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# USSR Report

SCIENCE AND TECHNOLOGY POLICY

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28 February 1984

## USSR REPORT

### SCIENCE AND TECHNOLOGY POLICY

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PROCEEDINGS AT ROUND TABLE DISCUSSION IN NOVOSIBIRSK DETAILED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Jun 83 p 2

[Article by A. Lyakhov and D. Pipko, special SOTSIALISTICHESKAYA INDUSTRIYA correspondents: "Science: The Campaign to Put Results into Practice"]

[Text] Round Table Discussion Held in Novosibirsk's Akademgorodok

Speaking from the podium at the June (1983) Plenum of the CPSU Central Committee, comrade Yu. V. Andropov emphasized that "Our immediate goal is clear: first of all we need to organize what we already have; we need to ensure the most rational utilization of the country's production and scientific and technical potential...We need to develop a system of organizational, economic, and moral measures that would motivate both managers and workers, and of course scientists and designers, to get involved in modernizing production; these measures also should make outmoded operations unprofitable. This is our immediate task."

Problems of incorporating science into production and of cooperation between science and production spheres were the topic of discussion at a round table organized by the editors of SOTSIALISTICHESKAYA INDUSTRIYA in conjunction with the Novosibirsk Oblast party committee and the presidium of the Siberian Department of the USSR Academy of Sciences. Novosibirsk's Akademgorodok [Academic Village] was not chosen at random as the site for this discussion. Back when the Siberian Department of the USSR Academy of Sciences was first formed, its scientists set themselves the goal of combining solid fundamental research with solutions for pressing practical problems. They proved the high degree of effectiveness that can be achieved with this approach. Diverse forms of cooperation between science and production were developed at the Siberian Department and have withstood the test of time. Beginning with contacts with individual enterprises and institutes, the academic collectives expanded their influence to include entire sectors of industry. They help develop the forecasting data for the major national economic goals in the USSR State Plan, and in the comprehensive programs of the USSR State Committee for Science and Technology. The Siberian Department has joint plans for coordinating research and incorporation with 22 ministries and departments.

The experience of the Siberian Department, in addition to its positive results, has uncovered typical complications in developing reciprocal ties between science and production. Therefore, the round table participants--scientists,

representatives from industry, and party workers--focused their primary attention on how to step up the realization of scientific achievements in the national economy, how to increase its influence on the rate of technical progress, and how to eliminate obstacles that arise on the road to incorporating highly effective developments.

The following people participated in the meeting: V. Koptuyug, academician, vice president of the USSR Academy of Sciences, and chairman of the Siberian Department of the USSR Academy of Sciences; V. Bokov, secretary of the Novosibirsk Oblast party committee; A. Popovich, instructor in the Science and Educational Institutions Department of the CPSU Central Committee; V. Vashchenko, chief of the Scientific Organizational Administration of the USSR State Committee for Science and Technology; A. Trofimuk, academician, first deputy chairman of the Siberian Department of the USSR Academy of Sciences, and director of the Geology and Geophysics Institute; D. Belyayev, academician, deputy chairman of the Siberian Department of the USSR Academy of Sciences, and director of the Cytology and Genetics Institute; Ye. Shemyakin, corresponding member of the USSR Academy of Sciences, deputy chairman of the Siberian Department of the USSR Academy of Sciences, and director of the Mining Institute; G. Boreskov, academician and director of the Catalysis Institute; A. Skrinskiy, academician and director of the Nuclear Physics Institute; Yu. Nesterikhin, academician and director of the Automation and Electrometry Institute; A. Rzhanov, corresponding member of the USSR Academy of Sciences and director of the Semiconductor Physics Institute; E. Golland, candidate of technical sciences and senior scientific associate at the Economics and Organization of Industrial Production Institute; A. Maslov, first secretary of the Sovetskiy rayon party committee in Novosibirsk; G. Golovachev, chief of the Science and Educational Institutions Department of the Novosibirsk Oblast party committee; V. Kazarezov, chief of the Machine Building Department of the Novosibirsk Oblast party committee; V. Zav'yalov, director of the "Sibelektroterm" [Siberian Electrical and Thermal Power] Production Association under the Ministry of the Electrical Equipment Industry; B. Prilepskiy, candidate of economic sciences and director of the Berdsk Chemical Plant under the Microbiology Industry Main Administration; A. Burdukov, doctor of technical sciences and chief of the Power and Chemical Machinery Special Design Bureau under the Ministry of Chemical and Petroleum Machine Building; V. Bushuyev, doctor of technical sciences and director of the Siberian Power Engineering Scientific Research Institute under the USSR Ministry of Power and Electrification.

In opening the meeting, Academician V. Koptuyug stressed: "The 26th CPSU Congress gave large-scale science an important assignment--in addition to working out fundamental problems, attention should be focused on research that can help bring about revolutionary transformations in production. No matter how successfully science develops, we as scientists can consider that we have carried out our duty only when the achievements of science are incorporated into the national economy rapidly and on a broad scale. Therefore, let us attempt to discuss the following with representatives from industry: how can we make the mechanism of incorporating scientific developments more reliable, flexible, and practical?"

In general terms, the meeting participants did not have any difficulty answering this question: for incorporation to no longer be a problem, production should have incentives for putting scientific achievements into practice. Indicators used to evaluate the activity of enterprises and sectors should be oriented in this direction. As it is, the existing indicators promote incorporation primarily when the new development does not require a radical reorganization of production, but still helps the enterprise increase its output or fulfill the plan with lower costs. These same indicators can be a hindrance if a fundamentally new process needs to be put into operation or if some new equipment is being put into production.

The round table participants tried to uncover the roots of this phenomenon by looking at the example of the industrial electron accelerators that were developed at the Nuclear Physics Institute almost 10 years ago. In describing them, Academician A. Skriskiy said that the institute seemed to have done everything to see that their incorporation went smoothly. The institute did more than just work out the technical specifications; using its production base it manufactured about 70 of these units which demonstrated their high efficiency in a wide range of industrial sectors.

V. Koptuyug said, "In the electrical equipment industry alone the use of these accelerators in manufacturing cable products has already resulted in a savings of more than 100 million rubles. In spite of this, the Ministry of the Electrical Equipment Industry only recently decided finally to organize production of accelerators using the Novosibirsk "Sibelektroterm" [Siberian Electric and Thermal] and "Elektroagregat" [Electrical Machinery] production associations as a base. What is the reason for this?"

In response, V. Zav'yalov, director of the "Sibelektroterm" Association said, "Don't forget that it's the cable producers who profit from the use of the accelerators, and it's our subsector that has to make them. Even though we're under the same ministry, each organization has its own assignments, its own plan, and its own indicators. Here we have been strongly discouraged from altering existing methods. But that is not the only problem. The "Sibelektroterm" Association manufactures powerful steel smelting furnaces and other metallurgical equipment. Because of this "piecemeal" type of production, we are accustomed to the inevitable reorganization of production. We are glad to cooperate with science when we see a possibility for increasing efficiency or improving product quality. But the production of accelerators is a special problem. It requires extensive cooperation, the assimilation of fine technological processes, and special assembly conditions. In other words, this fundamentally new process requires a huge amount of organizational work, which unfortunately is not taken into account when the enterprises' normative net production is being evaluated."

V. Vashchenko, chief of the Scientific Organizational Administration of the State Committee for Science and Technology, pointed out, "Nonetheless, both the ministry and your association finally decided to produce the accelerators. Does that mean that the question could have been resolved earlier?"

V. Zav'yalov answered, "When we are talking about a fundamentally new process, the ministry's staff also needs time to evaluate its advantages. We reached an

agreement because we had to start producing new industrial laser equipment, which is quite similar in "spirit" to the accelerators. I won't hide the fact that the oblast party committee gave the association this assignment; it was following recommendations made by scientists..."

V. Bokov, secretary of the Novosibirsk Oblast Party Committee, pointed out, "In its decisions our party has always stressed the need to increase responsibility for pursuing statewide interests, and to make decisive moves to eradicate bureaucratism and self-centeredness. We are, of course, trying to utilize the scientific potential of the Siberian Department to help solve the problems facing the oblast. At the same time we are directing collectives toward, and when necessary, questioning ministries about the incorporation of promising developments that are of statewide importance. In the final analysis, this type of approach will benefit our enterprises as well: by incorporating fundamentally new techniques into production, they can, as a rule, enter a qualitatively higher level of production..."

#### Incentives for Incorporation

A. Rzhanov, director of the Semiconductor Physics Institute and corresponding member of the USSR Academy of Sciences, raised the following question: "We are always counting on organizational measures. And we pass over instruments such as price, profit, and deductions for enterprise and ministry funds. These are instruments that can and should encourage technical progress."

V. Bushuyev, doctor of technical sciences and director of the Siberian Power Engineering Scientific Research Institute, expressed some doubt about this: "We can hardly place great hopes on economic levers when there are still shortages of many types of products. Why should enterprises renovate production when they have a guaranteed market anyway?"

V. Koptyug entered the debate and said, "Everything depends on the conditions under which the levers are introduced. A system can be introduced in which the length of time that each article is produced will consist of three stages, each of which is reflected differently in the enterprise's economics. At the first stage after a new article is put into production, the maximum deductions for the enterprise's benefit should be made so that there will be rapid compensation for expenditures on assimilation of the new article. At the second stage, the deductions decrease, but they remain at a level that will stimulate growth in the output of the new article. Finally, at the third stage the deductions should drop off rapidly to zero or even to some negative value--that is, they can be turned into fines for producing outdated articles.

"In anticipation of this, enterprises will make the preliminary preparations for assimilating new products, and will raise the issue of reconstruction and technical re-equipment before the ministries. And accordingly, ministry personnel will start thinking about these measures ahead of time. With regard to prices, when there is a shortage of a product, the prices cannot be reduced as rapidly. The difference between sale and deductions should be covered by the state budget..."

This suggestion raised a number of questions. How are the boundaries between the stages to be defined? Why should a product be changed if there is a demand for it?

In response, V. Koptuyug said, "With the immense scale on which our economy operates, demand cannot serve as a justification for production if the product is obsolete. Constant improvement of machinery, instruments, equipment and materials is one of the mandatory conditions of technical progress. The boundaries between stages should be determined depending on the extent to which the product corresponds to the world technical level..."

Deductions for enterprise and ministry funds depend directly on prices for new products; the meeting participants devoted particular attention to the incentive role played by these prices.

A. Skriniskiy said, "For example, polymer materials that undergo processing by electron clusters in accelerators acquire increased durability and stability. Because of this they have an immense economic impact in those sectors of industry in which they are used. Chemists, however, assert that it is not profitable for them to produce these materials..."

B. Prilepskiy, director of the Berdsk Chemical Plant, said, "Unfortunately, the existing price formation system often fails to stimulate new products. We can see evidence of this in the example of the growth factor developed by scientists in the Siberian Department. It is absolutely clear that at the first stage of production any new preparation is going to be expensive to produce. This was the case with antibiotics, the cost of which later dropped to one-fifth the original level. In order for enterprises to undertake production of fundamentally new items, prices for new products should be established in direct correlation to the product's technical level and its final effectiveness on a national economic scale..."

A. Skriniskiy said, "I'm afraid that this measure also fails to solve the problem. I had a discussion with personnel at the State Planning Committee regarding increasing prices for materials improved by irradiation. They told me: when the chemists come out with a proposal, we will support it. But the chemists are in no hurry to raise the issue, even though a considerable profit is involved."

B. Prilepskiy explained, "That is probably because a price increase would deprive them of a forceful argument that helps them decline from complicated production. A profit incentive will not mean anything to an enterprise without any reserve capacities. There could be a huge profit, but if the plan is not met by even one percent, the enterprise automatically falls into the category of enterprises that are lagging behind quotas and it is faced with all the consequences stemming from this categorization."

In discussing this issue, the round table participants reached the following conclusion: in order to be successful in resolving problems of scientific and technical progress, the planning system should call for certain reserve capacities. Without reserves we deprive ourselves of the opportunity to utilize all the advantages of our system of management.

Therefore, the deduction system should motivate enterprises to renovate production; prices for products should encourage the assimilation of innovations; and planned reserve capacities should provide the opportunities to do this. There is still one more condition, however. The successful assimilation of developments made by academic institutes depends to a great extent on how well they have been prepared for practical incorporation into production.

#### Intermediaries or Rivals?

A. Rzhanov stated, "If we want industry quickly to solve the problem of incorporating our developments, we must change our notion of the final 'product' of academic science. What do we usually appeal to ministries with? Reports on research results? New substances in test tubes? A model of a new instrument? Hardly anyone today would take results like this seriously. The accelerators received recognition because the Nuclear Physics Institute was able to manufacture them using its own production base and it was able to test them in various sectors. Only one conclusion is possible: in order to step up incorporation of results, academic institutes should have their own design bureaus and experimental production facilities.

V. Vashchenko asked, "It is obvious that there is a need to develop an experimental production base for academic science. But to what extent? We have powerful industrial science facilities that can handle the applied part of the work. And around Akademgorodok [Academic Village] a whole special complex has been created for industrial scientific research institutes and design bureaus. This complex has been named the 'incorporation belt'".

A. Rzhanov pointed out, "Unfortunately, far from all the industrial organizations, including those located in the 'incorporation belt', have agreed to perform the role of intermediary between academic science and production."

V. Koptuyug explained, "When the 'incorporation belt' was being created, the basic idea was to form scientific research institutes and design bureaus that were under dual authority. The plan was that in scientific terms they would orient themselves toward the research of academic institutes and then, picking up the baton, they would find practical applications for the research results. At the beginning, this is how things actually worked. It is no coincidence that the organizations in the 'incorporation belt' during the last five-year plan alone had an economic impact of more than one-quarter billion rubles. But the stronger these industrial scientific research institutes and design bureaus became, the less important became their role as intermediary. Ministries also started to burden them with their own current problems..."

Academician Yu. Nesterikhin, director of the Automation and Electrometry Institute, explained, "In order to move our ideas and developments into industry, we are making direct contacts with enterprises. For example, at one of them we set up an intersectorial design department made up of associates of the institute and specialists from the plant. This department started on experimental design work practically immediately after receiving research results from our institute. This organization provided substantial benefits in

terms of time: the period from development of a number of devices to assimilation of their industrial production was reduced from the traditional 5-7 years to 1-1.5 years. The department was later turned into an industrial institute. But, a path this smooth is not always possible..."

A. Burdukov, doctor of technical sciences and chief of the "Energokhimash" [Power and Chemical Machinery] Special Design Bureau, which is part of the "incorporation belt", said, "Almost half of the work outlined in our plans is based on the results of academic science. For example, high efficiency plasma processing methods for various production processes have been and are still being created on the basis of research and developments done at the Thermal Physics Institute. There is a real danger, however, that this type of work will begin to decline. As a rule, the development of promising ideas involves a certain amount of risk, and it requires time. But the economic mechanism of industrial science provides for incentives and payment only for completed work. This means that industrial scientific research institutes and design bureaus gladly take on small assignments that can be completed within a year. And they will do everything to decline from taking on complex, yet important, tasks..."

A. Rzhanov suggested, "If this mechanism is the product of objective production requirements, then one needs to think about transferring the 'incorporation belt' scientific research institutes and design bureaus to the Siberian Department. This is all the more important since it is difficult for these collectives to go beyond the bounds of their own industry. One of the main advantages of academic developments is that they can be utilized in several industries."

E. Golland, candidate of technical sciences, expressed some doubts about this: "Is it really necessary to transfer these organizations to the Siberian Department? The process of incorporation requires ten times more effort, means, and resources than the research itself. This is the source of the danger that practical work will keep fundamental science tied to the ground. It seems to me that it would be better for the 'incorporation belt' scientific research institutes and design bureaus to be subordinate to the State Committee for Science and Technology..."

In response to this, V. Vashchenko said, "We often hear suggestions that some scientific research institutes or design bureaus be transferred to the State Committee for Science and Technology. But to what extent are these suggestions warranted? After all, the necessary conditions must be created so that the committee will be able to guarantee their development and to provide them with all the essential materials. At the same time, this kind of reorganization threatens to disrupt thematic orientation and to break traditional ties. Wouldn't it be easier to improve the existing structure?"

Academician G. Boreskov, director of the Catalysis Institute, remarked, "The whole point is how can this be achieved? Our most promising operations are directed at a particular industry. The shortest path for their incorporation is to work in cooperation with the chief scientific research institutes. Some time ago, however, many of these industrial organizations started to believe that industry should develop only in accordance with the organizations' own developments. They often view us as unwanted competitors..."

The position of the chief scientific research institutes has been discussed in the press repeatedly. Having focused their attention on managing production, many ministries and industrial associations granted these scientific research organizations the right to evaluate and make decisions about all innovations that are received "from the outside". Some of these "chief" institutes started to operate according to the principle that "everything that isn't ours is bad". Because of this, the incorporation of promising developments is often delayed since they have to be "pushed through by force". Or, in order to by-pass the chief scientific research institutes, the developers limit themselves to incorporation of innovations at individual enterprises, even though the effect on an industry-wide scale could be much larger.

In their statements the round table participants stressed that successful cooperation between academic and industrial science depends to a great extent on the position of the ministries. With the aim of saving manpower, time, and means, the following rule should be followed: before ministries give assignments to industrial scientific research institutes and design bureaus, they should investigate to see whether the necessary solutions are available in academic science or in VUZes. If the necessary solutions do exist, the ministries should orient their organizations toward working out the final details.

V. Koptuyug said, "We are not saying that industrial science should be denied the right to carry out exploratory research. Strong collectives have emerged in industry, whose developments meet the highest requirements. But, when the issue is incorporation, and there are several suggestions, including some 'from the outside', the best of them should be chosen on the basis of general state interests, taking into account its prospects and export possibilities. In other words, the decision to incorporate major developments should always be based on the results of intradepartmental evaluations, with the participation of representatives of the State Committee for Science and Technology, the USSR Academy of Sciences, the State Committee for Standards, and the State Committee for Inventions and Discoveries..."

#### On Combined Programs

How should the efforts of academic science, industrial scientific research institutes and design bureaus, and enterprises be united when the issue is incorporation of interdepartmental developments? Or, when the issue is incorporation of developments that are so innovative they do not yet have their "own" industry? A problem of just this nature is obtaining liquid fuel from gas and coal.

This problem was discussed at the 26th CPSU Congress and it was included in one of the combined programs of the State Committee for Science and Technology. In working on this problem, the Catalysis Institute stepped up its research and within two years came up with three possible processes. It turned out, however, that there was no one to whom these proposals could be given for further development and incorporation. The question of who would produce the synthetic fuel also remained open for a long time. As a result, this important work started to slow down. The Ministry of the Gas Industry acted more

practically than the other organizations: it decided to organize production of liquid fuel from a gas condensate in northern regions where liquid fuel has to be shipped in.

Academician A. Trofimuk, director of the Geology and Geophysics Institute, stressed, "Our main hopes, after all, are pinned on obtaining liquified fuel from inexpensive coal. It seems that in light of this there are plans to do something useful--to create the Combined Use of Kansk-Achinsk Coal Institute. But under whose authority are they placing the institute? The Ministry of the Coal Industry? In addition to coal extraction, this ministry has also taken on the production of mining equipment. Does it have enough resources to organize the production of synthetic fuel? I doubt it. It is no accident that the new institute is involved primarily in current tasks of the coal industry. In order to focus work on the intersectorial, combined problem, the institute should be removed from the sphere of departmental influence. Then there would be a real hope that the institute could prepare a scientific and technical base for creating a new industry--coal chemistry. And the combined program would then gain a foothold..."

V. Koptuyug stressed, "In our opinion, the combined programs of the State Committee for Science and Technology are the primary 'instrument' for solving major intersectorial problems. This mechanism is now in the improvement stage. We must think about how it can be made more effective..."

Ye. Shemyakin, corresponding member of the USSR Academy of Sciences and director of the Mining Institute, voiced his opinion: "In order to do this, we must return to the principles that gave rise to the idea of combined programs. To reduce the time needed to solve major problems, not only do we need to coordinate efficiently the efforts of many collectives, we also need to provide the best possible working conditions for them. We must make it a priority to provide financing, material and technical supply, and construction of testing installations and experimental production operations. Then the employees of scientific research institutes, design bureaus, and enterprises will feel a heightened sense of responsibility for fulfilling the program goals. And consequently more can be demanded of them..."

