expenditures on scientific labor organizations and other directions. Of special importance is provision of our higher educational institutions with modern computer and microprocessor equipment. The rate of equipping VUZ's with modern computers is growing. Whereas in 1984 they obtained 80 digital computers, in 1985 a total of 263 such machines was acquired. As a result, as of 1 January 1986 VUZ's had 7,028 digital computers.

At the same time, the computer park is still being insufficiently effectively used. For example, the most expensive and fastest digital computers of the first group were being used 13.7 of the 24 hours of the day in the system of the USSR Ministry of Higher and Secondary Specialized Education. Of this time, 9 hours were spent on scientific research and 4.7 hours on the teaching process. The planned normative load of this group of computers is 15 hours. This is why the solution of the tasks set for higher school requires not only an increase of the computer park but also the adoption of measures for their more effective use.

Under the conditions of restructuring higher and specialized education, the considered questions require special attention as their solution will boost the effectiveness of VUZ science.

Footnote

1. The system of the USSR Ministry of Higher and Secondary Specialized Education includes 393 higher educational institutions under its jurisdiction and that of the ministries of higher and secondary specialized education of the union republics.

7697

Working Capital in Research in Electrical Equipment Industry

18140028b Moscow FINANSY SSSR in Russian No 8, Aug 87 pp 56-59

[Article by A.N. Nekrasova, graduate student of the Moscow Institute of the National Economy imeni G.V. Plekhanov: "The Use of Working Capital at Scientific Research Organizations of the Electrical Equipment Industry"]

[Text] The cardinal acceleration of scientific and technical progress in many respects depends on the efficiency of sectorial scientific and technical research, inasmuch as a large portion of the scientific and engineering potential of the country is concentrated at scientific research and planning and design organizations of sectorial ministries and departments. Taking this into account, in the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000 it is envisaged to increase substantially the level and effectiveness of sectorial science.

The successful activity of sectorial science is closely connected with the changeover of its organizations to the cost accounting principles of operation. At the June (1987) CPSU Central Committee Plenum it was envisaged "to conduct scientific research and development on the principles of cost accounting and self-financing and the payment by clients for scientific developments subject to the impact of their use." The cost accounting activity of scientific research institutes and design bureaus makes it possible: to strengthen their financial position and to increase their responsibility for the timely and high-quality conducting of research and development; to use internal working capital as a source of the covering of the expenditures connected with the formation of a reserve of the unfinished work; to

broaden the opportunities of scientific research institutes and design bureaus in the conducting of scientific and technical research; to shorten the time of the performance of research and development and to increase their effectiveness.

The provision of scientific research institutes and design bureaus with internal working capital gave rise to new problems, which are connected with the preservation of internal working capital, the conformity of its actual availability to the established standard, specific and efficient use, and the speeding up of its turnover rate in case of the performance of research and development. These problems require constant and comprehensive analysis from the standpoint of the provision of scientific research institutes and design bureaus with internal working capital on the basis of the data of their annual report balance; the conformity of the actual surpluses of commodity stocks to the established standards for the identification of above-standard, excessive, and unnecessary stocks; the soundness of the established standards of working capital with respect to its types; the rate of movement, the efficiency of the use, and the identification of the reserves of the speeding up of the turnover rate of working capital at individual stages of its circulation.

The circulation of working capital at scientific research and planning and design organizations is quite long, which is due to the specific nature of their activity. Thus, as a whole for scientific research institutes and design bureaus of the electrical equipment industry this circulation in 1985 came to 645.5 days. The duration of the turnover of capital at the named organizations for the most part is determined by the time that it is in unfinished production. This time as a whole for scientific research institutes and design bureaus of the electrical equipment industry in 1985 came to 610.5 days, including 727.8 days for work, which is performed in accordance with contracts with clients, and 532.3 days for work, which is financed by means of the unified fund for the development of science and technology (YeFRNT).