V. Zav'yalov pointed out, "Ministry employees still have just about the same attitude toward the combined program goals as they do to the plans for new equipment and techniques. In the worst case, they will only get a mild scolding for any failure to fulfill the quotas or goals. Our 'Sibelektroterm' Association, for example, is participating in a combined program which calls for the production of industrial laser instruments for strengthening parts by the end of the five-year plan. Up until this year everything was proceeding according to the plan: scientists developed and we manufactured experimental models of the instruments that are already undergoing testing. But a special shop needs to be built for series production of the instruments. The means for construction of the shop have not yet been allocated. What's worse, because of this no planning assignment has even been issued..."

V. Vashchenko asked, "How, in your opinion, can we increase the responsibility of ministries and departments for the fulfillment of program goals?"

V. Zav'yalov responded, "It is possible that like the situation with robots and manipulators, the combined program goals should be set aside in a separate section in the plans of ministries and departments. On the other hand, it is difficult to resolve such large intersectorial problems without practical administrative organs. Therefore, working groups should be formed under the State Committee for Science and Technology; they should be headed by program directors who have been given direct control over the course of their work."

In analyzing the various aspects of the problem of incorporation, the round table participants did not neglect the role of local party and soviet organs. With their active support an extensive search is going on for new forms of cooperation between science and production. Cooperation on a regional basis is one of these new forms. For example, an intersectorial coordinating center was formed in Novosibirsk for the application of protective surfaces on machinery parts. In Tomsk Oblast, cooperative work is being carried out successfully on incorporating powder metallurgy and automation of industrial processes. In Irkutsk an association of chemistry institutes and enterprises has been formed; among other important tasks, it is working on the complex processing of cellulose.

In addition to this, those speaking at the meeting pointed out that the immense potential of academic science is still far from being completely utilized. In analyzing ways to resolve this problem, they repeatedly referred to the statement made by comrade Yu. V. Andropov: "If we want to really advance the cause of incorporating new techniques and new labor methods, central administrative organs, the Academy of Sciences, the State Committee for Science and Technology, and ministries need to do more than just provide propaganda for them; they need to uncover and eliminate specific obstacles that are hindering scientific and technical progress. Planning methods and a material incentive system should promote the union of science and production". We can hope that the suggestions made at the round table meeting will speed up the resolution of this problem.

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CSO: 1814/53

## TECHNICAL AND ECONOMIC INDICATORS FOR INDUSTRIAL TECHNOLOGICAL INSTITUTES

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 11, Nov 83 pp 78-82

[Article by Yu. Berliner, department chief of the Means of Mechanization and Production of Instruments Industrial Association]

[Text] In accordance with the course worked out by the 25th and 26th CPSU Congresses for intensification of national production, there has been a substantial increase in the use of scientific and technical achievements in the national economy. Successful fulfillment of the goals that have been set will depend to a great extent on creating economic and organizational conditions at enterprises and organizations that will encourage high-quality, productive labor, initiative, and an enterprising spirit. In the final analysis, the level of efficiency at every enterprise and organization will depend on this. Furthermore, as was pointed out in the decree issued by the CPSU Central Committee and the USSR Council of Ministers "On Measures to Step Up Scientific and Technical Progress in the National Economy", the existing system for evaluating the results of economic management at enterprises and organizations does not have a sufficient influence on stepping up the development of new equipment, materials, and technology. This is also true of the existing system for evaluating the activity of industrial technological organizations.

The effectiveness of industrial scientific research and planning technological institutes depends to a great extent on an objective evaluation of their work, and in particular, on the practical application of fundamentally new planning indicators and economic norms. In accordance with the provision currently in force\*, the institutes' activity is evaluated on the basis of a system of indicators that describe the scientific and technical level and effectiveness of incorporating the research and developments that have been completed at the institute; the fulfillment of the thematic plan; the effect of the scientific research institute on the technical and economic level of production in the corresponding sector (or subsector); and the organization's scientific and technical potential. The effectiveness of expenditures on research and

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\*"A system for evaluating the scientific and technical activity of scientific research, planning and design, and planning and technological organizations", approved by a decree issued by the State Committee for Science and Technology and the USSR State Committee for Inventions and Discoveries on 22 August 1974.

development is to be determined by comparing the economic effect obtained in the national economy as a result of incorporating the developments with the organization's expenditures that made this effect possible.

Intensification of the economy and increasing its effectiveness, together with rational utilization of manpower and material resources have made it necessary to refine the technical and economic indicators used to evaluate institutes' activities so that they reflect the priority tasks facing industry. Experience shows that indicators such as economic effect obtained in the national economy as a result of incorporating finished developments and the economic effectiveness of expenditures on research operations, are inadequate for describing the activities of scientific research institutes.

In recent years, several ministries have started to plan and evaluate the effectiveness of institutes' work by using a number of additional indicators along with those mentioned above. The Ministry of the Electrical Equipment Industry, for example, has started using the real savings of material and manpower resources at institutes' enterprises as one of the main criteria for evaluating the work of scientific research institutes. They carry direct responsibility for the technological level of production. The Ministry of Construction, Road and Municipal Machine Building evaluates the work of technological institutes on the basis of indicators such as economic effectiveness, reduction in production costs, technological labor-intensiveness, savings of material and power resources, to what extent workers are freed up, transferring workers from manual labor to mechanized processes, reducing (freeing up) multi-purpose machine tools and other equipment.

Control operations that determine to what extent the work done meets technical requirements are an integral part of any industrial process. Special and multi-purpose measurement instruments are used for this. Technical and economic indicators can be used by institutes as instruments of this nature to reflect the effectiveness of the institutes' activities. The aim is not only to determine the results of their work, but also to control the work and see that the required level is reached. This is possible when there is directive planning of the indicators of scientific research institutes' economic effectiveness.

These indicators are not planned, however; the actual indicators obtained are used in the account, which does not provide the necessary conditions for the organizations' directors to make administrative decisions. There is a practical need to resolve this problem because of the interconnection between the planning of scientific and technical activity and its effectiveness.

Taking this into account, the Ministry of Heavy and Transport Machine Building introduced a system of technical and economic indicators for evaluating the effectiveness of institutes' work and a system was set up by which a higher organization carries out planning activities. The activity of scientific research institutes is evaluated on the level of an all-Union industrial association in terms of its economic effectiveness in the national economy and in its sector; the reduction in production costs and labor-intensiveness; how many workers are freed up; and how much metal, including rolled metal, is

saved. These criteria fully reflect the basic directions of the state's efforts to find reserves for further advances in industrial production.

Plans are made for the effectiveness of finished developments (the expected effect), and for incorporated developments (actual effect). An analysis of the economic indicators of finished projects makes it possible to evaluate an institute's scientific potential, the prospects for its developments, and the course of technical progress in the sector's enterprises. The actual effect of utilizing developments to improve technology, mechanization, and automation is included in the scientific research institute's report at the end of a year's period from the time the incorporation document was authorized.

The general criterion for effectiveness is the total economic effect from developments that have been incorporated and utilized; it is expressed in terms of the return per 1 ruble of expenditures and can be calculated in two different ways: the effect per 1 ruble of expenditures on maintenance of the institute; the effect of incorporation (per 1 ruble of the institute's expenditures) using the institute's own resources after a deduction has been made for expenditures on operations not included in the determination of the economic effect. The second variation is especially important. According to directive documents, these operations should not account for more than 20 percent of the total volume of work in an institute's plan. Included in this group of operations are the preparation of annual plans for scientific research and development, experimental design work, and planning and technological operations; preparation of reports on fulfillment of these plans; and preparation of various normative, reference, and methodological materials, etc.

In order to reach the assigned technical and economic indicators, the institutes' collectives had to think through very carefully their research topics and create conditions that would help increase the return on their work. Considerable attention was given to scientific and technical projects already in progress that would bring technological progress; developments that had already been completed and incorporated were reproduced and circulated, which made it possible to achieve a high degree of effectiveness with lower costs. There is also a change in the approach taken toward formation of a thematic plan. The primary goal is not to base a plan on a specific sum, but to raise technical and economic indicators and the quality of the developments.

The scientific and technical work already in progress made it necessary not only to re-examine the thematic plan and to exclude from it those operations that could be performed by plant services, but also to create the necessary conditions for realizing themes directed at incorporation into production of technological processes that correspond to the best worldwide and domestic models and that guarantee the production of high quality articles. The laboratory bases of scientific research institutes have been strengthened and experimental plants have been built. As a result, institutes are developing new technological processes and equipment and they are providing enterprises not only with the technical specifications, but also with metal equipment and accessories.

There is a simultaneous rise in labor productivity among institutes' scientific associates. Serving as a basis for this increase were: standard design and

technological solutions; reproduction and circulation of developments at several of the sector's enterprises; analytical calculations using computer equipment; improvements in the system of labor input; the signing of contracts for creative cooperation, etc. In 1982, measures taken to increase labor productivity at institutes of the Means of Mechanization and Production of Instruments Industrial Association resulted in a 10 percent increase in output per employee over the 1976 level.

Regulation of the content of directive thematic plans to be fulfilled by institutes, all-Union industrial associations, and ministry administrations is also of considerable importance. Scientific research organizations must be released from functions that do not really belong to them or that are the prerogative of enterprises.

The introduction of a system for planning technical and economic indicators at scientific research institutes forced their directors and collectives, as well as the higher administrative organs, to re-evaluate the existing structure of the institute and the direction of its research. Some collectives had been working for many years on one problem that lost its urgency long ago, and they had fallen into the study of trivial topics. Therefore, there was a need to make a prompt change in the direction of research and the organizational structure of the subdivisions; that is, planning had to be united in a practical way with scientific and technical and national economic goals.

Between 1979 and 1982, 60 structural subdivisions were rearranged, eliminated, or organized on a new basis. Primary attention was given to those subdivisions that did not correspond to the specialization of the scientific research institute; this increased the role and responsibility of the chief organizations for developing and incorporating advanced technology at the sector's enterprises. Topics with an economic effect of less than 30,000 rubles were excluded from the plan. Topics were re-evaluated on the basis of how well they meet the priority demands of production and the prospects for its development.

Certain complications arose in connection with the selection of a basis for technical and economic goals. At the first stage, they were based on average results of institutes' activities over recent years; future planning would take into account indicators from the country's leading scientific collectives, as well as an increase in the level of specialization at scientific research institutes, a rise in the number of developments that are reproduced and circulated, etc. These goals were coordinated with enterprises' plans for incorporating new technology, since the primary goal of industrial institutes is to raise the technical level of production.

An analysis shows that when an institute has one-fifth as many employees as the enterprises in the industrial production association with which it is associated, the scientific research institute's share of the quotas is as follows: for reduction of production costs--25 percent; for saving metal--9 percent; and for freeing up workers--23 percent. These average data can form the basis for long-range planning of indicators, but in annual plans an individual approach must be taken in each specific case.

This level of technical and economic indicators is possible only when plants are attached permanently to an institute, which is rare. When scientific organizations specialize in certain technological redistributions and directions, work is done not only at enterprises that are part of the institute's industrial production association, but at other enterprises in the sector. The latter can account for as much as 50 percent of the institute's total volume of work. Furthermore, academic, intersectorial, and specialized institutes from other ministries and departments, as well as VUZes, also participate in the development and incorporation of new technology at the sector's enterprises. Often expenditures on this work account for up to 30 percent of the total expenditures on new technology at a given enterprise.

Consequently, certain difficulties arise when industrial institutes establish valid goals for technical and economic indicators that depend on the goals of the sector's enterprises. In our opinion, quotas for economic effectiveness, reduction in labor-intensiveness, freeing up workers, and economizing on metal could be planned in proportion to expenditures on new technological measures that are carried out by various parties. It is well known, however, that the economic effect of introducing such measures does not depend directly on the size of the expenditures. Therefore, additional experience in planning technical and economic indicators certainly will make it possible to work out more specific recommendations.

The basic standard for optimal planning of technical and economic quotas can still be a regulated indicator of the economic effect from developments incorporated at the sector's enterprises (per 1 ruble of expenditures by the institute) using their own resources, after deduction of expenditures on work not involved in the calculation of the economic effect. With the aim of comparing this indicator at various scientific organizations, these expenditures do not include the following: economic incentive funds formed by means that were included in the estimated cost of the work; the cost of experimental models, produced using the organization's own resources, technological accessories, and nonstandard equipment; the financing provided for work performed by outside organizations; or costs involved in the formation of a savings fund. The work of leading industrial institutes shows that the economic effect of incorporated developments is between 2.4 and 2.6 rubles per ruble of expenditures.

Depending on the annual selection of topics and directions, the size of the components of the economic effect can vary (i.e., the reduction in production costs, labor-intensiveness, economizing on metal, etc.) The economic effect of incorporated developments as a whole, per 1 ruble of expenditures should be equal to that described above.

Planning of technical and economic indicators made it possible to take a new approach to evaluating the effectiveness of institutes' work, and to do a better job of revealing shortcomings in the assimilation of innovations. At the same time, some people expressed the opinion that the new system could lead to the pursuit of trivial topics, as a result of which an institute (and then the sector) would suffer a loss of prestige and would be deprived of prospects for scientific and technical change.

The topics pursued by technological institutes can be divided into three categories: research work tied to the creation of new technological processes; technical and economic topics that offer prospects for developing the sector (or subsector), plans for incorporating new equipment and technology, calculation of the utilization of production capacities, norms for the expenditure of material resources, etc.; technological and design developments directed at creating progressive technological processes and equipment.

It is obvious that the planning of effectiveness indicators cannot be applied to the first two categories of work, which do not offer any real economic effect upon completion. Technological and design developments, however, do provide a real economic effect in terms of their content and direction, so the new system can be applied to this type of work.

An analysis shows that institutes are not making full use of their possibilities for conducting investigative research and for development of new technological processes and equipment. As a rule, this type of work accounts for 9-15 percent of all the work done and the direction, content, and results of this work leave much to be desired. The problem is more often a lack of specific proposals for research on long-range topics, rather than a shortage of time or resources.

Therefore, introduction of a new system also requires a new approach to fulfilling the prospects for institutes' activities. In our opinion, the basic directions should be: the creation of scientific and technical projects in progress that will account for up to 20 percent of the total volume of work; broad reproduction and circulation (incorporation) at the sector's enterprises of developments already completed; greater specialization; concentration of efforts on the creation of fundamentally new technological processes that will provide a significant economic effect.

The planning of technical and economic indicators also required a change in the organizational principles governing the management of subdivisions of scientific research institutes, and a new approach to analyzing their activity. Technical and economic assignments are divided up among an institute's basic subdivisions. The assignments that each of the subdivisions are given for fulfilling technical and economic indicators make it necessary for all the employees to increase their creative activity and to seek out reserves for production effectiveness.

One of the most important problems is the assimilation of innovations. The decree issued by the CPSU Central Committee and the USSR Council of Ministers "On Measures to Step Up Scientific and Technical Progress in the National Economy" notes that ministries and departments are obliged to take decisive measures to strengthen all the links involved in creating and introducing new technology. Special attention should be given to implementing economic and moral measures that will encourage everyone involved in the process to renew equipment and technology.

Often the technical level of production is kept from advancing not because of a lack of new ideas, but because of unsatisfactory assimilation of new developments. Without going into a detailed analysis of this situation, we

will point out that with planning of technical and economic indicators at scientific research institutes, these problems are being dealt with more energetically. A plan is being worked out for incorporating finished developments, in addition to a plan for providing set technical and economic indicators for the plan year. The plan for incorporating finished developments is coordinated with plans for new technology and for carrying out the sector's most important projects; it is included in orders issued by the ministry. Implementation of these plans will provide an uninterrupted connection between the development and incorporation of innovations.

The issue of thematic planning at institutes is also of considerable importance. The system for including in the thematic plan work performed in accordance with economic agreements with enterprises is well known. In this situation the scientific research institute is governed primarily by its assigned specialization, as well as by the assignments given by its customers. The situation is somewhat different when the assignments come from ministry associations and administrations. In a number of cases these assignments involve a single task. Permanent groups, or sectors are organized at the institute to carry out these assignments; often after the necessary work has been completed, these groups continue to work on a topic that is no longer important. Therefore, with the aim of organizing institutes' thematic plans, it was determined that assignments would be included in these plans only when the original requirements authorized by the customer were present, reflecting the necessary volume and deadline for carrying out the work, the financing sources, material incentive funds, etc. As a result of this, in recent years there has been a drop in the proportion of "initiative" projects and their cost; and there has been a rise in the proportion of topics that are aimed directly at creating new technology.

A system for planning technical and economic indicators for institutes' activities would be inconceivable without a careful examination of the results of incorporating scientific and technical measures at all levels of management. On a statewide scale, the first step in this direction was taken by the USSR Central Statistical Administration when it introduced at enterprises and organizations the practice of reporting the results of incorporation on a standard interdepartmental form. The form calls for indicators such as the economic effect, the savings from lower production costs, and the number of workers that have been freed up. The data in the report are confirmed by the enterprise's engineering, planning, and financial services.

Now all institutes make quarterly (for reference), semi-annual, and annual reports to their industrial production association on the technical and economic indicators that have been obtained for finished and incorporated developments and there is periodic monitoring (once every two years) of the documents dealing with the introduction of scientific and technical measures at enterprises. These documents are reviewed in the presence of representatives from the institutes, which provides an opportunity for an objective evaluation of specific measures that are being implemented to introduce new technology.

A unified set of terms for technical and economic indicators makes it much easier to resolve the problem of comparative evaluation of the activities of scientific research institutes, and determining ways to improve their work.

The evaluation period established by the existing provision, however, (once every 3-4 years) can hardly be considered optimal, especially for industrial institutes. This is the case because the annual plans for new technology, as well as the long-range plans, that are worked out by all-Union industrial associations and enterprises and are tied to more detailed determination of the material and financial resources they have been allocated and to more detailed determination of the indicators of economic activity, also make the corresponding refinements in the operating plans of industrial scientific organizations. All this makes it necessary to carry out an annual evaluation of institutes' technical and economic indicators. The system adopted by the Ministry of Heavy and Transport Machine Building for evaluating the indicators by summarizing the results of socialist competition among scientific research institutes for periods of six months and one year makes it possible to make practical management decisions.

Organizational planning of technical and economic indicators is carried out within the framework of five-year and annual plans, which are elements of the general plans for the collectives' economic and social development. Institutes are informed of the annual indicators before they start putting together their thematic plan for the given planning period. The annual indicators that are given in the five-year plans are refined every year on the basis of results that have been achieved in effectiveness and specific assignments for new technology. Within the framework of the annual plan organizational and technical measures are worked out that will ensure fulfillment of the technical and economic goals for the plan year, as well as for the subsequent years of the five-year plan. Specifically, plans for the incorporation of developments made by scientific research institutes are coordinated with enterprises and confirmed; sources for meeting expenses involved in new technology are determined with the help of functional administrations and all-union industrial associations; basic directions for future development of enterprises and the amount of and deadlines for capital construction and technical re-equipment of production as a whole and in individual shops are coordinated with planning institutes, plants, and industrial production associations; and deadlines are set for the delivery of special equipment.

Measures that are being implemented to improve the planning of institutes' effectiveness and the system for awarding bonuses to their employees cannot help but affect the results of scientific research and planning and technological developments. For example, compared to 1976, in 1982 the estimated cost of work performed increased by 123.4 percent; the volume of incorporated work increased by 128 percent; the actual economic effect confirmed by plants resulting from the incorporation of innovations increased by 152 percent. During the same period the total bonuses awarded increased by 144 percent; this included a 101 percent increase in the bonuses awarded to institute directors; a 131.3 percent increase in bonuses awarded to chiefs of major departments; and a 150.7 percent increase in the bonuses awarded to those performing the work. The qualitative aspect of means paid out from economic incentive funds is also characteristic: bonuses paid for the creation and incorporation of new technology increased by 146.4 percent and bonuses for fulfillment of the quarterly plan increased by 117.6 percent. Also noteworthy is the fact that the increase in the size of the economic incentive funds was

due primarily to an increase in the amount and effectiveness of work done to develop and incorporate new technology.

Thus, the planning of technical and economic indicators for industrial technological institutes makes it possible to improve their work substantially, to strengthen their ties to production, and to increase their role in raising the technical level of production. This type of planning will help to realize the decree issued by the CPSU Central Committee and the USSR Council of Ministers "On Measures to Step Up Scientific and Technical Progress in the National Economy", which set the goal of achieving a cardinal increase in labor productivity on the basis of broad practical incorporation of scientific and technical achievements and advanced methods.

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## BELORUSSIAN METALLURGISTS COLLABORATE WITH PRODUCTION WORKERS

Moscow EKONOMICHESKAYA GAZETA in Russian No 33, Aug 83 p 9

[Article by Ya. Glezer, Minsk: "The Collaboration of Scientists and Production Workers"]

[Text] The collective of the Belorussian Scientific-Production Association for Powder Metallurgy is conducting joint studies with organizations of 15 ministries. This NPO [scientific-production association] is going through the period of becoming established.

Its composition includes: a scientific research institute, special design-technological office, test-experimental proving ground, and a plant for the production of articles from metal powder which is under construction in the city of Molodechno. The NPO is organizing its work in accordance with the territorial inter-branch principle. It delivers articles made of powdered metal to the "BelavtoMAZ" [expansion unknown], the Minsk Tractor Plant imeni V.I. Lenin, "Gomsel'mash" [Gomel Plant for Agricultural Machine Building], "Beloruskaliy" [expansion unknown], the Mogilev "Khimvolokno" [expansion unknown], and other enterprises.

During the last two years personnel of the NPO have received more than 150 authors' certificates for inventions and have developed and put into operation 60 technological processes.

We will present several examples of the effectiveness of the creative collaboration of the scientists and production workers. At the Borisov plant for automotive electrical equipment test models of starters with a collector which have been manufactured by a new process have been successfully bench tested. Now 450 grams of nonferrous metal are saved in the manufacture of each collector. On the basis of the annual program, many hundreds of tons are saved.

The NPO has established businesslike contacts with the machine-tool builders. For example, the technology for applying protective and hardening coatings to cutting tools from iron powder is being introduced in the Minsk association for the production of broaching lathes. As a result, the life of drills, tap borers, milling cutters, and cutting tools approximately doubled. And the consumption of high-alloy tool steels and hard alloys was reduced by more than half. In the Grodno production association for technological tools they have

succeeded in raising the utilization factor for metal from 0.45 to 0.92. The labor intensity of parts here was reduced approximately 1.5-fold.

The collaboration of the NPO with enterprises of the Ministry of Tractor and Agricultural Machine Building and the Ministry of Machine Building for Animal Husbandry and Fodder Production is developing fruitfully. Technological processes are being worked out for the manufacture of parts for tractors and agricultural machines of more than 30 items. The economic impact from the introduction of developments of the Belorussian scientists at enterprises of Minsel'khoz mash [Ministry of Tractor and Agricultural Machine Building] was 226,000 rubles last year. But this is only the beginning. A special-purpose combined plan was approved recently.

Displaying concern for raising the effectiveness of production directly at the machine-building enterprises, the association's scientists are devoting great attention to the development of basic research and the creation of new materials from powder compounds and new technological processes. In particular, work is being conducted on obtaining construction articles of complex form and friction and anti-friction materials which ensure operation under extreme conditions. Original means for mechanization and automation are being created.

Belorussian researchers are accomplishing a large volume of joint work within the framework of collaboration by CEMA member countries on the problem, "Powder Metallurgy." More than 200 foreign firms participated in the international exhibition which was conducted in Minsk. A representative symposium took place simultaneously.

Now the chief concern of the association's personnel is putting the Molodechno plant into operation on time. Construction of this enterprise with an annual capacity of 10,000 tons of articles from powder was begun a little more than two years ago. This year, the start-up complex for 5,000 tons of products is to be put into operation. The production of parts for 86 items for 8 ministries will be organized on the first production line.

Construction of the plant is being conducted according to the "Worker Relay Race" principle. Houses and institutions for social, cultural, and living conditions are being constructed simultaneously with industrial installations and the territory is being brought to good order.

Unfortunately, the schedule for turning over installations of the start-up complex has been disrupted.

From the moment of start-up, the plant requires iron powder in increasing quantity. The USSR Ministry of Ferrous Metallurgy initially determined the Sulinsky plant to be the main supplier of raw material. However, as was learned, this enterprise will not be able to provide the required powder next year. What was the way out? The USSR Ministry of Ferrous Metallurgy appointed a new supplier-- the Brovary plant near Kiev. But the problem has not been completely solved. There should be an examination and establishment once more as to which enterprises will provide powder to the Molodechno plant and in what quantity.

"In its socialist obligations," relates the general director of the association, O. Roman, "the collective has planned high goals. They have pledged to complete the annual thematic plan ahead of schedule and to obtain an economic impact of more than 14 million rubles from the introduction of scientific-research and experimental-technological developments into production. At the center of our attention is raising the scientific-technical level and the practical value of the innovations."

These days, competition is expanding in the subdivisions of the NPO. The fruits of the businesslike collaboration of the scientists and production workers will be even more ponderable tomorrow.

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## USSR CONFERENCE ON CONTROL PROBLEMS HELD IN YEREVAN

[Yerevan KOMMUNIST in Russian 13 Nov 83 p 2

[Article by Academician V. A. Trapeznikov, chairman of the organizational committee of the Ninth All-Union Conference on Problems of Management: "Management and Scientific-Technical Progress"]

[Text] The Ninth All-Union Conference on Problems of Management will open on 14 November in Yerevan at the Stepan Shumyan Palace. Such conferences are held regularly in our nation every three years. In their scales -- the number of participants and reports, duration, latitude of the program -- these conferences take place on the level of All-Union congresses.

Each of these conferences has been devoted to discussion of the increasingly complex problems that arise with increasing complexity of the tasks brought by requirements of the national economy. Typical in this respect is the change in titles of the conferences. The first was called a conference on automatic regulation (1940), followed in sequence by the titles "automatic control", "technical cybernetics", and now "problems of management."

The forthcoming conference has aroused great interest among the scientific-technical community. The number of applications for participation has far exceeded the capabilities of the organizational committee. The program committee of the conference is faced with the same problem. On the one hand, this has made their work more complicated, but on the other hand it has enabled them to select the reports that in greatest measure correspond to the tasks that have been set for the conference: discussion of the status of scientific work and directions most conducive to successful fulfillment of the resolutions of the Twenty-Sixth CPSU Congress, and of the November (1982) and June (1983) plenary sessions of the CPSU Central Committee, and orientation of scientists toward development of these directions.

Now that the Soviet people in completing the central year of the Eleventh Five-Year Plan are successfully handling the ambitious tasks in all areas of economic and cultural construction under conditions of drastically increasing complication of the international situation, conditions that are aggravated by the attempts of imperialism to slow down the forward movement of our nation, it is especially important to raise efficiency and quality of work in all elements of the national economy, to increase the productivity of labor, to

reinforce labor and production discipline. Here Soviet science has been called upon to play a special role, specifically and more particularly the science of management.

Party and governmental documents have given considerable attention to increasing the efficacy of management on all levels -- from automation of technological processes to the improvement of economic mechanisms. In a recent decree of the CPSU Central Committee and the USSR Council of Ministers on "Measures to Accelerate Scientific-Technical Progress in the National Economy", extensive automation of technological processes, the use of robotic complexes and computer technology was pointed out as one of the main directions of work.

Under these conditions, our conference takes on special significance. The keynote of the conference is "For Theory -- Practical Applicability; For Systems -- Ultimate Efficiency; For Facilities -- Maximum Reliability." Participating will be about 1000 specialists from 70 cities of all Soviet republics, representing numerous research institutes and design offices, plants and educational institutions. Among the participants are many eminent scientists, leading production teams and practicing specialists. Leading the discussions with reports and lectures will be academicians A. A. Voronov, T. I. Zaslavskaya, V. I. Il'ichev, V. S. Pugachev, associate members of the USSR Academy of Sciences I. I. Vorovich, I. M. Makarov, V. M. Matrosov, N. N. Moiseyev, D. Ye. Okhotsimskiy, Ye. P. Popov, G. S. Pospelov, K. V. Frolov, Ya. Z. Tsypkin, academicians and associate members of the academies of sciences of Soviet republics V. P. Zhivoglyadov, A. I. Kukhtenko, B. N. Malinovskiy, G. I. Naan, I. V. Prangishvili, B. G. Tamm, E. A. Yakubaytis, and others. The author of this article will also be giving a report. Taking a leading part in the work of the conference will be a group of eminent specialists from Armenia: K. A. Abgaryan, Yu. Ye. Khodzhamiryan, G. A. Areshyan, S. S. Zakharyan and others.

The presence of such a highly qualified collective means that we can assume the conference will be successful. Another reason that we can hope for success is that the conference is being held in Yervan, where every condition for fruitful work has been provided thanks to the concern of the Central Committee of the Communist Party of Armenia, the Council of Ministers of the Armenian SSR, the presidium of the Armenian Academy of Sciences. The choice of Yerevan as the site of the conference was prompted primarily because here there are strong collectives of scientists working in the field of management, and acquaintance with their work will doubtless enrich us all. On the other hand, the conference will be conducive to further enhancement of the work of Armenian specialists on management problems.

Then what do the scientists and engineers bring to their All-Union Conference? First of all, one must take notice (and this is evident from the proposed reports) that specialists in the field of management have been actively included in the development and realization of a number of important State-wide goal-oriented programs formulated in decrees of the Party and the government in recent years and requiring comprehensive interaction of a number of areas of science, engineering projects, special measures on planning and economic incentive.

The basis for successful practical applications is still fundamental theoretical research in the so-called "classical" areas of management. These are questions of the stability and controllability of complex nonlinear, multidimensional and distributed systems, the theory of optimum control, the theory of stochastic systems, i. e., systems for which the influence of random factors is significant, identification, i. e., the theory and methods of constructing mathematical models of actual systems from the results of experiments. Considerable advancement has been noted in these areas. There has also been intense development of the theory of control of moving objects: ships, aircraft, space vehicles.

There is a large set of control problems that involves systems including man. The complication and diversity of forms of interaction of people ("operators") with automatic systems give rise to development of the theory and methods of instructing and selection of operators, elaboration of questions of "psychological compatibility" of man and machine.

New results have been obtained in the area of facilities for logic control which, among other things have been responsible for development of present-day machine tools with preset numerical control. Effective algorithms are being developed for calendar planning of control and dispatching for complex automated production facilities. In application to problems of "unmanned" technology, information processing algorithms are being developed for handling jobs of quality control and final adjustment of technological processes. Intensive development is in progress on methods of the theory of reliability of technical facilities, software for automated systems, man-machine complexes.

Researchers have devoted considerable attention to solving problems of the major sectors of the national economy. For example, a number of studies have been aimed at solving problems in the power industry. Among these is the development of a method of planning the structure of placement and development of power-generating facilities on the scales of the nation as a whole and of separate regions, development of control systems for specific power plants, solution of some problems that come up in the search for promising methods of producing energy (e. g., controlling plasma configuration). Of major significance is joint participation of control specialists in solving the problems of petroleum and gas extraction, especially the development of highly efficient computers that will significantly increase the speed and accuracy of data processing in seismic mineral prospecting and other geophysical information. Interesting results have been obtained in solution of problems of public health, medicine and biology.

Developments carried out in the field of control theory for realization of the Food Program are exemplified by new methods for optimum control of conditions in greenhouses, methods of processing satellite information for on-line analysis of the status of agricultural fields and control of irrigation, application of fertilizer and the like, the use of procedures for multicriterial selection in planning feed lots and so on.

The field of utilization of automation is rapidly expanding into areas that until recently were exclusively human. For example, there is intensive

development of systems for automated design (SAPR) of industrial technical devices, facilities and systems for automation. A computer that is equipped with complex mathematical models and methods becomes an able helper on equal standing with a designing engineer, technologist or programmer. The development of SAPR systems means acceleration of the entire production cycle, from inception of the scientific idea to its practical realization. Wide distribution of the most effective control systems based on standardizing engineering features and using SAPR systems is one of the main ways of improving effective use of control theory. This applies in particular to the development of automated control systems (ASU) for technological facilities, shops and enterprises. The considerable experience that has been accumulated here (unfortunately negative at times) has enabled us in recent years to approach its theoretical generalization, systematization, and development of a procedure for the most rational planning and introduction of ASUs. One of the most important ideas here is assurance of continued development and improvement of the ASU, what is called its adaptation, the adjustment to constantly changing working conditions. Realization of this idea would be inconceivable without in-depth results in the field of adaptation theory that have been obtained in the Soviet Union. Recently, there has been considerable intensification of the efforts of specialists in the field of setting up versatile automated production facilities, considerable progress has been made in the creation of manipulators, in the field of robotics, development of robots with artificial sensing units.

The most advanced scientific ideas cannot be realized without appropriate technical facilities. Occupying a major place among present-day control facilities is computer technology. A leap in development of control computer complexes has been made as a result of highly productive computer systems based on homogeneous media with adjustable structure. The distinctive features of such systems are originality of engineering solutions, high technological properties, and low cost. There are to be reports at the conference on major advances in this area.

Research has been continuing in the field of magnetic elements of automatic equipment and computer technology, devices for fluidic automation of sensors and measuring instruments.

In our field of science there are also unsolved problems that we are well aware of, which are urgently in need of solution. The theoretical developments of Soviet scientists are in the vanguard of world-wide control science. At the same time, practical implementation of these ideas frequently drags out intolerably. To hasten this process, we need a set of organizational and engineering steps in which specialists in the field of control should have a definite say.

The conference will sum up the experience, the results of research and development that has been undertaken in the intervening years since the last conference. But this will be only a part of the work. It is even more important to point out the paths of future research, to outline the problems that we have to solve both in the immediate future and in the long run. This applies to programs of fundamental research aimed at formulating a general theory of

control, development of a general theory of systems, and at finding new principles for construction of highly productive technical control facilities.

Our task is to give attentive consideration to unfinished work in science, to look at options and develop the most promising directions, to take all steps to intensify the practical orientation of research, to promote the most rapid and most complete utilization of scientific results in the practice of the national economy.

We are sure that the discussion of these problems at the conference opening tomorrow will make a great contribution to the theory and technology of management.

It is impossible of course within a single article to go even briefly into all issues to be discussed at the conference. They are extensive, diverse, and from my point of view they are of interest and importance to the national economy.

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CSO: 1814/56

MEETING ON COORDINATION OF SCIENTIFIC WORK IN ARMENIA REPORTED

Yerevan KOMMUNIST in Russian 19 Oct 83 pp 1, 3

[ARMENPRESS report: "Progress on the Basis of Coordination"]

[Text] The third session of the Council on Coordination of Scientific Activity of Scientific Establishments and VUZ's in the Republic in the Field of the Natural and Social Sciences took place on 18 October in Yerevan.

President of the Armenian SSR Academy of Sciences academician V.A. Ambartsumyan delivered the opening address at the session.

In accordance with the party course aimed at intensifying social production, he said, the scales on which the achievements of science and technology are being used in the national economy are growing immeasurably. However, the level of this work still does not correspond fully with the demands and needs of rapid economic and social development.

The president noted that the CPSU Central Committee and USSR Council of Ministers decree "On Measures To Accelerate Scientific and Technical Progress in the National Economy" has been adopted as a program for action in the field of further strengthening the alliance between science and practice and introducing scientific developments in social production. This very important document, he stressed, focuses scientific workers on the accelerated practical introduction of the achievements of science and technology and of leading experience. In this regard coordination of their activity acquires very great significance. This, of course, also touches upon the use of creative efforts by scientists in solving production problems in the development of agriculture and the implementation of the Food Program.

At the session, deputy chairman of the Armenian SSR Council of Ministers V. Movsesyan presented a report entitled "The Course of Implementation of the USSR Food Program in Armenia and the Tasks of the Scientific Establishments." Talking about work to implement the Food Program in the republic during the period since the CPSU Central Committee May (1982) Plenum he noted the significant contribution made by the scientific collectives in this matter. The scientific establishments and scientific-production associations have participated in work on about 30 very important scientific and technical problems in agriculture. The link between the academy's establishments and

the corresponding institutes and production organizations of the Ministry of Agriculture has been significantly strengthened. The introduction of proposals of national economic significance in production has been improved. New high-yield varieties of agricultural crops and highly productive animal breeds have been handed over to agricultural production. Efficient agrotechnical methods are being successfully introduced in the opening up of salt marshes and dealing with soil erosion. The efforts of the scientific collectives have also been focused on the development and introduction of the latest promising methods in using biological methods against agricultural pests and in preventive measures against animal diseases.

A joint general meeting of the Academy of Sciences and the Ministry of Agriculture has drawn up for the scientific establishments very important scientific recommendations for implementation of the Food Program, covering the main directions in the further development of agriculture.

Despite the achievements in scientific research aimed at implementation of the Food Program, there are still shortcomings and omissions. Scientific work is slow on a number of urgent problems aimed at accelerating the intensification of agriculture. Specialization and centralization of production and the organizational forms for interfarm cooperation and the management of agrarian-industrial integration are not being developed as they should. The coordination of scientific research work and the creative link between academy and sector scientific establishments must be improved.

One very important task for the scientific establishments of the academy and the Ministry of Agriculture is that in order to implement the USSR Food Program there must be work on the fundamental problems and subjects that are of practical significance, being guided by the comprehensive plan for research and insuring the timely and good-quality execution of this work.

In his report the vice-president of the Armenian SSR Academy of Sciences, academician of the Armenian SSR Academy of Sciences V.V. Fanardzhyan spoke about the status of physical and chemical biology and biotechnology and the prospects for their development in the Armenian SSR.

The need to develop the entire complex of the biological sciences, he said, was underscored in the decisions of the 26th CPSU Congress. At the CPSU Central Committee June (1983) Plenum, comrade Yu.V. Andropov named biotechnology as one of the most important directions in scientific and technical progress.

In our republic definite work has been done to further develop physical and chemical biology and biotechnology and to use their achievements in medicine, agriculture and industry. An interdepartmental council has been set up under the Armenian SSR Academy of Sciences Presidium and it has been assigned the task of leadership and control of work done in this field.

In the biological sciences work has been significantly activated in the field of cell biology, physiology and immunology. Links with VUZ's and the sector scientific research institutes, and also with production and agricultural organizations and the kolkhozes and sovkhoses in the republic have been expanded and strengthened.

However, along with the successes in the development of research insuring implementation of the Food Program there are still substantial shortcomings and unresolved problems.

There is a need to improve the coordination of scientific research. Close creative links are lacking between academy and sector scientific establishments and the plant sector of science; research is inadequate in the regional and interrepublic programs, and--the chief thing--the achievements of the institutes are being introduced into agricultural practice only slowly.

The scientific councils of the academy have an important role to play in determining the directions of scientific research, organizing research work and introducing the results of work in production. Their tasks in light of the CPSU Central Committee and USSR Council of Ministers decree "On Measures To Accelerate Scientific and Technical Progress in the National Economy" were analyzed in the report of deputy academician-secretary of the Armenian SSR Academy of Sciences doctor of historical sciences professor A. Simonyan. He dealt in particular with the fruitful activities of the scientific councils on the science of machines, semiconductors, cybernetics and radioelectronics and so forth, aimed at linking scientific research with urgent problems and the use of scientific achievements for the purpose and in the interests of developing production.

At the same time it was noted that in general the activities of the scientific councils can still not be regarded as satisfactory. They are still inadequately promoting clarification of the directions of research in light of the new demands and of accelerating scientific and technical progress in the republic's national economy.

There was an exchange of opinion at the session on the representative reports.