During the 11th Five-Year Plan the drastic shortening of the time that capital is in unfinished research and development, which is financed from the unified fund for the development of science and technology, occurred. Whereas in 1980 at scientific research institutes and design bureaus of the electrical equipment industry the turnover rate of working capital, which was placed in unfinished research and development that are financed by means of assets of the unified fund for the development of science and technology, came to 743.2 days, in 1985 it was 210.9 days less, that is, the turnover rate was sped up by 28.2 percent. The decrease of the proportion of minor themes and the change of the evaluation of the work of scientific research institutes and design bureaus, which is now given if this work as a whole exists, had a substantial influence on the shortening of the time of the turnover of working capital in unfinished production.

Working capital at the stage of the financing of expenditures on materials at scientific research institutes and design bureaus is held back a comparatively short time, inasmuch as the time of its turnover depends on the periodicity of deliveries of materials for the fulfillment of themes and on the volume of their consumption. During the 11th Five-Year Plan as a whole for scientific research institutes and design bureaus of the electrical equipment industry the time that working capital is at the stage of the financing of expenditures on materials increased by 20 days. This slowing of the turnover rate of working capital, which is invested in materials, occurred in connection with the increase of the cost of the materials being used and the irregularity of their arrival.

In case of the analysis of the use of working capital the ascertaining of the conformity of its availability to the established standard is of great importance. During the 11th Five-Year Plan the scientific research institutes and design bureaus of the electrical equipment industry performed considerable work, which was aimed at ensuring the preservation of internal working capital, and for the most part achieved the proper conformity. As a result during 1981-1985 a shortage of internal working capital, which in 1984 alone came to 188,000 rubles, was allowed.

The shortage of internal working capital was reduced during the 11th Five-Year Plan for scientific research and design organizations of the group of the All-Union Light Sources and Illumination Engineering Equipment Industrial Association. For the All-Union Scientific Research Institute of Lighting Engineering (Moscow), for example, this shortage was reduced from 358,000 rubles on 1 January 1984 to 6,000 rubles on 1 January 1985. On 1 January 1986 the institute ensured the conformity of internal working capital to the established standard.

At the same time during the 11th Five-Year Plan many scientific research institutes and design bureaus did not always worry about the preservation of internal working capital. For the scientific research institutes and design bureaus of Soyuzelektromash, for example, all the scientific research and design and technological organizations allowed a shortage of internal working capital during 1984. The appearance of a shortage of internal working capital at the scientific research institutes and design bureaus was a result of the making of unplanned outlays and the failure to fulfill the plans of research and development.

The making up of the shortage of internal working capital of scientific research institutes and design bureaus is carried out by means of additional assets which are received from the unified fund for the development of science and technology. For the temporary making up of the shortage of internal working capital, in our opinion, it is advisable to use bank credit and to issue it for a period of not more than 2 years with the charging of 7 percent per annum for use of the loan. In case of the formation of a shortage of internal working

capital at scientific research institutes and design bureaus for reasons, which do not depend on their activity, it is advisable to compensate for them by means of the reserve of financial assistance of the ministry.

The precise fulfillment of the plans of scientific research work both with respect to the volume and with respect to the themes, the timely making of settlements with clients, the special-purpose spending of working capital, and so on contribute to the assurance of the preservation of the internal working capital of scientific research institutes and design bureaus.

At scientific research and planning and design organizations not only a shortage, but also a surplus of internal working capital arise in their activity. For example, many scientific research institutes and design bureaus of the USSR electrical equipment industry during the 11th Five-Year Plan constantly had such surpluses. The amount of the surplus of internal working capital decreased significantly in 1985, having come to 0.02 percent of the overall standard of working capital of scientific research institutes and design bureaus for the ministry as a whole. These surpluses decreased substantially for the groups of scientific research institutes and design bureaus of Soyuzelektrokabel, Soyuzelektrotyazhmash, and Soyuzelektromash. Thus, the amount of the surplus decreased for the group of scientific research institutes and design bureaus of Soyuzelektrotyazhmash from 6,227,000 rubles on 1 January 1983 to 105,000 rubles on 1 January 1986.

The analysis of the conformity of internal working capital and the standards with respect to 10 groups of scientific research institutes and design bureaus showed that during 1981-1985 surpluses of internal working capital occurred at scientific research and planning and design organizations of the groups of Soyuzelektrokabel and Soyuzelektrotyazhmash. For the group of scientific research institutes and design bureaus of Soyuzelektrotekhnologiya the surplus of internal working capital on 1 January 1986 was significant and exceeded the standard by 22.4 percent. The availability of a surplus of internal working capital makes it possible to use the capital more freely and attests to shortcomings in its rate setting and in the monitoring of special-purpose and efficient use.

Not only the supply with internal working capital, but also the conformity of the actual balances of working capital to the established standards have a substantial influence on the financial status of scientific research institutes and design bureaus. During the 11th Five-Year Plan as a whole for scientific research institutes and design bureaus of the electrical equipment industry the actual balances of all working capital significantly exceeded its standards. The total amount of the above-standard reserves for scientific research institutes and design bureaus, for which standards were established, came in 1984 to 60.3 million rubles and in 1985 to 86.4 million rubles. The formation of above-standard reserves of commodity stocks and working capital, which are in unfinished production, adversely affected the financial status of scientific research institutes and design bureaus. For this led to the freezing of a portion of the resources, to financial difficulties in case of settlements with suppliers for commodity stocks, and to the inefficient distribution of working capital, which is invested in unfinished research and development.

At the same time given the absolute increase of the above-standard balances of working capital as a whole for scientific research institutes and design bureaus of the electrical equipment industry their amount with respect to the standard decreased annually and came to: in 1981—25.7 percent, in 1982—23.3 percent, in 1983—23 percent, in 1984—15.6 percent, and in 1985—15.4 percent. The improvement of the planning of scientific, planning, design, and technological work, the establishment of more sound standards of internal working capital for scientific research institutes and design bureaus, the improvement of material and technical supply, and the tightening up of the monitoring of the consumption of physical assets and the capital, which is allocated for scientific work and scientific and technical development, contributed to the decrease of the above-standard balances of working capital.

The above-standard balances of working capital of scientific research institutes and design bureaus of the electrical equipment industry formed due to the above-standard production stocks and amounts of unfinished research and development. The analysis of the actual production stocks and their comparison with the standard showed that during the 11th Five-Year Plan as a whole for scientific research institutes and design bureaus of the electrical equipment industry above-standard production stocks occurred annually. Here their amount constantly increased. In 1985 the above-standard production stocks as a whole for scientific research institutes and design bureaus of the electrical equipment industry increased as against 1981 by 13 percent. This increase would have been more significant, if the overall standard of internal working capital had not been revised annually. Given the increase of the actual production stocks during 1981-1985 by 13.6 million rubles the standard of working capital was increased by 8.3 million rubles, which comes to 60 percent of the total increase of the actual production stocks as a whole for scientific research institutes and design bureaus of the electrical equipment industry.

To overcome the tendency of the above-standard production stocks at scientific research institutes and design bureaus of the sector to increase it is advisable to identify on the basis of an inventory the unnecessary, unmarketable, and low-quality production stocks and to ensure their sale and writing off, to revise periodically the standards of internal working capital with allowance made for the increase of the amount of work of scientific research institutes and design bureaus, the changes of their structure and nature, and the assignments on speeding up the turnover rate of working capital; to

tighten up the monitoring on the part of the managers of scientific research institutes and design bureaus of the special-purpose and well-founded expenditure of monetary assets in case of the acquisition of materials, inexpensive and rapidly wearing objects, and special equipment for experimental work.

The changes of the above-standard stocks with respect to raw materials, basic materials, and inexpensive and rapidly wearing objects had a substantial influence on the dynamics of the above-standard production stocks of scientific research institutes and design bureaus. Thus, the above-standard production stocks for the groups of scientific research institutes and design bureaus of the All-Union Electric Carriers, Lifting, and Transport Equipment Industrial Association were reduced due to the decrease of the above-standard stocks of raw materials and basic materials from 3,032,000 rubles in 1983 to 158,000 rubles in 1985.