Chairman of Armenian SSR Council of Ministers F.T. Sarkisyan, secretary of the Armenian Communist Party Central Committee K.L. Dallakyan, deputy chairman of the Armenian SSR Council of Ministers Yu.Ye. Khodzhamiryan, and chief of the Armenian Communist Party Central Committee Department of Science and Educational Institutions A.P. Melkonyan participated in the work of the session.

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CSO: 1814/60

ELECTIONS TO AZERBAIJAN ACADEMY OF SCIENCES REPORTED

Baku VYSHKA in Russian 2 Jul 83 p 3

[AZERINFORM report: "Elections to the Azerbaijan SSR Academy of Sciences"]

[Text] A general meeting of the Azerbaijan SSR Academy of Sciences took place on 30 June.

At the meeting elections were held for full members (academicians) and corresponding members of the republic academy of sciences.

The following were elected full members of the Azerbaijan SSR Academy of Sciences: for mathematics: M.L. Rasulov; for physics: N.A. Guliyev, E. Yu. Salayev; for geology: F.M. Bagir-zade, E.Sh. Shikhalibeyli; for medicine: Z.A. Aliyeva, A.A. Namazova; for economics: A.A. Makhmudov; for the history of art: A.R. Salamzade.

The following were elected corresponding members of the republic academy of sciences: for mathematics: Ya.D. Mamedov; for physics: S.A. Gadzhiyev; for space systems and instruments: T.A. Aliyev; for chemistry: S.M. Aliyev, R.G. Rizayev, P.G. Rustamov; for geology: S.G. Salayev; for the development and exploitation of oil, gas, and gas condensate deposits: N.D. Tairov; for medicine: R.N. Ragimov; for botany: V.D. Gadzhiyev; for genetics: U.K. Alekperov; for human and animal physiology: R.Yu. Kasumov; for entomology: S.R. Mamedova; for economics: T.S. Veliyev; for history: M.A. Ismaylov, G.A. Madatov; for philosophy: A.F. Dashdamirov; for literature: A.F. Zamanov, B.A. Nabiyeu; for linguistics: A.M. Kurbanov.

Speaking at the meeting the president of the Azerbaijan SSR Academy of Sciences, corresponding member of the USSR Academy of Sciences G.B. Abdullayev, summed up the results of the elections. On behalf of the general meeting he congratulated those elected members of the academy and wished them further success in their scientific activities.

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CSO: 1814/60

REPORT ON AZERBAIJAN ACADEMY OF SCIENCES PARTY CONFERENCE

Baku BAKINSKIY RABOCHIY in Russian 2 Nov 83 p 2

[Article by N. Kuptsova: "The High Duty of Scientists"]

[Text] Science today is a direct productive force of our society. Science today is a life-giving source of technical-economic and social development, elevation of the spiritual culture of the nation and their standard of living. Construction of the new society is unthinkable without science. In looking ahead for five or ten years, it was pointed out at the Twenty-Sixth Party Congress, we cannot forget that it is during these years that the national economic structure will be laid and developed that will take the nation into the twenty-first century. It must embody the major characteristics and ideals of the new society, be in the vanguard of progress, personify the integration of science and production, the unbreakable union of creative thought and creative labor. The congress has placed great and responsible jobs before Soviet science, stressing the need for raising its efficacy, extensive development of fundamental research, able concentration of efforts in main areas, large-scale and long-range problems. All these tasks are made specific in the resolutions of the November (1982) and June (1983) plenary sessions of the CPSU Central Committee.

The Fifteenth Party Conference of the Azerbaijan Academy of Sciences, which took place in an atmosphere of severity and self-criticism, was convoked for comprehensive examination of the activity of science institutions from the standpoint of today's high demands on science.

In the summary report made by Sh. Khalilov, secretary of the Party Committee of the Academy of Sciences of the Republic, and in the speeches of delegates, it was stressed that the combat readiness of the science team, the effectiveness of team research, are measured by the specific contribution made to the successful fulfillment of the main tasks of the five-year plan. Wherever Party organizations have been able to bring about a creative environment, an atmosphere of bold forays, productive discussions, comradely severity, to direct the efforts of science teams toward simultaneous elevation of quality and productivity of the labor of the collaborators, significant results have been achieved.

Valuable research has been done in the field of physico-technical and mathematical sciences, as well as by the department of earth sciences. Useful

recommendations have been made in the area of development of the petroleum and gas extracting industry of the republic, petroleum processing and petrochemistry. The work of institutes in the department of biological sciences is aimed at further development of agricultural production and the solution of problems outlined by the nation's Food Program. Fundamental research has been done in the institutes of history, economics, philosophy and law, literature, linguistics, architecture and art, as well as in the museums.

Work has been activated on introducing the results of completed scientific research and inventions into the national economy. Institutes of the Academy of Sciences have recommended for introduction during the Eleventh Five-Year Plan 179 completed projects whose use will be conducive to further growth of scientific-technical progress and will ensure a considerable economic effect.

It was noted at the conference that all this has been made possible by the continued attention of the Central Committee of the Communist Party of Azerbaijan that has been given to scientific institutions, by radical steps in personnel policy, in the planning of scientific research, in reinforcement of the material-technical base of the Academy of Sciences, in expansion of the ties of science with production.

But, in analyzing what has been achieved, delegates A. Alizade, A. Abilov, F. Maksudov and others in discussing the report stressed that the activity of scientific institutions no longer fully meets the demands that are made. The Party organizations have not been able to ensure Party influence on some of the major sections, to see to it that all communists have been involved in research with full zeal, with high responsibility. One still observes a break between science and practice, there are considerable expenses and omissions in research planning that result in an excessive number of topics and in trivial topics. Only a fourth of all scientific developments are put into production. With each passing year, fewer and fewer jobs are included in the plan of economic and social development of the republic. Business contacts of scientific institutions with ministries and agencies might be more productive. Expensive equipment is being uneconomically used. Rural workers are waiting for the scientists occupied with solving major problems of the agro-industrial complex to have their say. There is not enough persistence in solving important problems of environmental protection, as noted by the report of delegate G. Aliyev, who dealt at some length with the tasks of the institutes of the Academy of Sciences on transforming the republic into a vacation zone.

At the plenary session of the Central Committee of the Communist Party of Azerbaijan, which was held in June 1983, serious criticism was leveled against the activity of institutes and institutions dealing with the problems of the social sciences. Delegates B. Nabiyeu, M. Abasov, A. Makhmudov and others showed by specific examples that scientists are still slow in turning to the real and practical problems that are posed by life, to work on problems of socioeconomic and sociocultural development. The Party organizations of the institutes of history, philosophy and law, economics and some others are not taking an active part in determining the main directions of work, are not giving the proper evaluation of protectionism, are not concerned about the development of criticism and self-criticism in collectives.

In analyzing the activity of scientists in economics, the speakers stressed the need for paying more attention to selecting optimum ways for further development of the economy of the republic as a component part of the unified national economic complex of the nation, to improving the planning and forecasting of economic and social progress, the economic mechanism. Problems of price formation deserve special attention. Recommendations on rational use of the working force are important.

It was noted at the conference that considerable experience has been accumulated in the republic on mobilizing workers for successful fulfillment of State plans and high socialist obligations, on moral and international education of the broad masses. It is a debt of honor of scientists to publicize this experience, to make a comprehensive study of moral problems of labor, to shed light on all stages of socialist construction in Azerbaijan. What is needed is a Marxist-Leninist development of the problems of genesis of the Azerbaijan nation, it is important to publish multiple-volume editions on the history, literature, philosophy and art of Azerbaijan. The conference stressed the increasing role of socialist traditions and ceremonies in communistic education of the working people, and deplored the erroneous treatment of certain old ceremonies by scientists of the institute of philosophy and law.

The speakers emphasized that Party organizations, using the right of supervising the activity of the administration, and taking the experience of collectives as a basis, should create an atmosphere of active creative endeavor, should help to reinforce discipline, to raise the responsibility of communists and all coworkers for the cause with which they have been charged. They indicated the inseparable connection between improvement of the quality of all work and further improvement of ideological and political education. The talent of a scientist is inseparable from his ideological position. The speakers exactly analyzed the status of Party training. In some institutes, instructive experience has been accumulated in organizing the training of propagandist cadres. But the delegates concentrated their main attention on shortcomings in this important segment of ideological activity. Facts were cited evidencing poor attendance, interruption of studies, poor training of propagandists and students, omissions in komsomol political education.

The criteria in accordance with which the Party teaches us to evaluate our work are a clear political direction, efficiency, and practical results. And here a great deal depends on how thoughtfully and seriously the Party organizations take problems of training skilled science personnel. The speakers called attention to the fact that in some institutes, such as those of philosophy and law, physiology, botany, zoology, not a single doctoral dissertation has been defended since 1976 despite the availability of specialized councils, that among doctors there are few people of middle age. And things are no better in regard to training through the graduate program. But the Party committee and the primary Party organizations do not make the science directors responsible for disruption of the training of cadres. Not one of them has even been heard from either in the presidium of the Academy of Sciences or at the meeting of the Party committee. Nor are any due demands made on the leading personnel. It is chiefly this that explains the facts of digression of some comrades from the norms of our morale in the institutes of inorganic and physical chemistry,

soil science and agronomy, cybernetics, the science center for biological research, the special design office of mathematical modeling. They have all been given Party and administrative penalties. It was noted at the conference that we must be consistent in carrying out the Leninist principle of selection and placement of personnel in accordance with vocational and political qualities, and ensure the proper combination of scientists of the older generation with young specialists. To this end, we must make better use of competitions for job advancement and periodic certification of workers.

The Party organization of the Academy of Sciences of the republic brings together more than 2,500 communists. This is a great force if it is directed toward solution of problems that are decisive not only for today, but for the future of various sectors of the national economy. Party organizations are called upon to exercise more influence on the state of affairs, to show more concern for elevating the advance role of communists, their responsibility for the section with which they are entrusted. They must take consideration of the opinion of Party members both in the development of thematic plans, and in evaluating the effectiveness of completed work, as well as the selection and education of personnel. This thought, which has pervaded the work of election and report meetings in 105 Party groups and 37 Party organizations, was the main topic of this conference as well.

G. A. Gasanov, the secretary of the Central Committee of the Communist Party of Azerbaijan, spoke at the Fifteenth Party Conference of the Academy of Sciences of the republic.

Taking part in the work of the conference was Kh. Ya. Khalilov, first secretary of the regional committee of the Rayon imeni 26 Baku Commissars.

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CSO: 1814/56

## CONFERENCE ON STUDIES IN ECONOMICS IN BELORUSSIA DISCUSSED

Minsk SOVETSKAYA BELORUSSIYA in Russian 9 Oct 83 p 2

[Article by I. Mostkov: "From Urgency of Research to the Effectiveness of Economy", notes from a republican conference of economists and practical workers]

[Text] This conference was held at the Central Committee of the Belorussian Party Committee and was attended by the best economists and practical workers of the republic: prominent scholars, leading workers of a number of ministries, departments and associations. It was devoted to, probably, the most burning problems, such as the improvement of the effectiveness of economic studies, improvement of instruction in political economy and improvement of the economic training of the personnel. The report of S. D. Galuza, director of the Institute of Economics of the Belorussian SSR Academy of Sciences, co-reports by L. P. Metlitskiy, vice-chairman of the Gosplan of the republic, and I. D. Prokhorenko, Doctor of Economic Sciences, professor, and then the majority of the reports showed that, apart from other things, business-like approach can well go along with sharp criticisms and emotionally inflamed atmosphere.

The emotional atmosphere, some sharp words at times, profound analysis of the state of economics, well reasoned proposals which made the conference instructive and fruitful were dictated by the high requirements and high demands made of economic sciences by the 26th Party Congress, November (1982) and June (1983) Plenums of the CPSU Central Committee, speeches by Comrade Yu. V. Andropov and his article "The Teaching of Carl Marx and Some Problems of Socialist Construction in the USSR". At the June (1983) Plenum of the CPSU Central Committee, Comrade Yu. V. Andropov said: "... We have not sufficiently studied the society in which we live and work, have not yet fully revealed its characteristic regularities, particularly economic."

Belorussian economists can be proud of a number of their works, studies and recommendations. They were mentioned at the conference, but only in passing. Firstly, because it is much more important to see what has not yet been done to evaluate the gaps and to determine what is most important today and tomorrow. Secondly, the very considerable potential of the economic science of Belorussia can and must produce a high yield. There are: The Institute of Economics of

the Belorussian SSR Academy of Sciences, three scientific research institutes of economics of the Belorussian SSR Gosplan, Institute of Economics and Organization of Agricultural Production of the Ministry of Agriculture of the republic, Belorussian Branch of the Scientific Research Institute of Labor, a number of other research subdivisions, and eighty departments of economics in vuzes. This a considerable scientific force, but insufficiently active. Sharing the responsibility of the entire Soviet political economy for its serious liability in the development of a number of fundamental problems, Belorussian scientists are obviously giving insufficient attention to the study of regional economic problems. Discontinuity and a lack of integration in economic studies are one of the reasons of imperfection of the mechanism of regional production control.

Serious flaws in science are due to professional narrow-mindedness and a lack of communication on the part of some scientists and the scientific groups which, as Comrade Galuza said at the conference, "have become too isolated, so to say barricaded themselves in their immediate environment and took the positions of extreme economism, when everything without exception is 'removed' from production". In the meantime, as is known, economics is greatly influenced by politics, ideology, morals, mass psychology, family relations and other social phenomena.

The conference demonstrated it very clearly that cooperation in the sphere of science is not only desirable, but is necessary.

The republic has accumulated considerable experience in the cooperation of various research groups and concentration of considerable scientific forces on integrated studies of urgent problems. For example, 150 organizations and executing enterprises participated in the preparation of the integrated program of the scientific and technical progress simultaneously with the main organization (Institute of Economics of the Belorussian SSR Academy of Sciences). The scheme of the development and arrangement of the productive forces of the republic (main organization -- Scientific Research Institute of the Problems of National Economy Management of the Belorussian SSR Gosplan) was developed by 55 co-executors.

These are not the only examples which prove the wide possibilities of such integrated studies and the necessity of improving their organization. Excessive independence of numerous sections of such projects result in substantial discrepancies in the conclusions and predictions, even with respect to the same index. A very serious defect in the studies on the prognostication of various characteristics of the republic's development is their disconnectedness. In the meantime, an acute demand arose not in disconnected predictions but in an integrated system ("Precisely, a system!" -- stressed one of the participants of the discussions) of scientific, technological and socioeconomic predictions.

If the interdepartmental council on economic sciences of the Belorussian SSR Gosplan has already mapped out the measures for strengthening and improving the coordination of activities, then the problems of the scientific and methodological guidance of research are awaiting their solution. Evidently, it is necessary to enhance the role of the Institute of Economics of the Belorussian SSR Academy of Sciences as a methodological center of economics and the problem councils created on its basis.

The other side of the problem of integrated studies conducted on special-purpose programs is that, as was mentioned at the conference, "there is a lot of democratism, but little centralism". The main organization with its multitude of duties does not obviously have enough rights, and it does not have any of them in the distribution of funds.

In any case, the mechanism of the interaction of the coexecutors of the scientific and technological programs needs badly to be improved. This is the opinion of many participants of the conference. For example, V. F. Medvedev, director of the BelNIINTI [Belorussian Scientific Research Institute of Scientific and Technical Information] spoke excitedly, emotionally and with concern about the absence of proper interaction of scientific teams.

Economic scientific institutions are not yet an integral interconnected formation... There is no single concept of the improvement of regional economic problems... It is necessary to improve regional planning and direction of science ... Special-purpose scientific and technical programs are in many instances improved coordination plans.

This is why it is important, according to the participants of the conference, to develop and realize in the plans for the Twelfth Five-Year Plan a general concept of specialization and cooperation of institutes of economics, departments of vuzes and other scientific subdivisions. Among other proposals for solving these problems, it was proposed to create a scientific organization center for directing the work of scientific research institutes of economics and to create a republican journal "The National Economy of Belorussia (or to convert the existing journal "Industry of Belorussia" into it).

The lack of studies on a number of fundamental problems of political economy, uncoordinated work of scientific teams, frequent instances of work on insignificant topics, pursuits for studies that could develop into a dissertation and other faults of the economic science could not but reflect on its obviously low contribution to the solution of the most critical problems of the organization and control of production.

Of course, it is possible to give many examples of very fruitful contacts of scientific groups with ministries, departments, planning organizations, associations and enterprises. However, the participants of the conference considered it more important to search jointly for the ways of overcoming the defects which lower the effectiveness of science and compel practical workers to use the trial and error method. Among other things, science is obviously not keeping up with the practical needs brought about by the changeover of industry to the intensive path of development, acceleration of scientific and technological progress, creation of agroindustrial complexes, enhancement of the rights of the enterprises in planning, and many other very important changes in the national economy.

For example, the experiment in the housing and municipal services of the republic promises far-reaching consequences. In this sector, an integrated control system at the republican, oblast and rayon levels is being created. The development of a new technology of preplan calculations in the form of a speech dialogue of the worker with the computer is nearing completion; a special-purpose program for increasing the productivity of labor has been developed. Naturally,

all this posed serious problems to science. Minister of Housing and Public Utilities of the Belorussian SSR A. I. Bezlyudov reported about the searching for answers to these questions and on the cooperation of the ministry with scientific institutions of Moscow and other cities of the country, because, unfortunately, it was found impossible to enlist the cooperation of the republic's scientists in this experiment to a sufficient degree.

Presently, the Ministry of Light Industry of the republic is preparing for an exceptionally important innovation: it will be testing new economic control factors which will considerably enhance the rights and independence of enterprises and their responsibility for the final results of their work. Many indexes will be eliminated and the remaining indexes will have a new role. The system of incentives will change, which will have to change the attitude of people toward work.

Addressing the scientists at the conference, M. V. Pavlova, head of the economic planning administration of the Ministry of Light Industry of the Belorussian SSR, said the following: "We need much help from science, however, the scientific research institutes and vuzes of the republic are very ineffective in fulfilling our requests."

Such a unique experiment as the creation of intersectorial production, primarily, the NPO [Scientific Production Association] of Powder Metallurgy, also requires the attention of economists. The conference mapped out the ways of activating scientific studies in some other economic problems, including the sphere of labor. Among other things, there will be a clearer planning of studies, and a flexible plan will be developed for the next five-year plan for scientific researches on economic topics, as well as special-purpose programs (for example, for better utilization of manpower).

Of course, close contacts of science with practical work cannot be accomplished only in one direction. Traffic in the opposite direction is also necessary, since science itself needs constant help, particularly in supplying it with planning and statistical information. Presently, economists are often "on a starvation diet" in this respect, which cannot but lead to unnecessary expenditures of time and, moreover, to mistakes in their studies and conclusions. Evidently, scientists have to be provided regularly, constantly and necessarily with the required information, which is the responsibility of the Gosplan and Statistics Administration of the Republic.

It has become necessary also to regulate the cooperation of scientific institutions with management agencies of the national economy. So far, when studies or recommendations from scientists are received, these agencies may or may not discuss them, may or may not introduce them, or may or may not report to the authors about the fate of the results of their work... The Gosplan should, first of all, necessarily involve scientists in the development of the most important economic projects, solutions, experiments and plans, and secondly, to establish clear regulations for the consideration and use of scientific recommendations and proposals.

The discussion about the economic training and retraining, particularly of economists and the improvement of training of undergraduate and graduate students progressed at the same high businesslike level.

The proper approach to the faults and the constructive attitude of the speakers who introduced many concrete proposals on all aspects of economics determined not only what has to be done now but also how it is to be done, and made it possible to work out sufficiently detailed recommendations on the problems discussed. As a result of this, it is believed that the conference must be, to some degree, a landmark in the development of the Belorussian economic science and in the strengthening of its connection with practical work.

However, we should be concerned with one of the peculiarities of the number of the reports, when the speakers discussed in detail, and even criticized, certain general faults or omissions in the work of some people, but did not mention a word about how they or the groups headed by them are going to organize the work in the light of today's requirements. However, the success of the work depends primarily on the efforts of each person in the section entrusted to him.