Unfortunately, during the 11th Five-Year Plan an increase of the above-standard production stocks of the group of scientific research institutes and design bureaus of the All-Union Light Sources and Illumination Engineering Equipment Industrial Association, Soyuzpreobrazovatel, and Soyuzelektrotekhnologiya was also observed. Their amount came in 1985 for the scientific research institutes and design bureaus of the All-Union Light Sources and Illumination Engineering Equipment Industrial Association to 1,879,000 rubles as against 1,054,000 rubles in 1981 and accordingly for the scientific research institutes and design bureaus of Soyuzelektrotekhnologiya to 3,111,000 rubles as against 786,000 rubles.

The increase of the amounts of scientific and technical work being performed, the change of its themes and structure, the exceeding of the planned norms in case of the consumption of physical assets, their excessive delivery under the conditions of the effect of transit norms, and the existence at scientific research institutes and design bureaus of groundless standards of working capital with respect to raw materials and basic materials had a substantial influence on the formation and increase of the above-standard stocks with respect to raw materials and basic materials of scientific research institutes and design bureaus of the electrical equipment industry.

In connection with the increase of the actual stocks of raw materials and basic materials by groups of scientific research institutes and design bureaus their standards of internal working capital were revised. Thus, the standard for raw materials and basic materials for the group of scientific research institutes and design bureaus of Soyuzpreobrazovatel during 1981-1985 increased by sevenfold with an increase of the actual balances by 4.2-fold. However, in 1985 its amount remained 32 percent less than the actual stocks for raw materials and basic materials.

It is hardly possible to consider justified the revision in 1985 for the group of scientific research institutes and design bureaus of Soyuzelektrotekhnologiya of the standard of working capital with respect to raw materials and basic materials in the direction of its decrease given the actual balances which exceeded the standard in 1984 by 130 percent. In connection with the decrease of the standard the amount of the above-plan stocks with respect to raw materials and basic materials for this group of scientific research institutes and design bureaus increased. The decrease in 1985 of the standard of working capital with respect to raw materials and basic materials for the group of scientific research institutes and design bureaus of Soyuzelektrotyazhmash was just as unfounded. Their actual balances in 1984 exceeded the standard by 51 percent. At the same time given the actual balances of raw materials and basic materials for the group of scientific research institutes and design bureaus of Soyuzelektromash, which were stable during 1982-1985, the standards of their working capital were not revised.

During the 11th Five-Year Plan at scientific research institutes and design bureaus the actual balances of working capital, which was invested in inexpensive and rapidly wearing objects, decreased. Thus, for the scientific research institutes and design bureaus of the All-Union Light Sources and Illumination Engineering Equipment Industrial Association the above-standard stocks decreased from 1,251,000 rubles in 1981 to 1,031,000 rubles in 1985, or by 21.3 percent, accordingly for the scientific research institutes, as well as design bureaus of the All-Union Transformer and High Voltage Apparatus Industrial Association they decreased from 1,226,000 rubles to 1,060,000 rubles, or by 15.7 percent; the above-standard stocks with respect to inexpensive and rapidly wearing objects increased for the scientific research institutes and design bureaus of Soyuzelektrotyazhmash by 22 percent and the All-Union Electric Carriers, Lifting, and Transport Equipment Industrial Association by 16 percent. The increase of the above-standard balances of working capital with respect to inexpensive and rapidly wearing objects for the majority of scientific research institutes and design bureaus was due to the increase of their actual stocks and was accompanied by the constant revision of the prevailing standards of internal working capital.

At scientific research institutes and design bureaus, which have been changed over to cost accounting, the payment for work is ensured after its completion or the fulfillment of a specific stage of it. In this connection for the period of the fulfillment of the work, that is, prior to its delivery and acceptance, working capital is needed for the formation of expenditures in unfinished production. These expenditures, as is known, are financed by means of assets of the clients and the unified fund for the development of science and technology, and with respect to the ministries, which have been changed over to full cost accounting and self-financing, by means of assets of the fund for the development of production, science, and technology.

The analysis of the ratio of the actual balances of working capital and its standards, which are invested in unfinished production of the electrical equipment industry, showed that for the majority of scientific research institutes and design bureaus above-standard expenditures on unfinished production, which are financed by means of assets of the unified fund for the development of science and technology and assets of the clients, occurred.

With respect to the groups of scientific research institutes and design bureaus, taking into account the time, during which the standards of internal working capital were in effect, the situation with the balances of working capital, which was invested in unfinished production, was as follows. Thus, for the scientific research and planning and design organizations of Soyuzelektrotyazhmash the actual balances of working capital in unfinished production, which are financed by means of the unified fund for the development of science and technology, increased during 1981-1985 by 35.4 percent, while accordingly the standard increased by 24.8 percent. As a result the above-standard balances of working capital, which are invested in unfinished production, increased from 6 million rubles in 1981 to 11.8 million rubles in 1985.

For the groups of scientific research institutes and design bureaus of Soyuzelektrokabel and the All-Union Light Sources and Illumination Engineering Equipment Industrial Association, whose standards of working capital with respect to unfinished production by means of assets of the unified fund for the development of science and technology were established in 1983, the annual decrease of the above-standard balances of working capital was accomplished. Thus, for the scientific research institutes and design bureaus of the All-Union Light Sources and Illumination Engineering Equipment Industrial Association these balances decreased from 4.8 million rubles in 1983 to 3.9 million rubles in 1985, or by 21.1. percent. Both the change of the standard in the direction of its increase and the decrease of the actual balances of working capital, which was invested in unfinished production, influenced the decrease of the balances of working capital in unfinished work.

The actual balances of working capital in unfinished work, which are financed by means of assets of clients, during the 11th Five-Year Plan formed in different ways for scientific research institutes and design bureaus. Thus, for the groups of scientific research institutes and design bureaus of Soyuzelektrotyazhmash the above-standard balances of working capital in unfinished work decreased from 11.3 million rubles in 1981 to 6.8 million rubles in 1983, but during 1984-1985 the actual balances were less than the standard of working capital.

For the group of scientific research institutes and design bureaus of Soyuzelektroizolyator during all the years of the 11th Five-Year Plan the actual balances of working capital in unfinished production were less than their standard. The same situation also formed for the group of scientific research institutes and design bureaus of Soyuzelektromash. All this testifies to the overstatement of the prevailing standards of internal working capital in unfinished production, which is financed at the expense of clients, and to the need for their substantial improvement.

The shortening of the time of the fulfillment of scientific work and development by the increase of the labor productivity of the performers of themes and developers and the improvement of their quality; the timely introduction of prototypes of machines, instruments, and technological process; the establishment of scientifically sound standards of working capital with respect to unfinished production; the making of a regular inventory of expenditures and a check of settlements with respect to themes, which are in unfinished production with a breakdown by sources of financing; and the strict observance of the policy of economy when consuming material, manpower, and financial resources, which are allocated for research and development, could contribute to the further improvement of the distribution of working capital in unfinished work and to the decrease of its actual and above-standard balances.

7807

Special-Purpose Financing of Science

18140028a Moscow FINANSY SSSR in Russian No 8, Aug 87 pp 30-33

[Article by N.S. Ayrapetyan, chief of a department of the Administration of the Financing of Education, Science, and Culture of the USSR Ministry of Finance, under the rubric "The Social Program of the Five-Year Plan": "Questions of the Financing of Science"]

[Text] Party policy in the area of science is aimed at the creation of the conditions for the rapid development of all fields of knowledge, the concentration of resources on the most promising directions, the strengthening of the cooperation of academic, VUZ, and sectorial science, and the increase of the effectiveness of research for the purpose of accelerating scientific and technical progress and ensuring by means of this the sharp increase of the growth rate of social production. At present a powerful scientific and technical potential has been created in the USSR. The state is annually allocating considerable material, manpower, and financial resources for the development of science. The expenditures on scientific research work (NIR) from the budget and other sources (including capital investments) are constantly increasing. During 1971-1975 they came to 77 billion rubles (or on the average 15.4 billion rubles a year), during 1976-1980—97.9 billion rubles (19.6 billion rubles), and during 1981-1985—131.2 billion rubles (26.2 billion rubles). In 1987 as compared with 1971 they will increase by 2.5-fold and will come to 30.8 billion rubles