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CSO: 1814/55

## WAYS OF EVALUATING SOCIALIST COMPETITIONS DISCUSSED

Minsk SOVETSKAYA BELORUSSIYA in Russian 31 Aug 83 p 2

[Article based on an interview with G. N. Kuznetsov, Chairman of the Trade Union Bureau of the Special Design Bureau of the Institute of Heat and Mass Transfer, Belorussian SSR Academy of Sciences, by a Sovetskaya Belorussiya correspondent: "Creativity Stimuli"]

[Text] There is an important link between science and production which determines in many respects their cooperation in the realization of the scientific and technological progress: design developers and creators of experimental models. It is stated in the recently published resolution of the CPSU Central Committee and the USSR Council of Ministers "On Measures for the Acceleration of the Scientific and Technological Progress in the National Economy": "Special attention must be given to the implementation of such economic and moral measures which would cause all participants of the development of equipment and technologies and their introduction into production to take interest in their renovation."

The stimulating role of socialist competitions and ways of increasing their effectiveness were discussed by a correspondent of "Sovetskaya Belorussiya" with G. N. Kuznetsov, Chairman of the Trade Union Bureau of the Special Design Bureau of the Institute of Heat and Mass Transfer of the Belorussian SSR Academy of Sciences.

An unexpected situation arose at the SKB [special design bureau] of the ITMO [Institute of Heat and Mass Transfer] of the Belorussian SSR Academy of Sciences when the results of the socialist competition were summed up for the quarter: the personnel of the department of high-temperature processes and thermal treatment of materials disagreed with the decision of the trade union bureau, demanded that it be reconsidered and supplementary rules be added to the "Regulations for the Organization of Social Competitions and Movement for the Communist Attitude to Work." A controversial situation arose. This happens, but not very often. An urgent meeting of experts was summoned.

This incident was cited by G. N. Kuznetsov, Chairman of the SKB Trade Union Bureau, in the discussion with our correspondent as the confirmation of his position: no matter how well the conditions of social competitions are worked out, life introduces its corrections in them. Therefore, it is necessary to improve the criteria for scoring the results patiently and consistently.

G. N. Kuznetsov explained what he was talking about. Their department was delivering for series production a complex of new drying equipment which was more effective than before. This promised a good economic effect from its introduction to our personnel, including the department.

The developers know what it means to put something in series production. This takes no less time and effort than the development of a new device. But it was the introduction into series production that was not taken into consideration in our "Regulations". The committee of experts and then the trade union bureau recognized that it was necessary to correct this. Appropriate additions to the conditions of competitions were made, and concrete achievements of the developers were taken into consideration. As a result of this, the department headed by V. A. Nemkovich rose to the top.

[Question] Gennadiy Nikolayevich, doesn't this case confirm that competition among creative personnels must also be creative? It should not only stimulate the achievement of the highest results, but also to ensure their comparability. For example, a department rose to the top because of the introduction of a large item and then immediately dropped out of the socialist competition: their achievement cannot be measured by the existing point system, because it has no provisions for such a "jump".

[Answer] It is for this reason that, in addition to the members of the trade union bureau and representatives of the administration, we involve a broad sector of the most active party and trade union members in the scoring of the quarterly results of the competition. Our council of experts is also for this purpose.

In order to successfully design a new piece of equipment, to embody a scientific device in metal and work out a technological process, in addition to knowledge, it is necessary to have ingenuity or even a talent. And how does one measure who is more talented or ingenious?

The problem of criterion arises constantly in one or another form. But a system which makes it possible to compare the results, sum them up and determine the effectiveness of work is operating now. In the SKB, designers are competing with their colleagues, developers, and accountants are competing with planners, while production subdivisions compete with one another. In each of the five groups from "A" to "E" there are its own conditions for competition.

For example, let us take group "A" which includes our main subdivisions. The department of rheophysical equipment design (headed by Candidate of Technical Sciences R. G. Gorodkin) has a stable, well formed staff with a good microclimate. During the long existence of the department, there have been no instances of failures in performing production assignments or introduction plans. Two-thirds of the members of the department have patents on their inventions. The

introduction into series production of a device for determination of thermal conductivity of rheological (viscous) media, to a certain degree, is a result of the healthy situation in the competition among the sectors of the department.

Here is another example: the department of scientific instrument making headed by S. A. Nekrasov is working on the modernization of the scientific base of an academic institute, and is developing automation systems for physical experiments with the use of electronic computers in research. An institute-wide data processing system has been operating since 1981. Systems developed by the department have also been introduced at the clients' establishments. Members of this department were awarded the USSR Council of Ministers Prize, prizes of the USSR VDNKh [Exhibition of the Achievements of the National Economy], and were encouraged by the Presidium of the Belorussian SSR Academy of Sciences. However, in their competition with SKB departments, they, "electronics specialists", lost to the "mechanics", whose volume of design documentation (in pages) is always larger. In order for this department to compete on equal terms, in the "Regulations" the point evaluation was considerably increased for the drawings of the printed plates. The situation changed immediately.

[Question] Gennadiy Nikolayevich, how is it possible to equalize the points given for the performance of main production assignments with the evaluation of other types of activity? The opponents of the point system protest most frequently against mechanical addition of points. It goes without saying that it is necessary for designers, fitters, and accountants to participate in public activities, to make trips to enterprises they are helping, to give their time to voluntary brigade work, to give and attend lectures, etc. However, it is evidently inadmissible for the total points for these useful activities to exceed or to be equated, as it often happens, with the number of points given for excellent and creative performance of one's production duties.

[Answer] The system for evaluating the final results and quality of work is constructed in such a way that only those groups which successfully completed the main production task are eligible for prizes. Our "Regulations" primarily encourage the introduction of scientific and technical research projects developed in cooperation with ITMO scientists of the Belorussian SSR Academy of Sciences which are embodied in drawings and then in metal.

The main criterion in the competition of shops, sections and brigades of experimental production (groups "B" and "C") is high-quality production of new equipment ahead of schedule. In their competition, thirteen workers and one section of experimental production were awarded their own quality marks. These were a high recognition of trust, and guarantee of quality and, finally, additional points on which depends the amount of prizes.

In the groups "E" and "D", which include accountants, departments of material and technical supply, standardization, technological department and others, it is more difficult to estimate the results of their work. At the present time, the Trade Union Bureau with the aid of the administration is working out a new, more objective system of scoring the results of the competition in these departments.

[Question] The SKB of an academic institute requires a high mobility, efficiency and a feeling for innovations, on which greatly depends the acceleration of the technological progress. Do the conditions of the competition contain any stimuli which make it possible to reorient quickly the designers and the production workers to the creation of the latest equipment and devices and to interest them in the solution of advanced scientific problems?

[Answer] Yes, competitions make it possible to influence effectively the direction of work. For example, so far we are not satisfied with the volume of the introduction of our projects in the enterprises of the republic. Some of this depends on us and some on the enterprises. We are also concerned about some quality indexes in research efforts. We presented these problems for discussion by the working personnel, and then we decided to increase the weight of the indexes which will lead to a change in the situation.

Our "Regulations" do not welcome any high overfullment of plans. If it is great, it means that the plan was obviously too low. Since the time it was decided that the department cannot receive more points for early delivery of a project than for the work itself, the periods of designing became close to optimal, and the justification of the planning improved.

Organization of competition is a very complex matter, and, of course, we have many unsolved problems. In addition to moral stimulation, we are using material stimulation of the workers. However, it is not sufficiently effective. The reason is that the approach to the financing of our organization is based on the idea that it is unproductive. However, we produce and yield a considerable economic effect. However, there are no sufficient funds for the funding of our winners.

We are also thinking of how to strengthen the role of the criteria of the quality and effectiveness of work and to reflect them fully in competition. Here, as in any creative activities there can be no simple answers. It is necessary to think, search, and try...

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GEORGIAN SSR ACADEMY OF SCIENCES HOLDS GENERAL MEETING

Tbilisi ZARYA VOSTOKA in Russian 16 Oct 83 p 3

[Article by Georgian Information Agency: "From Scientific Studies to Production"]

[Text] A purposeful strategy of scientific research, the ability to concentrate efforts and means on the main directions and to combine the advantages of the socialist system with achievements of the scientific and technological revolution are the main conditions for enhancing the role of science in communist construction. The general meeting of the Georgian Academy of Sciences discussed the ways and means of solving the problems posed to the scientists of the republic by the June (1983) Plenum of the CPSU Central Committee and the 24th Plenum of the Central Committee of the Communist Party of Georgia and how to increase their contribution to the acceleration of the pace of the scientific and technological progress in accordance with the resolution of the CPSU Central Committee and the USSR Council of Ministers.

Reports were presented by the president of the Georgian Academy of Sciences, Ye. Kharadze and Academician Secretary of the republic's Academy of Sciences, E. Sekhniashvili.

It was stressed in the reports and speeches that the resolution of the June (1983) Plenum of the CPSU Central Committee and the speech at the Plenum by Chairman of the Presidium of the Supreme Soviet of the USSR Yu. E. Andropov determined the most important tasks of communist construction at the present stage and basic directions of the activities of the Communist Party and the Soviet people in the conditions of developed socialism.

A special part in the fulfillment of the goals set by the Plenum is assigned to science, scientific and technological progress, the growth of productive forces, and further improvement of production relations. The main productive force of a society is man, his work activities, and revolutionary reorganization of society is impossible without remaking man himself. This requires the actualization of the entire ideological and educational work, its forms and methods.

Ideological activities must contribute to the increase of political consciousness of the citizens, establishment of Lenin's style in work, businesslike

and creative conditions in production, discipline, and responsibility of each person to society. It was from these positions that the work of sociologists was analyzed. Having mentioned positive aspects of this work, the speakers pointed out that Georgian sociologists have to raise the standards of their studies on the problems of further improvement of the effectiveness of production, regularities in the formation of the structure of a classless society, problems of the internationalization of socialist life, development of the Marxist-Leninist theory, social thinking and communist education, and struggle with bourgeois and revisionistic ideologies. It is necessary to be more active in revealing the optimal ways of solving important social problems, to show on specific examples the regularities in the development of the socialist society, to develop political economic problems of a society of developed socialism, and to facilitate a deeper penetration of social sciences into all spheres of social production.

Particularly effective solutions must be found for such important problems as the stimulation of the scientific and technological progress, improvement of control and planning systems, improvement of the quality of products, effectiveness of production, the development of scientifically substantiated principles of price formation, and thorough scientific evaluation of economic experiments and introduction of their results into production, etc.

The republic's scientists are presently concentrating their efforts on the solution of basic problems and are actively participating in the realization of 24 union and 24 republican integrated programs.

The academy's institutions are expanding their work on the development of machines, mechanisms and technologies both for the present time and for the future. Scientists are aided effectively in their everyday activities by the Central Committee of the Communist Party of Georgia and the government of the republic, due to which the material and research base of the Georgian science has become noticeably stronger in the last 10-11 years, primarily that of the republic's Academy of Sciences. In 1971, the fixed capital of the academy amounted to 60 million rubles, while it reached 155 million rubles by the end of 1982. It was stressed at the meeting that the personnels of the academy's institutions should expand the range of their studies, increase their output-capital ratio, and to conduct more persistently and purposefully their studies which are of primary importance to the national economy.

It is important that the institutes of the academy conduct their studies jointly with production personnels of industrial enterprises, construction, transportation, and agriculture.

However, only a few institutes in the academy's system have permanent experimental production bases. In order to strengthen further the ties of science with production, it is necessary for specialized institutes to have practical help from directors of the sectors of the national economy of the republic and union sectorial ministries.

The general meeting examined the organizational problem. Georgian scientist Kalistrat Zosimovich Saliya, who is living in France, was unanimously elected

honorary member of the Georgian Academy of Sciences. This honor was given to him for his active popularization of the history and achievements of Soviet Georgia abroad. Together with his wife Nina Saliya, he is publishing in Paris the scientific journal "Bedi Kartlisa -- Kartvelological Review" which united prominent kartvelologists of Western Europe. In recent years, Soviet Georgian scientists have also been participating in this journal which is very popular in the West.

Two years ago, K. Saliya's fundamental work "History of the Georgian People" was published in France in the French language and a year ago in England in the English language. The book was awarded a special prize of the Academy of Sciences of France. Through the efforts of K. Saliya, honorary member of many universities and academies of Western Europe, and his wife, a collection of several hundreds of unique publications from the personal library of the Saliya family was created in the Institute of Manuscripts imeni K. Kekelidze of the Academy of Sciences of the Republic.

Participating in the meeting were Chairman of the Council of Ministers of the Georgian SSR D. Kartvelishvili, Chairman of the Department of Sciences and Educational Institutions of the Central Committee of the Communist Party of Georgia A. Sakvarelidze, and Vice-Chairman of the Gosplan of the Georgian SSR I. Zhordaniya.

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GEORGIAN ACADEMY OF SCIENCES TAKES PART IN INTERNATIONAL PROGRAMS

Tbilisi ZARYA VOSTOKA in Russian 22 Oct 83 p 3

[Article by Vice President of the Georgian SSR Academy of Sciences, Sergey Durmishidze: "Multilateral Contacts"]

[Text] An important direction in the activity of the Soviet state, as stressed by the June Plenary Session of the CPSU Central Committee, is the expansion of economic and scientific-technical ties with other nations, utilization of capabilities, mutually advantageous cooperation, i. e., the sound principles aimed at protecting the interests of detente and peace, the interests of every nation, of all mankind.

Scientific cooperation is accomplished mainly by joint development of current problems in science as provided in the prospectus of scientific cooperation of the USSR with other CEMA member nations, and also on the basis of multilateral and bilateral cooperation of academic institutions, and bilateral scientific-technical cooperation with nonacademic institutions as a result of organization of symposiums, exchange of science delegations and the like. Also of important significance here is the joint work on developing equipment and instruments for subsequent introduction into various sectors of the national economy.

Scientific contacts with capitalist nations are realized primarily in accordance with the intergovernmental agreements of the USSR with other nations on scientific and cultural exchange directly through the Board of Foreign Relations of the USSR Academy of Sciences. Many foreign scientists have been invited by the science institutions of the Georgian Academy of Sciences.

Joint research called for in the prospectus is carried out in the form of coordination and mutual consultations. For example, in 1981-1982 the Georgian Academy of Sciences sent 322 scientists to other nations; of these 183 went to socialist nations, and 139 -- to capitalist nations. Taking part in the work of congresses, conferences, colloquiums, symposiums and seminars held in other nations were 213 scientists of the Georgian Academy, of which 92 were involved in work in capitalist nations, and 121 -- in socialist nations. At the same time, the scientific institutions of the Georgian Academy were visited by 465 foreign scientists, of which 227 were from socialist nations, and

238 were from capitalist nations. Taking part in international events held in Georgia were 718 visiting scientists, of whom 254 were from capitalist nations, and 464 -- from socialist nations.

Contacts with scientific institutions of socialist nations occupy an important place in the international relations of the Georgian Academy of Sciences.

Most scientific institutions of the Georgian Academy of Sciences -- Tbilisi Mathematics Institute, Abastumani Astrophysical Observatory, the Institute of Geology, the institutes of physics, metallurgy, mining mechanics, mechanics of machines, geophysics, pharmacology, physical and organic chemistry, physiology, paleobiology, botany, zoology, plant biochemistry, experimental morphology, the sector of hydrogeology and engineering geology, Central Botanic Gardens -- are doing fruitful research on urgent problems of science in conjunction with scientific institutions of the People's Republic of Bulgaria, the Hungarian People's Republic, the German Democratic Republic, the Czechoslovak Socialist Republic, the Polish People's Republic, the Socialist Republic of Rumania, the Socialist Federated Republic of Yugoslavia. About 29 topics are being researched.

The Institute of Mining Mechanics in cooperation with the Scientific Research Coal Institute of the Federal Ministry of Fuel and Power of CSSR (Ostava) is working on the topic of "Developing Methods of Geophysical Observations and Instrumentation for Continuous Monitoring of the Stressed and Strained State of Rocks Under Complex Conditions of Deep Mines."

The goal of joint research by the Institute of Mining Mechanics and the Institute of Mechanics of Rocks of the Polish Academy of Sciences is to investigate the nature of mine shocks and seismic conditions in the vicinity of the Tkibuli-Shaor deposit. This direction of research is of exceptionally important national economic significance.

The Institute of Mining Mechanics is also cooperating with the Institute of Geology and Geotechnology of the Czechoslovak Academy of Sciences (Prague), with the Mansfeld Scientific Production Combine imeni W. Pik (GDR). In 1981-1982 alone in the Chiatura Manganese Deposit and the Mansfeld Copper Deposit, research was done on determining the rational dimensions of chambers and of untouched ore blocks between chambers, development of technology for preliminary maintenance of the ore body for the purpose of continuous extraction of concentrated ores, establishment of optimum parameters of the operation of mechanized shoring under conditions of drilling and blasting, which in 1982 saved 140,000 rubles on a single longwall.

The Institute of Metallurgy of the Georgian Academy of Sciences in line with CEMA is doing preparatory scientific work in conjunction with scientific institutions of Czechoslovakia, Bulgaria, Hungary and East Germany on the topic "Elaboration of Questions of Corrosion and Protection of Metals Under Atmospheric Conditions" and on the topic "Development of a Method of Polarization Resistance for Determining the Corrosion Rate of Steel in Water and Dirt" in cooperation with the Czechoslovak Institute of Metal Protection.

The Institute of Geology, and the Institute of Physical and Organic Chemistry of the Georgian Academy in conjunction with Sofia University (Bulgaria) are working on the topic of "Natural Zeolites and Their Uses." These studies are of considerable scientific and national economic importance. Bulgarian specialists have developed a zeolite substrate, "Balkanin", on which tomatoes, cucumbers, strawberries, muskmelons, peppers and flowers will grow. In this case, the yield is double the level when they are grown in ordinary soil. They also mature more quickly: vegetation is shortened by about 25 days. The extensive use of zeolites in agriculture will be conducive to a drastic increase in the efficiency of agricultural production.

Joint research by the Institute of Physics of the Georgian Academy of Sciences and the Central Institute of Molecular Biology of the East German Academy of Sciences has been quite productive.

Scientific work is being done with the Institute of Solid State Physics and Electron Microscopy of the East German Academy of Sciences on the topic "Elementary Processes of Ductility and Fracture, and Real Structure." The results of cooperation enable diagnosis of the quality of crystals to be used for various purposes in science and engineering.

Joint research is also being done by the academic institutes of socialist nations in cooperation with the Institute of Physiology of the Academy of Sciences of our republic, yielding interesting and important data. Intensive work has been done on the topic of "Experimental and Clinical Investigation of Neuroses" between Georgian physiologists and specialists of the Institute of Physiology of Humboldt University (East Germany). A routine stage has been completed in the joint research, which is of great interest for clinical medicine. There has been productive scientific-technical cooperation between the Institute of Physiology of the Georgian Academy and the Gedeon Richter Chemical Plant of Hungary on the topic "Investigation of Pharmacological Preparations That Eliminate Spasms of Brain Arteries". A fundamentally new technique for testing spasmolytic preparations that had been developed in the laboratory of physiology and pathology of blood circulation in the brain at the Institute of Physiology of our republic's Academy of Sciences was checked out on a specimen of the drug "Kavinton". In view of the high therapeutic efficacy of this drug, it has been rapidly introduced into medical practice.

Within the framework of bilateral scientific cooperation, Abastumani Astrophysical Observatory in cooperation with the Central Astrophysics Institute of the East German Academy of Sciences is working on the topic "Investigation of Clusters of Galaxies", and with the Observatory of the Central Laboratory of Space Research of the Bulgarian Academy of Sciences is engaged in research on studying the upper layers of the earth's atmosphere.

The Institute of Paleobiology of the Georgian Academy is engaged in joint research with the Institute of Paleontology and Geology of the Quaternary of the Yugoslavian Academy of Arts and Sciences (Zagreb) and with the Polish Academy of Sciences.

Also productive and effective are science contacts of the Georgian Academy of Sciences with science centers in capitalist nations. The Institute of

Physics of the Georgian Academy of Sciences is doing joint research with the laboratory of low temperatures of Helsinki Technical University.