(6.3 percent more than the 1986 allocations). These data do not reflect the expenditures on scientific research work, which is conducted by higher educational institutions in accordance with economic contracts with clients (more than 1.5 billion rubles a year); at the chairs of higher educational institutions, which are attributed to the estimates of educational institutions; for the maintenance of plant laboratories, and so on.

In conformity with the State Plan of USSR Economic and Social Development for 1986-1990 it is envisaged to increase the spending on the development of science (excluding capital investments) in 1990 to 33 billion rubles. Their growth rate will exceed by 1.5-fold the growth rate of the national income. Much capital will be allocated for the strengthening of the material and technical base of science. It is envisaged to increase by 70 percent the capital investments which are being allocated for these purposes. The dynamics of the growth of the number of people employed in the sector "Science and Scientific Service" is shown in Table 1 (the data are cited for the last year of the 5-year period).

Table 1

Indicators	1971-1975	1976-1980	1981-1985
Number of people employed in the sector "Science and Scientific Service," thousands	3790	4379	4554
Number of scientists and science teachers, thousands, at the end of the year	1223.4	1373.3	1491.3

The acceleration of the development of science is an objective process. Under these conditions the problem of the intensification of scientific activity and first of all its organizational economic factors are acquiring particular importance, inasmuch as, on the one hand, their implementation does not require substantial capital expenditures and, on the other, makes it possible to ensure the leading growth rate of the effectiveness of scientific research as compared with the high rate of increase of the resources for their conducting. In this connection, in our opinion, the task of changing the existing system of the financing of science seems important.

A specific procedure of the planning and financing of organizations and institutions of science and scientific service has formed in the country. The USSR State Planning Committee and the USSR State Committee for Science and Technology (GKNT) approve the plan of financing of scientific research work, including the wage fund of workers of scientific research institutes and separately the wage fund of workers of institutions and organizations of scientific service. Allocations from the state budget and the unified fund for the development of science and technology (YeFRNT) and in the sectors, which have been changed over to full cost accounting and self-financing, from the centralized fund for the development of production, science, and technology are the basic sources of financing of scientific research work. The share of the indicated and other sources of financing in the amount of the expenditures on scientific research work for 1987 by organizations, which are planned by the USSR State Committee for Science and Technology, is cited in Table 2.

Table 2

Amount of expenditures	Including sources, percent				
	Budget	Unified fund for the development of science and technology, centralized fund for the development of production, science, and technology	Contracts	Assets taken into accounting in the product cost	Others
100.0	39.5	36.5	21.6	1.9	0.5

When determining the amount of expenditures by sources of financing they proceed from the following: the scientific research work, which is connected with the fulfillment of the assignments of directive organs and scientific and technical programs and with the solution of problems in the area of the natural and social sciences, and the scientific research work of a fundamental (theoretical) and basic type are financed by means of the unified fund for the development of science and technology and allocations from the state budget; the scientific research work of a statewide and sectorial nature is financed by means of the unified fund for the development of science and technology and the assets, which are envisaged for this work in the plans of the production cost of industrial output, construction and installation work, transportation, and so on; the scientific research work of a statewide and sectorial nature in the area of construction is financed by means of allocations from the budget, which are specially allotted for these purposes in accordance with established procedure;

—the scientific research work of a statewide and sectorial nature, which is performed by scientific research institutions of the system of the USSR State Agroindustrial Committee for agriculture, is financed by means of allocations from the budget and by means of accumulations from the sale of products, which are produced at experimental farms and at enterprises of the scientific research institutions; the scientific research work, which is performed by scientific research institutions of the USSR Ministry of Geology and the ministries and administrations of geology of the union republics, is financed by means of allocations from the budget for operating expenses for geological prospecting, topographic, and geodetic work.