An agreement has been made between the Institute of Mechanics of Machines of the Georgian Academy and the laboratory of experimental and physical mechanics affiliated with "Paris-VI" University on scientific cooperation in the field of internal combustion engines. An agreement has also been concluded between the Institute of Mining Mechanics of the Georgian Academy and the Italian Steinex Company for joint research on the topic "Improving Equipment for Making Building Blocks From Natural Stone by a Method of Splitting." The Institute of Geology maintains ties with other nations within the scope of development of a number of international programs.

Two botanical institutes -- one affiliated with our academy and the other of Innsbruck -- working together on the topic "Influence of Human Activity on Mountain Ecosystems", have been doing research relative to the influence that hay cutting has on the microclimate and energy exchange of the mountain ecosystem of Kazbegi.

Joint research is being done on comprehensive biological-anthropological and socioethnographic studies of nations and ethnic groups with a high percentage of longevous people. Taking part in these studies is the Abkhazian Institute of Language, Literature and History, the institutes of experimental morphology, psychology, pharmacochimistry and zoology of the Georgian Academy of Sciences, the Institute of Pediatrics of the Ministry of Health of the republic. The Institute of Experimental Morphology coordinates the medical and biological division of the Soviet research program. Doing research on the U. S. side are: the Department of Anthropology of Columbia University, the Institute on the Study of Man (New York), the Department of Anthropology of Kentucky University, and the Laboratory of Demography and Population Genetics of Houston Medical Center, Texas University.

An unusual and interesting form of scientific cooperation is the active participation of Georgian scientists in the activity of various international organizations, their speeches, reports and lectures in foreign science centers.

As we see, the scientific contacts of institutions of the Georgian Academy of Sciences with foreign science centers are characterized today by diversity and versatility. Nearly all topics are long-range or of fundamental significance, and this means that we are right to expect important results that will doubtless be of great practical use for the nations taking part in these joint science projects.

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CSO: 1814/56

GENERAL MEETING OF LATVIAN ACADEMY OF SCIENCES REPORTED

Riga SOVETSKAYA MOLODEZH' in Russian 11 Nov 83 pp 1-2

[LATINFORM report: To Improve the Efficiency of Scientific Research"]

[Text] A session of the general meeting of the republic academy of sciences took place on 10 November in Riga. Eminent scientists, chiefs of scientific research establishments and VUZ's and representatives of the public organizations in the republic's capital were present in the conference hall of the academy's high building.

The president of the Latvian SSR Academy of Sciences, Hero of Socialist Labor A.K. Malmeyster presented a report entitled "The Tasks of the Latvian SSR Academy of Sciences in Fulfilling Party and Government Decisions on Science and Scientific and Technical Progress." He noted that the CPSU Central Committee June (1983) Plenum has become a major political event in the country's life. At the plenum the most important directions were determined for the multifaceted creative activity of the party and Soviet people at the present stage, and clear landmarks were shown for our historical advance in both the short term and the long term. The efforts of the party and people have now been concentrated on the planned and comprehensive improvement of developed socialism. In the realization of this important task the role of science is exceptionally great. In his speech at the plenum, CPSU Central Committee general secretary and chairman of the USSR Supreme Soviet Presidium comrade Yu.V. Andropov said that "unified scientific and technical policy is now acquiring decisive significance." Combining the advantages of the socialist system with the achievements of the scientific and technical revolution is also of particularly great significance because the development of science and technology has become one of the main aspects of competition between the socialist and the capitalist systems.

The party and government devote much attention to the acceleration of scientific and technical progress. This year the CPSU Central Committee and USSR Council of Ministers and the Latvian Communist Party Central Committee and republic Council of Ministers have adopted a number of decrees aimed at raising the level and results of research and the extensive introduction of scientific developments into production. These important documents have become a program of action for the activities of the scientific collectives in the republic as they strive to make a weighty contribution to further efficiency growth

in social production and increased labor productivity and the economic and social development of the country and the republic.

During the first two-and-half years of the 11th Five-Year Plan 308 developments from the academy institutions in Latvia were introduced in the national economy. Research was conducted in accordance with 447 economic contracts worth R15.1 million. Twelve foreign trade agreements were concluded. Some 350 inventions offered a good start for the long term. Significant work was done in the academy to develop the agrarian-industrial associations--a basically new form for the organization of agricultural production. The economic effect from the creation of the Talsinskiy rayon agrarian-industrial association alone is about R5 million annually. These associations are now functioning in all rayons in the republic.

The range of work done within the framework of the Food Program is extensive. It is closely connected with a radical improvement in fodder production and increasing crop yields and field fertility. Timely research has also been conducted in the field of developing composite polymer materials and articles made from them having prespecified properties. The achievements of plastics chemistry and magnetohydrodynamics are enabling significant improvements in technological processes. Latvian chemists were the first in the country to master the complex technology for peptide synthesis and they have already produced test batches for medicine and agriculture. A technology has also been developed to synthesize prostaglandin for the first time in the USSR, and this will offer an opportunity to organize the industrial output of Soviet-made prostaglandin medications. Research in the field of wood processing, the development of the fuel and energy complex, the development of multiple-processor computer systems and networks, and protection of metals against corrosion is of great significance for the national economies of the country and the republic. The republic academy of sciences has been participating actively in the development of a regional comprehensive program for scientific and technical progress. During the period 1986-2005 the Latvian SSR will focus on the resolution of key problems.

As we sum up the results of our activities, the president of the academy said, at the same time we think about how to achieve finer direction and fruitfulness in our work and how better to help in the fulfillment of present-day economic and sociopolitical tasks. And here there are still many possibilities. It is essential to improve the forms of cooperation with production and show more initiative in setting up sector scientific laboratories right there in the enterprises, and to conduct research on agreed subject on a broader scale. Fixed attention should be given to economic substantiation for proposals destined to be used in the national economy, and to striving for maximum practical introduction of valuable recommendations. The use of these and other reserves for strengthening the scientific potential is the guarantee of further successes.

The academic secretary of the department of social sciences V.A. Shteynberg presented a report entitled "Urgent Questions in the Social Sciences in the Republic in Light of the Decisions of the CPSU Central Committee June (1983) Plenum and the Latvian Communist Party Central Committee July (1983) Plenum." He noted that the patterns in the development of science indicate that the

humanities--economics, philosophy, sociology, history, law, literature, linguistics and so forth--are now advancing in terms of their role in the life of society. This is dictated by the demands of our dynamic age and the requirements of a developed socialist society.

Since it is closely tied to practice and follows Leninist traditions, the party of communists has shown a wonderful example of the profound understanding of social patterns and trends in economic, spiritual and ideological development. The party has proposed a broad program of actions, outlined at the 26th CPSU Congress and the CPSU Central Committee June Plenum. A plenum of the Latvian Communist Party Central Committee took place in July at which a careful analysis was made of the status of research in the social sciences in the republic and measures were proposed that are of enormous importance for the further development of research and the resolution of urgent questions of ideological and mass-political work in the republic. At the plenum the need was stressed "to pay more attention to questions of planning for and the effective organization of scientific research on the phenomena and processes of social life at the stage of mature socialism, and to enhancing exactingness toward the style and methods of work by scientific and VUZ collectives..." and justified reproofs were directed at the republic academy of sciences Institute of Language and Literature.

All these important instructions have become a subject of serious discussion in the social sciences institutes, where a careful analysis has been made of everything done and not done, and where work plans have in some cases been substantially altered. In general, during the course of the discussions a successful assessment was made of work on studies of the history of the Latvian people, the revolutionary struggle of Latvia's working masses, and the enormous political and social gains made in the cause of building socialism and communism on Latvian soil.

In the amendments to research plans each humanities institute paid particular heed to the presidium of the republic academy of sciences. The actual position and possibilities of the institutes were analyzed in detail. Thus, relying on work already done in advance, the Institute of Economics proposed a strengthening of research in the field of improving production relationships under socialism, generalization of the experience of the rayon agrarian-industrial associations, and improvements in the economic mechanism in the development of the agrarian-industrial complex in the country and in the republic. In both this and other institutes the number of individual themes and less urgent themes was cut back and ways were considered to focus efforts in more important directions. A number of other steps were also taken to promote a decisive turnabout by social scientists toward really practical tasks, strengthening work on the problems of developed socialism, and studies of the history and culture of the population in the past. All this should provide corresponding practical results, the speaker said, and lead to the development of specific recommendations that meet the demands of the party and government; and we are sure that it will.

The speaker went on to deal in detail with questions of counterpropaganda, which have acquired special significance in connection with the aggravated

international situation. It is the duty of each scientist, it was emphasized in the report, to convincingly show the historical truth and strength of our theoretical positions and to actively unmask bourgeois antiscientific concepts.

There is every reason to assert that the plans for scientific research work in the social sciences field can be fulfilled in a high quality manner and within the periods set, the speaker said in conclusion. Scientists are fully resolved to apply maximum efforts in order to raise the significance of the social sciences to the level required by the complex times in which we are living and creating the new social world and affirming relationships of the most profound humane nature one man to another.

Deputy chairman of the Latvian SSR Council of Ministers V.M. Krumin', academicians A.P. Grigulis, B.A. Purin and R.Ya. Karklin', and corresponding members of the academy V.O. Miller and V.V. Doroshenko spoke at the general meeting session.

Those participating in the general meeting session adopted a resolution in which the specific tasks of Latvian scientists were determined for compliance with the decisions of the CPSU Central Committee June (1983) Plenum and the Latvian Communist Party Central Committee July Plenum.

Those participating in the session unanimously approved the party course toward maintaining peace and preventing thermonuclear war and expressed their firm conviction that the creative energy of the scientists and their new achievements will serve the cause of strengthening the might of our motherland.

The following comrades participated in the work of the session: I.A. Anderson, E.M. Ozols, deputy chairman of the Latvian SSR Supreme Soviet Presidium V.A. Blyum, deputy chairman of the republic council of ministers and Gosplan chairman M.L. Raman, and Latvian Communist Party Central Committee department chief V.S. Klibik.

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CSO: 1814/54

NEW ORGANIZATION TO PROPAGANDIZE LEADING TECHNICAL EXPERIENCE

Riga SOVETSKAYA LATVIYA in Russian 16 Nov 83 p 2

[Interview with V. Bondarenko, director of the Riga Technical House, by correspondent V. Polyanskiy: "Experience Augments Effort"]

[Text] The address 35 Gorkiy Street in Riga still does not bear the inscription "Riga Technical House." But while the refurbishing of this building is taking place the workers of the new formation have already succeeded in accomplishing a great deal. They have organized regular study sessions with specialists from various sectors of the republic's national economy at seminars devoted to the study of leading experience in introducing territorial systems to control output quality, labor and production efficiency, insuring accuracy and uniformity in measurements, certifying working conditions, and the legal regulation of questions of controlling output quality.

SOVETSKAYA LATVIYA correspondent V. Polyanskiy asked its director V. Bondarenko about the aims, tasks and work plans of the recently created Technical House.

Our most important task, he said, is propagandizing leading experience and the achievements of science and technology on the broad, mass scales demanded by the recent CPSU Central Committee and USSR Council of Ministers decree "On Measures To Accelerate Scientific and Technical Progress in the National Economy." With the creation of the Technical House, all the sector scientific and technical societies (and we have about 20 within the republic) have obtained a unified methodology and material-technical base for propagandizing leading experience. Under the aegis of the Latvian republic council of professional unions the Technical House is designed to eliminate elements of the narrow departmental approach, which are still found in important work such as assessing and introducing the achievements of science and technology.

The work plans for our collective are closely linked with the participation of a broad range of administrations and scientific research organizations within both the republic and the country. For example, the permanent seminars

organized this year on the problems of controlling output quality, labor and production efficiency are taking place with the active participation of specialists from the Latvian republic board of the State Committee for Standards, the All-Union Scientific Research Institute of Standardization, the Latvian SSR Academy of Sciences Institute of Economics, party officials, and lecturers from the "Znaniye" society. In the near future our aktiv of propagandists of what is new and progressive will be augmented by major scientists from scientific research institutes in Moscow and Leningrad. Next year it is planned to set up a mobile thematic stand at the USSR Exhibition of National Economic Achievements. At this stand the leading experience of Latvian specialists will be generously shared with the entire country.

The collective of the Technical House has been assigned the task of active and comprehensive propaganda of the best experience. Hence the broad range of thematic measures that we are implementing. These include seminars with specialists from production associations and enterprises on improving collective forms for labor organization and wages, the resolution of urgent problems of environmental protection, the use of efficient methods in transportation services and so forth. We are expanding the "geography" of our work: even this year a number of seminars will be held not only in Riga but also Yelgava and Valmiera, and next year in Daugavpils, Liepaya and other cities in the republic.

A major measure of the Technical House, in which the republic Gosplan, the Latvian SSR Academy of Sciences, the Latvian republican council of the All-Union Society of Inventors and Rationalizers, and the board of the "Znaniye" society are also participating, is the conference planned for December on the problems of technical creativity, at which scientists from many cities in the country will share their methods and practical experience in organizing work on inventorship and rationalization.

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CSO: 1814/60

FIRST SESSION OF CENTRAL KAZAKHSTAN DEPARTMENT OF KAZAKH ACADEMY OF SCIENCES

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 29 Oct 83 p 2

[KAZTAG report: "To Strengthen the Links Between Science and Production. The First Session of the Central Kazakhstan Department of the Republic Academy of Sciences"]

[Text] The creation of the Central Kazakhstan Department of the republic academy of sciences is an important milestone in the development of the economies of Dzhezkazgan, Karanganda, Kokchetav, Kustanay, Pavlodar and Tselinograd oblasts and the opening up of their natural resources.

On 27 October the first session of a general meeting of the Central Kazakhstan Department took place in Karanganda. It was opened by the president of the Kazakh SSR Academy of Sciences academician A.M. Kunayev, who delivered a few opening words. Deputy chairman of the USSR Academy of Sciences Council on Coordination of Scientific Activity of Union Republic Academies of Sciences N.S. Pshirkov read greetings to the Central Kazakhstan Department of the republic academy of sciences from the USSR Academy of Sciences. Those participating in the session welcomed A.G. Korokin, first secretary of the Kazakh Communist Party Karanganda obkom.

A report entitled "The Establishment and Development of Science in Central Kazakhstan and the Tasks of Scientists in Light of the Demands of the 26th CPSU Congress" was presented by academician of the Kazakh SSR Academy of Sciences A.S. Saginov. The following spoke at the session: Kazakh SSR minister of geology S.Ye. Chakabayev, academician-secretary of the Kazakh SSR Academy of Sciences Chemical and Technological Sciences Department academician B.A. Zhubanov, academician-secretary of the Biological Sciences Department and director of the Kazakh SSR Academy of Sciences Institute of Microbiology and Virology academician A.N. Ilyaletdinov, director of the Institute of Geological Sciences imeni K.I. Satpayev, academician of the Kazakh SSR Academy of Sciences A.A. Abulin, and the director of the Institute of Mining corresponding member of the Kazakh SSR Academy of Sciences Sh. A-G. Volgozhin.

It was stressed that the main task of the new scientific center should be consistent and persistent implementation of the tasks set by the 26th CPSU Congress, the CPSU Central Committee June (1983) Plenum, and the CPSU Central Committee and USSR Council of Ministers decree "On Measures To Accelerate

Scientific and Technical Progress in the National Economy," and contained in the speeches of CPSU Central Committee general secretary and chairman of the USSR Supreme Soviet Presidium comrade Yu.V. Andropov on questions of improving the efficiency and quality of scientific research and making maximum use of research results in the national economy.

The efforts of the scientists should be aimed at key fundamental and applied research and the elimination of unjustified duplication and triviality in their work. Specialists from industrial enterprises and scientists from the VUZ's must be recruited more into solving tasks concerned with the use of the achievements of science and technology.

The republic's scientific community greets with a sense of satisfaction the opening of the Central Kazakhstan Department of the republic academy of sciences, which has been a graphic new manifestation of party and government concern for the development of science in Kazakhstan. About 10,000 scientific workers and VUZ teachers are working in Central Kazakhstan, including two academicians and 4 corresponding members of the Kazakh SSR Academy of Sciences and about 70 doctors of science and 1,250 candidates of science. They maintain ties with major enterprises--the Magnitogorsk and Karaganda metallurgical enterprises, the Dzhezkazgan and Balkhash mining and metallurgical enterprises, the Sokolovskiy-Karabayskiy and Lisakovskiy mining and enrichment combines, the "Karagandaugol'," "Ekibastuz" and "Tsentrkazgeologiya" associations and the Yermakovskiy ferroalloys plant.

The new department of the Kazakh SSR Academy of Sciences includes institutes of chemicals and metallurgy, organic synthesis and carbon chemistry, a branch of the botanical gardens, and departments of the academy institutes of mining, geology, economics and seismology.

Election of members of the Central Kazakhstan Department took place. The director of the Chemical and Metallurgical Institute corresponding member of the republic academy of sciences D.N. Abishev was elected academician-secretary; academicians of the Kazakh SSR Academy of Sciences Ye.A. Buketov and A.S. Saginov were elected members of the department bureau.

First secretary of the Kazakh Communist Party Dzhezkazgan obkom N.G. Davydov, chief of the Kazakh Communist Party Central Committee Department of Science and Educational Institutions S.T. Temibrekov, and the secretaries of the Kokchetav, Pavlodar and Tselinograd party obkoms participated in the work of the session.

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## ACTIVITIES OF TAJIK ACADEMY OF SCIENCES REPORTED

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 16 Oct 83 p 2

[Article by the Tajik Telegraph Agency: "For a High Yield of Science. From the Report and Election Party Meeting of the Tajik SSR Academy of Sciences"]

[Text] On Oct 14, a report and election party meeting of the Tajik SSR Academy of Sciences was held in an atmosphere of high activity of the communists with a stress on the enhancement of the role of science in the technicoeconomic and social development of the republic. The participants of the meeting enthusiastically approved and fully supported the Declaration of the General Secretary of the CPSU Central Committee, Chariman of the Presidium of the USSR Supreme Soviet, Yu. V. Andropov, published on 28 September 1983 as a document of great political significance reflecting the course of our Soviet land toward preventing the threat of nuclear war and strengthening universal peace.

The meeting discussed the report of the Party Committee on the work done.

During the last three years, the institutions of the Academy conducted studies on 216 topics and assignments and completed their work on 29 topics. Much was done on the study of the natural resources of the Tajikistan and improvement of the effectiveness of agricultural production; fundamental studies were conducted in mathematics, physics, astrophysics, seismology, geology, chemistry, and biology; works were published on urgent problems of history, philosophy, economics and philology.

Work is progressing successfully on long-term contracts and agreements on creative cooperation during the five-year plan between the Academy of Sciences, ministries and departments of the republic; more than one hundred jobs on economic contracts in the amount of 2.5 million rubles are fulfilled annually. During the two and a half years of the five-year plan, scientific institutions of the academy submitted 214 applications to the USSR State Committee for the Matters of Inventions and Discoveries, received 100 patents and 81 approvals.

At the same time, I. Sh. Sharipov, secretary of the Party Committee, who presented the report, and the participants in the discussions -- M. S. Asimov, president of the Tajik USSR Academy of Sciences, B. I. Iskandarov, director of the Institute of History imeni A. Donish, I. A. Abdusalyamov, sector head of the Institute of Zoology and Parasitology imeni Ye. N. Pavlovskiy, Kh. Kh. Karimsa, chairman of the leading people's control group, D. K. Karamshoyev, department head of the Institute of Language and Literature imeni A. Rudaka, and others -- spoke in detail about the reserves in the fulfillment of the tasks given to science by the 26th Party Congress at the May and November (1982) and June (1983) Plenums of the CPSU Central Committee which were clearly presented in Comrade Yu. V. Andropov's speeches and articles.

During the period under review, the Party Committee did much work on mobilizing the communists and all workers of the academy for carrying out the resolutions of the party. Much attention was given to increasing the effectiveness of studies and strengthening the ties of science with production.