However, the existing system of financing is not conducive to the more efficient use of the potential of Soviet science. Thus, the amount of expenditures on the performance of experimental design, planning, and technological work, including in accordance with all-union scientific and technical programs, is not planned in a centralized manner. The organizations that perform these types of work are assigned to scientific service, and their activity is not coordinated by the USSR State Committee for Science and Technology.

Meanwhile at present the process of integrating various types of scientific activity, science, and production has intensified, fundamentally new forms of the scientific process, which are based on the uniting of basic and technological research and the emergence of fundamentally new technologies already as a result of the conducting of basic research, have appeared. All this predetermined the changeover to new organizational structures of scientific activity and to the establishment of scientific production associations, integrated scientific research, planning and design, and technological organizations, interbranch scientific technical complexes, engineering centers, and others. The majority of sectorial scientific research institutes and design bureaus are being included in production and scientific production associations. Under these conditions the division of the sphere of scientific activity into "science" and "scientific service" even within an individual organization (association) does not conform to the real processes in this sphere.

At the same time the notion of scientific activity as the sequential realization of individual and interconnected stages: basic research, applied research, and scientific and technical development, is generally recognized in scientific literature and in practical work. For the characterization of the stages of scientific activity it is possible to use the definitions, which were proposed by Ye.V. Kosov,[1] with several refinements and additions.

Basic research is the identification, study, and classification of phenomena and the laws of development of nature and society. A discovery, a new theory or concept (which has been substantiated theoretically and has been confirmed experimentally), as well as the establishment (registration) of previously unknown objective phenomena of the material world can be the end result. Scientific publications (announcements), reports, and other information are the forms of expression of the results of such research. The basic criterion of the quality of the results of basic research is the discovery of new phenomena of the material world, which is confirmed by the issuing of a certificate. This research can be both theoretical and experimental. The probability of obtaining results, which are suitable for use in production, at the stage of basic research is low—5-10 percent.

Applied research is the study of means of the practical use of the results of basic research of a specific field (sector). The goal of applied research is the "materialization" of knowledge in the form of new, original, and, as a rule, patentable diagrams and operating models of instruments and mechanisms, substances and materials, that is, results that demonstrate the technical possibility of the interpretation of objective knowledge from the standpoint of its use by social production. Pilot experimental work and laboratory tests are conducted for the substantiation and selection of the most effective technical solutions at this stage. Approximately 80-90 percent of the results are suitable for use in practice.

Scientific and technical (technical) development is the set of experimental design, planning and technological, and organizational management operations, elaborations of standards, and work in the area of design, which ensure the production of a fundamentally new product, as well as promote the evolutionary improvement of already existing types of products. Pilot production—the manufacture of the first specimens of new items (or their models, if it is a question of unique equipment or a unique structure) for the verification of the correctness of the design and technological developments and preparation for their introduction—is also assigned to this stage. The stage concludes with tests of the specimen (or the experimental checking of the innovation) and the making of a decision on its mass production (introduction). Approximately 95-97 percent of all scientific and technical development concludes with results that are suitable for use in production. The criterion of the quality of the results of development is determined by the conformity of new models of products to the world technical and economic level (or its exceeding) of equipment and by the possibility of the export of the product, which has been duplicated in accordance with these models.

In our opinion, first, one should elaborate precise criteria for each stage of scientific activity and make a one-time account of all the work being performed by stages and, second, it is necessary to introduce in the corresponding section of the State Plan of USSR Economic and Social Development individual plans of financing: basic research, applied research, and scientific and technical development, which will make it possible to ensure continuous financing and the optimum ratio of expenditures with respect to all the stages of scientific

activity. It is necessary to form such plans of financing by means of three sources—the state budget, the regional (republic, local) budget, and the centralized fund of ministries and departments (the unified fund for the development of science and technology, the centralized fund for the development of production, science, and technology). They are used in the following directions:

—the state budget—the financing of basic research in the academic and VUZ sectors of science, programs and assignments (orders) of all-union significance at all the stages of scientific activity (basic research—applied research—scientific and technical development); the maintenance and development of the potential of nonproduction scientific research institutions of union significance;