For example, experimental production of extrapure aluminum was set up, methods of long-term earthquake prediction were developed, genetic and physiologobiological principles of the stability of cotton to wilt were studied, and integrated method of protecting cotton plants against pests and diseases is used widely. Some results in the area of economic sciences connected with the development of preplan documents are used in the national economic planning.

However, the contribution of the Academy of Sciences to the development of the national economy of the republic is far from adequate. The party organizations of the institutes do not sufficiently direct the efforts of the scientific personnel toward successful fulfillment of the tasks of improving the effectiveness and quality of their studies, and do not give sufficient attention to the ideological and political education of scientific intellectuals and to the formation of a creative atmosphere in each team.

In the course of a number of years, some scientific subdivisions of individual institutes of the academy have been working without producing proper results, and its presidium, the Party Committee and party organizations of the institutes resigned themselves to this situation, do not evaluate such facts on the basis of principles, and condone violations of the performance discipline. For these reasons, for example, two stages of the union integrated program on the problems of the utilization of solar energy in the national economy and one stage of the union program for the Tajik Aluminum Plant were not fulfilled in 1982.

The Tajik SSR Academy of Sciences is entrusted with the coordination of scientific studies conducted in the republic. However, the Presidium of the Academy of Sciences does not give sufficient attention to combining the effort of academic institutions, sectorial scientific institutions and vuzes for solving the most important national economic problems, and the direction and level of the fundamental and applied studies conducted currently do not fully satisfy the needs and special characteristics of the economic and social development of the republic.

There are extremely few joint research projects directed toward increasing labor productivity, conservation of energy and material resources conducted by the departments of physicomathematical, chemical, and geological sciences with production enterprises and associations.

Many problems of socioeconomic development remain unsolved in the republic: rational utilization of natural and labor resources, growth of labor productivity, increasing the effectiveness of production, and the republican automated control system (RASU) of the national economy. It is necessary to conduct thorough studies of economic phenomena of the republic's life and to produce concrete substantiated recommendations on this basis.

The academy and vuzes do not conduct joint discussions of scientific works and creative scientific discussion on individual problems of social sciences, as a result of which some scientific publications are at a low ideological and theoretical level. In this connection, the sociologists were subjected to serious criticism at the tenth Plenum of the Central Committee of the Communist Party of Tajikistan.

In accordance with the basic directions of the 26th CPSU Congress, the sociologists should expand their work on solving a large complex of theoretical problems connected with the increased effect of socialist culture on the ideological and moral education of the Soviet man and the shaping of the communist personality. Scholars should give their special attention to the study of the problems of atheistic, international and patriotic education.

The strengthening of the influence of the party on the development of science and acceleration of the scientific and technological progress must be accompanied, first of all, by all possible strengthening and improvement of the fighting efficiency of the primary party organizations.

Today, the main task of the primary party organization of the Academy of Science of the Tajik SSR is consistent and persistent realization of the goals set by the 26th CPSU Congress, the directions of the July (1983) Plenum of the CPSU Central Committee, the resolution of the CPSU Central Committee and the USSR Council of Ministers "On Measures for the Acceleration of the Scientific and Technological Progress in the National Economy", and propositions and conclusions contained in the speeches of the General Secretary of the CPSU, Chairman of the Presidium of the USSR Supreme Soviet Comrade Yu. V. Andropov.

The speakers criticized the Party Committee for not using every possibility for enhancing the role of the departmental party organizations of the institutes and inadequate organization of the training of secretaries and exchange of experience. During the period under review, the Party Committee did not hold discussions of reports about the fulfillment by the communists of their official duties and observance of the requirements of the CPSU Rules.

Analyzing the work of the academy, communists pointed out the necessity of ensuring a high degree of organization and order in all subdivisions of the academy, of strengthening the Party, state and labor discipline, and of improving the organization of socialist competitions.

The meeting discussed the considerable reserves for increasing the contribution of scientists to the fulfillment of the Food Program and a fuller utilization of the most valuable scientific equipment. Much attention was given to the problems of improving the production conditions of work and the moral and psychological climate in the teams. Having critically assessed the work performed, the communists mapped out extensive measures directed toward the removal of the faults in the activities of the scientific institutions.

G. B. Bobosadykova, secretary of the Central Committee of the Communist Party of Tajikistan spoke at the meeting.

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RESEARCH IN MAN-MACHINE INTERACTION DISCUSSED

Yerevan KOMMUNIST in Russian 20 Sep 83 p 2

[Interview with Ruben Aguzumtsyan, candidate of psychology, docent, by D. Balagezyan: "Human Factors Engineering"]

[Text] The scientific and technological progress which characterizes the modern era has burst forth upon man's world, into all fields of work without exception. Today it is difficult to imagine man without functioning technical systems and devices designed to increase the output from his labor.

Specific problems have developed in recent decades in man-machine interaction. A new scientific discipline, human factors engineering, has begun to study the problems.

In Armenia the work in this field is headed by Candidate of Psychology Ruben Aguzumtsyan, docent at Yerevan State University. He successfully combines the knowledge of a graduate electronics engineer and the psychologist in his scientific work. We have asked him to answer a number of questions.

[Question] Ruben Vasgenovich, a great deal has been written and said about man's interaction with technical equipment in recent years. How are these problems manifested?

[Answer] The human being, his attitude, his perception and his way of thinking, his mental makeup, which is of course a reflection of the world around him, are changed in the process of his interaction with machines. The fact has been established that the rate of change for the world around us does not always coincide with the changes in the human mind. This gives rise to new problems such as low labor productivity, nervous stress and various occupational illnesses. This occurs because we are not always prepared /adequately to accept/ changes in our environment and we therefore use the old yardstick for measuring new developments. The development and adoption of automated control systems (ASU) has been one such change. At first everyone was delighted--machines could do many things far better, more rapidly and accurately than could man. Strangely, however, a so-called sobering-up period soon began. People suddenly realized that the automated control systems, although complex and "intelligent" devices, are not producing the needed effect, because man is not always comfortable or at ease working in the new situation....

[Question] Then it became necessary to gain a more thorough understanding of the nature of man's interaction with machines?

[Answer] Absolutely. The research resulted in a new scientific discipline, human factors engineering. This was at the beginning of the 1960's. This was not only a period of importance and urgency in the practical respect. It was also a turning point for our entire mind, for our way of thinking. Representatives of the technical sciences were forced to turn to psychology, a science to which they were not accustomed, and the psychologists had to turn to the exact sciences. /Human factors engineering/, which began to study man's functioning under the new working conditions, thereby making it possible to understand and study the human mind in a new way, developed at precisely this juncture. Once again we sensed with new force and on a new scale, objectively, that man is the chief and most important element, that everything is done for his sake and everything which is created is the fruit of the human mind.

Our society's most effective reserve lies in the practical application of our knowledge of the human mind, which will make it possible /to increase labor productivity and make labor a joyful thing/. Over the past 15-20 years we have been accumulating experimental data in this area, which has led to the creation of the methodological principles and methods of human factors engineering, whereas we can now perform practical production and control tasks.

[Question] Human factors engineering is a new scientific field. Ruben Vasgenovich, could you give us some examples of effective results from the recommendations made by the scientists?

[Answer] Certainly. Like any other scientific discipline, the studies performed in human factors engineering have a large practical effect. On this level human factors engineering is important in two clearly defined ways. On the one hand it is expected to make man's labor pleasant, comfortable and joyful, that is, to /humanize/ labor by optimizing its interrelation with the tools of labor, using a scientific approach and taking human characteristics into account in the process of creating new control systems. On the other hand, it is expected to increase labor productivity.

[Question] What is the level of research in the field of human factors engineering in our republic?

[Answer] Special and focused research has been performed in Armenia since a group operating on the basis of economic agreements was formed at Yerevan State University. It mainly studies the problem of the human operator's functional dependability. This problem is considered from three standpoints: occupational selection, training and the optimization of man's interaction with machines. Special attention is given to job training performed with technical equipment (trainers).

Our specialists work closely with the nation's leading scientific and psychological training subdivisions, as well as with the republic's enterprises and organizations. The specific nature of the work performed by the scientists is determined by the availability in Armenia of numerous organizations developing technical control systems. Close contacts with them make it possible also to study

the diversity of phenomena occurring in the control of various installations and to better assess the needs of industry. The application of recommendations arrived at on the basis of experimental research in the functional reliability of telegraph operators in the Yerevan Branch of the Scientific Research Institute of the Ministry of Communications is an example of this cooperation. It has reduced the number of errors and made it possible to create a more convenient system of transmitting visual information, thereby making the work considerably more effective.

All-Union seminars on the problem "Psychological Aspects of Effectiveness and the Reliability of 'Man-Machine' Systems" and an All-Union conference on "The Psychological Aspects of the Building of Trainers" have been conducted through the university in Armenia. By decision of the latter /the university has become the basic and head organization for the study of this set of scientific subjects/. It is planned to conduct a second All-Union conference on this problem in Armenia next year.

[Question] The university specialists are engaged in serious projects under economic agreements with various enterprises and collectives. What is the situation with respect to basic research?

[Answer] A major, scientifically based system capable of accomplishing specific practical tasks must be based on a solid foundation of basic research. Otherwise, the successes will only be temporary and will be less effectiveness. Such research is being performed at Yerevan State University. It has gained recognition from the nation's leading organizations and scientists. Our successes in this field would be more effective, however, if they were less dependent upon the client's practical tasks. It would be better if the scientific projects in the new field of science were more focused.

It is obviously time to create a scientific research institute for applied psychology in the republic. This would be of great benefit not only to the practical workers and scientists but also to those developing the new automated systems and to VUZ students.

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## NEED TO CONSERVE MATERIALS UNDERSCORED

Minsk SOVETSKAYA BELORUSSIYA in Russian 19 Aug 83 p 2

[Article by L. Rodionov, candidate of economic sciences, docent at the Belorussian State Institute of the National Economy: "The Most Important Factor of Effectiveness"]

[Text] At our high level of industrial development the conservation of materials is becoming the main condition for production's transition to intensive development. The conservation of materials is the most effective factor in the struggle to enhance labor productivity, since they account for more than 60 percent of the outlays. The conservation of materials is more than just conservation of the labor embodied in them. It also means a reduction in the need for additional labor. A decrease in production or extraction volumes, hauling and processing, as well as in the corresponding need for workers, can be achieved relative to the quantity of materials saved.

The following example illustrates this. The metal utilization coefficient at machine-building enterprises in Belorussia has stabilized at the 0.74-0.76 level. This means that a fourth of it becomes waste metal. When precision stamping is employed instead of machining, however, waste is reduced to a minimum, and 15,000 machine tools and more than 20,000 workers are freed for each million tons of metal processed.

There is an even more effective way to conserve metal--by using powdered materials. One ton of metal powder replaces 2.5 tons of rolled metal, which is sufficient to free 190 workers and 80 machine tools (that is, the output-capital ratio also increases). Start-up of the Molodechno plant, designed to produce 10,000 tons of items made of metal powder per year, will free around 3,000 workers from material production and will save more than 20,000 tons of rolled metal annually.

The technological process for the production of parts for roller bearings by pressure forging them out of powder metal instead of iron castings and then finishing them on a lathe, which has been adopted at the Minsk Bearing Plant, has markedly reduced the amount of labor and metal consumed in the production of the bearings.

By cutting electric power consumption by just 1 percent, as an example, the republic could cover the electric energy needs of such giants as the Mozyr Refinery and the Minsk Motor Vehicle Plant. It is not difficult to imagine the

extent to which this would reduce the number of workers employed in the fuel extraction-transportation-electric power production chain.

The planned economy has great possibilities for conserving materials by making progressive structural advances in their production and extraction and by implementing appropriate interbranch programs. The aforementioned plant for the production of items from metal powder in Molodechno is being constructed within the framework of a comprehensive program for the development of powder metallurgy in the nation. Hydroelectric and atomic electric power plants will account for more than 70 percent of the growth in electric power production during the current five-year period. This will reduce the need for fuel to produce electric power. A third of the assignment for metal conservation is being achieved not by the consumers but by the producers themselves--the metallurgists--who are increasing their output of economical rolled metal sections. The use of synthetic resins and plastics, a ton of which replaces 3-4 tons of rolled metal, is being substantially expanded. Such measures, designed to help alter the existing production structure, are being carried out within the framework of a centrally approved plan by coordinating the interests of producers and consumers. The consumer does not really care where the electric power comes from--a nuclear or a thermal electric power plant--and has nothing to do with implementing the plans for their construction. We need to produce so many fluorescent lights, however, which use 5-fold less electric power than conventional lightbulbs, and for this the consumers must have an interest in replacing the conventional lights with the more economical ones. It is possible to create such an interest only with rigid norming of materials consumption--electric energy in this case--and with an appropriate material incentive system.

The centralized norming covers only the most important materials, however, which account for approximately one fourth of the total cost of materials. No less than 12 millions types of products are produced in all, however, and a large number of norms are established for each of them. While five consumption norms have to be established for a ball-point pen, for example, hundreds are needed for certain items. Then we have to add consumption norms for construction, agriculture, transport and the consumer service field. What is the answer? We have to establish more rigid control over the use of material resources. The total materials consumption ceilings in kopecks per ruble of output or work, which are being adopted in the planning, and assignments for reducing the amount of materials used in the main types of products are producing greater results than the detailed regulation of all norms centrally, from above.

Conservation of purchased and semi-finished products, which embody unnecessary strengthening features, constitutes a considerable reserve. Even the famous Minsk tractors have excess weight due to the tires and electrical equipment, which weigh considerably more than those of the best like models. The "Meliormash" plant in Mozyr uses a large number of workers and a great deal of materials for modernizing and altering the series-produced tractors it receives, since there are no special economical power units for the production of various makes of land reclamation equipment. Or take the production of construction parts and elements. All of the parts are unified for the construction of multi-storied buildings, and the lower and upper floors therefore have equal strength. This results in increased consumption of materials and makes the buildings heavier. In addition, they have heavy interior partitions requiring labor-consuming interior finishing work.

Progress in improving the use of materials depends greatly upon the restructuring of the capital investment policy. The amount of capital invested in the lumbering industry has to be reduced in order to increase the amount used for the production of machine systems capable of completely processing waste lumber, for example. In the development of the agroindustrial complex production in the capital-producing branches is increasing more rapidly. The same is true of branches of the infrastructure. This is permitting more effective use to be made of materials and equipment allocated for the rural area, to preserve them and increase output in the form of the final product. The conversion of heavy trucks from gasoline to diesel is reducing the amount of capital needed to expand oil extraction and will make it possible to use the capital to build up capacities for the production of diesel engines. Even the new types of forklifts, the production of which is being set up during the current five-year period, can operate on diesel fuel or even gas.

Certain successes have been achieved in the republic in the conservation and efficient utilization of specific materials, primarily by applying scientific and technological achievements. I will not enumerate them, but I would point out that in general there has still been no noticeable progress with respect to reducing the quantity of materials used in production, construction or transport. Furthermore, while conserving a certain type of materials, in some cases there is a significant overconsumption of other types of materials and an overall growth in the amount of materials used. During the past decade, for example, production has been carried out in the republic's wood-processing industry without increasing lumber procurement volumes. This is clearly a significant achievement, and it has been maintained over a lengthy period of time. The lumber was delivered irregularly and with disruptions, however, which increased the cost of procuring and storing it. In addition, there was obvious overconsumption of various materials, fuel and energy for maintaining and operating the equipment and machinery, repairing and maintaining the forestry roads. As a result the Belorussian SSR Ministry of the Timber and Wood Processing Industry permitted material outlays to increase more rapidly than production volumes. During the 10th five-year period material outlays increased by 24 percent, while the ministry's industrial output volume grew by 17.8 percent. Other ministries also had outstripping rates of growth for material outlays. Overall, stocks of goods and materials increased 1.5-fold more rapidly in the republic over the past five-year period than the volume of industrial output, while above-norm stocks doubled.

Planned assignments for conservation of materials are regularly not fulfilled. In 1981 the republic fulfilled the plan for conservation of rolled ferrous metals by only 81 percent; gasoline for motor vehicles, by 84 percent; diesel fuel, by 86 percent; and lumber, by 90 percent. The situation has not changed in the second year of the current five-year period. This is mainly caused by a lack of proper demandingness and strictness with respect to the fulfillment of assignments for conserving raw and processed materials, fuel and energy. All of this is damaging realistic possibilities for fulfilling plans and it frequently causes the ministries and labor collectives to lower plans. And the shortage of raw and processed materials and energy is precisely the main cause of this.

As a result of stagnation in the thinking of many management leaders the conservation of live labor, even with an increase in material outlays, continues to be the only factor increasing labor productivity in the broad sense of the term, the only condition for the transition to the intensive path of development and

the elimination of the shortage of workers. The Novogrudskiy Gas Equipment Plant, the Volkovyysk Foundry Equipment Plant, the Grodno Motor Vehicle Assemblies Plant and others send thousands and thousands of tons of commercial waste metal to the scrap heap for remelting. It turns out to be economically advantageous to rework the finished rolled metal from the metal supply base, which involves fewer labor outlays. The processing of commercial waste metal requires more labor and means, which is unprofitable for the enterprise and forces it to increase the number of workers in the semi-finishing section or to create yet another plant subdivision.

Tens of thousands of tons of metal plate and even rolled sections are remelted, although it is perfectly possible to use them without this processing. It would appear that the Gomel Measurement Instrument Plant is doing a great deal to bring out initiative in the collective--the workers themselves have an interest in increasing output norms. An inspection conducted in the fall of 1982, however, showed that materials are not being used efficiently there. Hundreds of tons of commercial waste metal (even stainless steel) are sent to the scrap heap to be melted down. In other words, it is far easier to fulfill the output norms and production volume plans without "becoming involved" in the conservation of materials and energy.

Party and government decisions call for the implementation of extensive measures to increase the effect of economic and material incentives for taking determined steps toward the efficient utilization of raw and processed materials, fuel and energy. Some of these measures are already being carried out.

Payment for water has been included in the production costs of the manufactured goods; assignments for production profitability are made up without considering direct material outlays in the production cost; stable norms and prices are to be set for a five-year period, without any review due to possible changes in production's material consumption level; and wholesale prices are to be set for new products without considering the retention of profit from the previous product as the minimum. Payment for stock out of above-ceiling material resources is exacted in advance from the profit left at the collective's disposal, while above-ceiling outlays are paid by the supplier at increased prices and rates. If the consumption of materials is below the established ceilings, the savings gained in the amount of payment for stocks is left for the collective.

Direct deductions into the economic incentive funds from the amount saved by reducing production's materials consumption to a level below the ceilings are being introduced; bonuses for management personnel are beginning to be awarded in accordance with this saving; and many abatements are provided for the efficient use of waste products and secondary materials.

The labor collectives and teams are still mainly interested in fulfilling or exceeding production volume plans, however, frequently at any cost. This situation indirectly encourages waste. It is easier to fulfill or exceed production and output plans when fewer personnel are used for conserving materials, and the technological process is far simpler when the materials are utilized without restraint. This is in conflict with the requirements for increasing production effectiveness, however.

The June Plenum of the CPSU Central Committee especially stressed the importance of enhancing labor productivity and further intensifying production. The conservation of materials and the efficient utilization of raw and processed materials, fuel and electric energy constitute an extremely important field of work for accomplishing this task.

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## SPECIALISTS TRAINED IN MULTIPLE FIELDS NEEDED

Tallinn SOVETSKAYA ESTONIYA in Russian 9 Sep 83 p 3

[Report by Oleg Belotserkovskiy, academician of the USSR Academy of Sciences and rector at the Moscow Physical and Technical Institute, recorded by Yu. Zaytsev: "The Scientist-and-Engineer"]

[Text] At the request of SOVETSKAYA ESTONIYA Oleg Belotserkovskiy, academician of the USSR Academy of Sciences and rector of the Moscow Physical and Technical Institute, discusses problems of the higher school.

It has been calculated that as a direct production force science could become four to five times more effective without any or with almost no additional capital investments, simply as a result of organizational improvements. One of the ways to accomplish this is to bring it into closer relationship with the national economy. This will provide it with productive stimuli, give it new ideas and involve the theoreticians and the experimenters in problems of practical importance. Science would then have a debt to pay. Each ruble spent on science would give the country an assured increase of almost 5 rubles in the national income.