—the regional budget—the financing of programs and assignments (orders) of regional significance at all the stages of scientific activity (basic research—applied research—scientific and technical development); the maintenance and development of the potential of regional nonproduction scientific research institutions; the financing of applied research and scientific and technical development in accordance with the regional peculiarities of the development of productive forces;

—the centralized fund of the ministry (department)—the financing (on a shared basis) of scientific and technical programs of all-union (regional), intersectorial, and interregional significance of the entire cycle from research to introduction, scientific and technical programs of sectorial significance for the implementation of the "research—introduction" cycle, as well as basic and applied research and scientific and technical development of a sectorwide nature.

The assets of the funds for the development of production, science, and technology of associations, enterprises, and organizations are another source of financing of research and development. The amount of the expenditures, which is allocated from these funds for the conducting of scientific research, as well as for the solution of problems on the maintenance and development of the scientific, technical, and scientific production potential of associations, enterprises, and organizations, is not planned in a centralized manner and is determined by the enterprises themselves in consultation with the labor collectives. It should be reflected only in accounting and statistical reporting.

For the increase of the centralization of assets in the most important scientific and technical directions and their purposeful use it would be advisable to create at the disposal of the USSR State Committee for Science and Technology within the limits of the approved plan of the financing of science a fund for the financing of scientific and technical programs and assignments of all-union, interregional, and intersectorial significance, which is formed by means of allocations from the state budget, as well as deductions from a portion of the corresponding centralized funds of USSR ministries and departments. The creation of such a fund at the disposal of the USSR State Committee for Science and Technology will enable the committee, in acting as the client, to carry out direct supervision in the formulation of programs and special assignments (orders), to coordinate and monitor the activity of the coperforming organizations, and to finance this work directly (through the main organizations). The use of this fund for supporting the activity of interbranch scientific technical complexes seems especially effective.

At present the multichannel financing of scientific and technical programs and assignments, in case of which each coperforming ministry finances only its own part of the program, is being carried out. This is having the result that the main ministries (organizations), which are responsible for the fulfillment of the program as a whole, in practice cannot influence the coperformers outside their sector. The interdepartmental barriers in this case are a significant obstacle in the assurance of the effective management of scientific and technical programs and in the creation of a reliable financial base for their successful fulfillment.

For the purpose of concentrating financial resources in the most important regional scientific and technical directions one should also establish at the disposal of the state planning committee of the union republic a fund for the financing of scientific and technical programs and assignments of regional significance, which is formed by means of allocations from the regional (republic, local) budget and deductions from a portion of the corresponding centralized funds of ministries and departments of republic subordination.

Both ministries and departments, in our opinion, should perform analogous functions of the client of sectorial scientific and technical programs. For this the assets of the centralized fund of the ministry (department) instead of their distribution among organizations and enterprises through "its own" main administrations (administrations, associations) should be allocated in a special-purpose manner to the main organizations for the financing of the corresponding sectorial programs and assignments (orders).

The advantage of the proposed special-purpose financing from the corresponding funds of all levels—all-union, regional, sectorial—consists in the fact that the clients of these programs—the USSR State Committee for Science and Technology, the state planning committee of the union republic, the ministry (department)—do not have under permanent administrative subordination scientific research and design and technological organizations and production enterprises (with respect to ministries and departments this is correct in the sense that the financing of sectorial programs and assignments will be carried out directly through the main organizations, and not through the

main administrations). It is thereby possible to accomplish the changeover to economic contractual relations between the clients and developers of the scientific and technical programs and assignments, which will be based on the combination of centralized and cost accounting economic methods. As a result the opportunity to finance not the maintenance of organizations and associations, as is presently being done, but directly scientific research and development will appear.

Footnote

1. See Ye.V. Kosov, "Intensifikatsiya nauchnykh issledovaniy i razrabotok" [The Intensification of Scientific Research and Development], Moscow, Ekonomika, 1983, pp 28-32.

7807