There is a good reason why the number of scientific production associations is increasing. In addition to intraplant laboratories, a scientific production association also includes separate research, design and planning organizations, which, together with the enterprise, form a single large firm headed by a scientific institution, an institute. This sort of integration accelerates progress in engineering and technology and the application of discoveries, inventions and all sorts of innovations in the economy.

Along with the process of making industry more scientific, science is also being "industrialized." Accelerators and reactors, gigantic radiotelescopes and electron microscopes, electronic computers and so forth make up the equipment of science today. An engineer well acquainted with science must assist the scientist, and a scientist well acquainted with engineering must help the engineer.

A need has arisen for personnel of a new type. There is an increasing need for the scientist-engineer and the scientist-organizer with a well-rounded education permitting him to easily understand the theoretician, the experimenter and the practical worker and to bring the viewpoints of the scientists and the production workers closer together.

What demands is this making of the higher school?

The chief problem of higher and secondary specialized education today is that of providing quality training for the specialists. They have to operate today in a situation of unprecedented rates and scales of national economic development, a more complex structure and interbranch ties, the extensive application of scientific achievements in the practical work and emphasis on the more complete utilization of intensive economic growth factors. This involves the acceleration of scientific processes, the rapid dissemination of scientific control principles into all areas of public life, and new possibilities for perfecting the structure of society and for the all-round development of the personality.

Occupational mobility of the specialists is becoming one of the main requirements. The specific nature and the urgency of this problem lies in the fact that it is assigned to the mass educational system. New scientific fields are emerging and developing with extraordinary speed today. In order to take this into adequate account in the training and to provide the specialists with the proper preparation, I believe that we need a basic reorientation of higher education, a new approach to the matter of the specialist's field of training. This is expressed by the formula "focused field of knowledge with a broad foundation."

Finally, this factor is especially important--at the contemporary stage life demands improved forms of alliance between the higher educational institutions and science and production.

Basically, two systems for training highly skilled cadres--universities and technical schools--have developed in the nation.

The former, which provides extensive general scientific training, does not give all of the knowledge essential for working in industrial scientific research institutes and laboratories. And unfortunately, the VUZ's do not provide a broad education. Specialists in the various fields, however, are now being faced with extremely complex scientific, engineering and production problems, the resolution of which requires both of the above.

Space research has brought out a whole group of totally new problems in the field of aerodynamics, for example, and purely scientific tasks (the formulation and resolution of complex nonlinear problems of physical dynamics), applied tasks (the development of effective methods for resolving them and applying them on the practical level), engineering tasks (determination of the most suitable designs from the standpoint of the system as a whole) and tasks related entirely to production, to the accomplishment of the projects, are thoroughly interwoven therein.

The need to train the appropriate researchers is what has resulted in the creation of the type of VUZ's--so-called technical universities, which combine the strongpoints of the university and the higher technical school. The central principle upon which these VUZ's are based is that of training specialists in cooperation with scientific research institutes, design offices and industry, and the creation of scientific training production associations.

The Moscow Physical and Technical Institute, the Novosibirsk State University, the Moscow Institute of Engineering and Physics and a number of others are rightly considered to be such VUZ's. The instruction process in these schools is based on maximum student independence in the training, achieved by developing in them the ability to think creatively. The physical-mathematical, engineering and other general disciplines are taught by the departments there in the VUZ's. The students' training in the special disciplines and their independent scientific research work are supervised by departments created at main scientific research institutes and made up of their leading scientists.

Experience has shown that the graduates of these VUZ's are capable of mastering related fields of science relatively rapidly when necessary, that they do not suffer from the professional narrowness which has now become unacceptable. In the training process itself the students become acquainted with the latest scientific and technological achievements, master modern scientific research methods and use the latest equipment. Working on a creative scientific team, they develop responsibility and professional enthusiasm.

This training system can reduce or even totally eliminate the gap between the knowledge of the graduates and the level of development of science. From the very beginning the future specialists master the latest achievements in that field of knowledge in which they will be working. The system for training the cadres involves continuously and automatically following, as it were, the development of corresponding fields of science and technology.

It is not a simple matter to combine the professionally specialized and the universal, however. The flood of knowledge is increasing in all areas. They began to be integrated long ago, however. Take biophysics, biochemistry and other fields as an example. And life itself, as we have already mentioned, is more and more frequently posing problems which simultaneously involve many branches of science and technology. Comprehensive programs and interbranch projects have become a common thing.

It is important to be trained for this kind of cooperation. Complementing one another, the colleagues as a whole acquire a new quality, receive something greater than the simple mathematical total of the knowledge, the mechanical joining of minds "beneath the same roof." After all, the reverse effect can result from this when there is a lack of close contacts and of the ability to cover the junctures of the special fields. It is important to be able to function as a single team (in the case of a joint program) and to find a common language. Without mutual understanding specialists in different fields will not be able to arrive at mutually acceptable solutions. The technical universities are preparing the specialists for this.

I am confident that the future lies precisely with such specialists, with broad and solid training in all the main and related disciplines, basic and applied. It lies with specialists capable of "conjoining" their knowledge and the knowledge of others, able to see the long-term situation while resolving current problems, of getting their bearings in the stream of scientific and technological, social and economic and political information. I agree that we cannot embrace the unembraceable. The combining of breadth and depth is not a fantasy, however.

Experience has shown that it is possible. And not just the experience of the Moscow Physical and Technical Institute, but that of other Soviet VUZ's as well.

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ROUND TABLE DISCUSSES SCIENTIFIC CREATIVITY OF YOUTH

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 9 Dec 83 pp 1,2

[Round table discussion led by special correspondents M. Alimov and V. Sinenko: "How To Discover an Inventor"]

[Text] At the CPSU Central Committee June (1983) Plenum it was stressed that resolution of the most important national economic tasks depends largely on the acceleration of scientific and technical progress and the extensive and rapid introduction of the achievements of science and technology and advanced experience into production. What can the scientific and technical creativity of youth offer the national economy? What is hampering the greatest effectiveness in realizing available strengths and opportunities? These were the subjects of discussion at a KOMSOMOL'SKAYA PRAVDA round table organized within the framework of the scientific-practical conference "Development of the Scientific and Technical Creativity of the Workers" which took place in Tashkent.

The following took part in the discussion: S.A. Anisimov, candidate of philosophical sciences and senior scientific associated at the Komsomol Central Committee Scientific Research Center of the Higher Cooperative School; V.A. Ashkin, deputy director of the Tashkent city station for young technicians and chief of the "Avtokonstruktor" laboratory; V.R. Verbul', brigade leader of an experimental creative brigade at the Ulan-Ude locomotive and car repair plant honored rationalizer of the Buryat ASSR, and the deputy chairman of the oblast council of young scientists and specialists; D.I. Tkach, Ukrainian Komsomol Central Committee secretary; and M.Kh. Khabibullayev, brigade leader of a comprehensive brigade of communist labor at the Tashkent "Vysotstroy" trust.

Little Lost Robot.

Correspondent: Studies show that of the most active innovator-producers at least 8 out of 10 were involved in scientific and technical creativity when

they were still at school. Now, for example, in Tashkent alone more than 23,000 children are involved in various small groups. Career counseling, becoming accustomed to labor, instilling creative principles, deepening and extending knowledge, acquiring the skills of design--these will all undoubtedly be of use to our national economy in the future. But are there opportunities for obtaining some return from student youth already today?

S. Anisimov: No one remains indifferent to any exhibition of children's technical creativity. What fantasy, what effort, what love goes into every model. Sometimes it is simply impossible to believe that it has all been done by children. But let us take a moment to stop being moved by them and consider whether many of them are of real use. Can many of them be used in production? in the home? The conclusion will not be comforting. As a rule these beautiful toys are unfortunately made only for the next-door kindergarten.

V. Ashkin: In the auto design laboratory we decided to work in a new way. Together with the children we designed and fabricated basically new models of motor scooters. Our machines are distinguished by their good trafficability and economy. They are light but at the same time capable of carry an extra load. The model has officially received a high evaluation from specialists. And so? They said that they were interested in them in Lvov. But that is too far away and without direct contact with a producing plant nothing will happen. They do not produce motor scooters in Tashkent and so no one here is interested in our ideas. A muffler and our other developments have suffered the same fate.

M. Khabibullayev: But why have you become involved with motor scooters? In Tashkent itself there are many enterprise where, if they coincide with the aims and tasks that the labor collectives are resolving, your ideas could be suitable. At least establishing contacts would be easier.

V. Ashkin: I was interested in working with motor scooters. Children are very interested in them.

Correspondent: We note that Vladimir Aleksandrovich's laboratory is one of the leaders at the "Young Technicians" station. The enthusiasm and creative approach of its leader are bearing fruit. The children design models that have been remarked upon at the very best exhibitions and they have medals of the All-Union Exhibition of National Economic Achievements and have been talked about in the press.

D. Tkach: The way it is, children's technical creativity here is entirely in the hands of enthusiasts like Vladimir Aleksandrovich. If he likes motor scooters this is what the children will become involved in. If he likes the three-masted brig "Chernyy glaz" from a book about pirates, then that is it. In the accountability reports of the "Young Technician" groups and stations the main thing is participating and winning in exhibitions, and there is only one criterion: the exhibits must be well thought-out and interesting. This is what gave birth to a whole series of the "Chernyy glaz" ships, and to robots that can sing and dance but, unfortunately, not do anything useful.

Correspondent: Incidentally, we have seen one of these robots at the Tashkent station. At one time it did a great deal and amazed those visiting the exhibitions, but now it sits forgotten and neglected in one of the cases. The plans call for a new model.

D. Tkach: So they played with it for a while and then discarded it. But I am sure that Khabibullayev's comprehensive construction brigade still has the problem of small-scale mechanization. Why not help him? The scientific and technical creativity of youth is enormously in debt to the grain growers, the construction workers, the miners, and any other occupation where there is a great deal of manual labor.

V. Verbul': We shall not refuse help. Now we are in need of a model for shiny nickel plating in a technological process that has already been introduced. We are wasting time and effort on fabricating it. But it could be done by any children's technical group. We would help with materials and tools and advice.

What Is Clipping Our Wings?

V. Ashkin: Here we are touching on a very basic question--the approach to children's technical creativity itself. Will we not lose the dreams of our children in this way? We should not confuse the concepts of labor indoctrination and technical creativity. It is not right when at the level of class three labor, when the skills of a fitter are being acquired, a mass of metal is used for nothing, instead of making at least very simple catches for the school lockers. But we are dealing with technical creativity. They come to us on a volunteer basis. And whether we like it or not there must be room for play and competition and scope for fantasy and a personal interest if we are to interest the children. And a poor material-technical base is clipping our wings. I think I am not mistaken in saying that the management board of the station and the group leaders spend about 80 percent of their time on frequently fruitless searches for materials. Things have reached the point where they will not sell us the "Constructor" kits in the "Young Technician" store unless we pay cash. Now, for example, we have an idea for setting up a school pioneer camp on wheels. For 2 years we have been in a position to organize a column of vehicles. But we need materials. Right now our source is the trash dump.

S. Anisimov: Yes, the most acute problem for the children's technical groups is materials, tools and equipment. Where to get them? The enterprises could pass on everything we need for work to the children's establishments under their patronage. But up to now they do not feel that there is any advantage in such cooperation, and we can scarcely talk about a system or any kind of substantial results. To the point, we do have experience of this kind of creative cooperation in the country: Moscow, Leningrad, the Baltic republics, and number of oblasts in the Ukraine, Yaroslavl, Chelyabinsk and Novosibirsk oblasts.

V. Ashkin: And I repeat it again: learning a trade should not be confused with inventiveness. It was an inventor that replaced the sail with the

smokestack. And it is precisely children who are sometimes capable of the unexpected discovery. And having linked ourselves to production, we still look more at today than tomorrow.

M. Khabibullayev: Tell us, Vladimir Aleksandrovich, how many children come to your laboratory?

V. Ashkin: Many have signed up, but there is natural dropout. At present we have 15 people in the aktiv. It is possible to work with these children. The equipment that we develop is not simple. Without ability, love of labor, perseverance, love and--most of all--talent, we could not be sustained. But in the future, we shall be successful with the other children, no matter how many there are.

M. Khabibullayev: As far as I know only one schoolchild in ten studying at the vocational and technical schools is engaged in technical creativity. The entire system by which this matter is organized is oriented on the individual. We seek out champions, because only the exhibition is assessed. I am not against those with talent but we must try to achieve a situation in which each of our small helpers thinks about how to improve his bicycle and direct his thoughts into useful channels. It is significant that the prestige of the technical VUZ's has fallen. But is there a reason for this? Do we have the right to sacrifice the rest for the sake of the gifted children, writing them off as showing no promise? There should also be a place in the group for the slow thinker, and even for the idler. See for yourself; as he rubs shoulders with other children and finds himself in a creative atmosphere he will probably change and show what he can do.

D. Tkach: Really, in educating the rising generation it is impossible to act just by groping along using the enthusiasts who are there looking after the children. In our republic, together with the council of ministers and the Ukrainian trade union council we have adopted a resolution on the development of children's technical creativity. More than 500 children's groups and clubs are already working on tasks from the scientific and technical establishments, the enterprises, and the kolkhozes and sovkhoses. The subjects are linked to the needs of the rayon or oblast. The course is toward maximum use of the available material-technical base. The workshops at the vocational and technical schools, the interschool production-training combines and the training shops and sections at the enterprises are all reserves that at present are being poorly used. When they have finished their studies the trainees leave, and in some cases during the second shift equipment stands idle and places are available. It is essential to break down the administrative barriers and provide children with the opportunity to get on with what they are doing. It is also necessary to think about training for highly skilled specialists--the organizers of children's technical creativity. Here, the higher school has words to say.

From Play to Production.

Correspondent: The effectiveness of creativity is judged from final results, in this case, from its effect on technical progress. For various reasons, three-fourths of the highly effective inventions of young innovators and 25

percent of rationalization proposals recommended for introduction have still not been used in the national economy. And it is not only economic harm that this causes. Any creativity withers when it is done for nothing.

S. Anisimov: There are several reasons, both direct and indirect, that influence the fate of inventions and rationalization proposals. It happens that a young inventor may focus on problems that are far removed from the urgent needs of production. For example, people drag heavy sacks around on their shoulders but the inventor struggles with complicated electronics that facilitate calculation of the number of people carrying the sacks. A second reason is found in the collective that is psychologically unprepared to accept an idea: "my hammer is not much use but I am used to it." One important reason is the poor introduction base and the fact that proposals run beyond the possibilities. And here it is not simple for the young inventors; there is less economic effect and they get no support at the shop level.

V. Verbul': Until our attitude toward introduction is the same as toward creativity it will be difficult to hope for any marked advances. Both moral and material interest should be mutual, because whoever introduces also creates something new. Nothing can be introduced by coercion. And, contrariwise, when people are seized with an idea and recognize its use, then any barriers are surmountable. A broad horizon is opened up here by the CPSU Central Committee and Councils of Ministers decree on scientific and technical progress. We sense this tangibly in the example of our own experimental creative brigade. Three of us are engineers and two are workers. Inventor, technologist, designer, manufacturer--we are all there in the one collective. We solve problems through the entire cycle, from work on the technical idea to its introduction. Creative youth collectives are being set up on the base of the brigade. In the last 2 years alone 15 of these comprehensive creative youth collectives have been functioning, and more than 150 young engineers, technicians, workers, scientists and students have been participating in their work.

We could now also now achieve the replication of our developments in the sector. And do it painlessly for the plant. At the brigade level we have agreements with similar enterprises for the introduction of our technological processes. We expect support from the central board and from the plant managers. We help to introduce technological processes at other plants, while here at home the representatives of the client are wasting time on this. Having solved a problem in one place, why agonize over it in another? In this way it will be possible to clear many production bottlenecks.

Now we are thinking about how to recruit students from vocational and technical schools and tekhnikums into the comprehensive creative youth collectives. There is work enough for everyone! In Ulan-Ude they are prepared to follow our example at many of the enterprises. However, up to now no legal status has been defined for the creative cost-accounting collectives.

D. Tkach: A public-state system is needed for recruitment of youth for technical creativity. In the Ukraine an attempt is being made to set up such a system. It is planned to use as the base a unified organ that coordinates the work of the Komsomol and trade union organizations, the ministries and administrations

and others interested in an organization to recruit all categories of youth in the republic for technical creativity. This also includes representatives of the All-Union Society of Inventors and Rationalizers and the Scientific and Technical Society who are working with young people and are still acting in isolation.

S. Anisimov: In this connection the experience of the fraternal countries is of interest. In Bulgaria, for example, a system of technical and scientific creativity for youth has been set up on a public-state basis. The state provides for the financial and material needs of the movement. Studies in the technical groups and clubs are not games but a first step in science and production. In Hungary the "Creative Youth" association is in existence, and any young inventor can go it with his own idea or design. As a rule these are proposals that cannot be included in the sector or enterprise plans. In the association they evaluate the idea, find an enterprise interested in the innovation, and provide finance and cooperate in the introduction and protect the inventor's interests.

Correspondent: Since 1967 we have been conducting the all-union reviews of youth scientific and technical creativity, which have made it possible to enhance the creative activity of young workers, students, and those attending schools, vocational and technical schools and tekhnikums.

At the same time, taking into account the demands of the CPSU Central Committee and USSR Council of Ministers decree "On Measures To Accelerate Scientific and Technical Progress in the National Economy" it is essential seek out new forms by which youth can participate in this important matter.

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Those participating in the round table propose the following:

--to define the legal basis of the movement for youth scientific and technical creativity and its organizational structure and management and centralized financing and material-technical support;

--taking into account the requirements of the national economy, to introduce cost accounting in the activity of youth scientific and technical creativity on the basis of a closer approximation to production;

--to set up an all-union center for youth scientific and technical creativity.

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It is now up to the USSR State Committee for Science and Technology and other interested ministries, administrations and public organizations to have their say.

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## CHANGES SUGGESTED IN SYSTEM FOR CONFERRING SCIENTIFIC DEGREES

Yerevan KOMMUNIST in Russian 7 Dec 83 p 2

[Article by V. Chalabov, candidate of technical sciences: "How Should Scientific Creativity Be Evaluated?"]

[Text] The CPSU Central Committee June (1983) Plenum outlined many constructive ways aimed at the further development of the economy, science and culture. They included the problem of introducing the achievements of science and technology and leading experience, with which, as the plenum noted, things are still in a bad way.

Criticism is often directed at the scientists and institute chiefs for insufficient activity in the matter of introducing their own developments in the national economy. This is undoubtedly a just criticism. At the same time, one of the main conditions enabling success in the organization of partnership and cooperation between science and production is the same great interest on the part of producers and economic leaders, in close and planned cooperation with science, so that the main planning indicators for an enterprise would depend on this condition. Without this, all the efforts of the scientists, even the most energetic, will not lead to success. We no longer see the scientist who does not want, does not strive to bring his developments to broad introduction and bring maximum effect. But we still meet quite a few producers who regard with apprehension and mistrust the innovations proposed by science. True, the counterarguments of the managers demand serious study and analysis, since it is not a matter simply of some convinced conservative economic leaders and producers. For example, if it is suggested that a scientific worker should lead production, he himself often becomes apprehensive when it is a matter of introducing new equipment at his enterprise. The reasons for this attitude were characterized in the speech of comrade Yu.V. Andropov at the CPSU Central Committee June (1983) Plenum: "The manager who has taken a 'risk' and introduced a new technology at his enterprise or produced new equipment frequently loses, while he who shuns innovation loses nothing."

Yu.V. Andropov defined the main ways to correct this situation: "To organize the kind of system of organizational, economic and moral measures as would make technicians and managers, and workers, and, of course, scientists and designers, interested in equipment renewal and would make it unprofitable to work in the old way: this is the task." But there is another difficulty. It is rooted in the imperfection of the forms of socialist competition among

scientists themselves, and in the lack of focus for its final result--a scientific development realized in production. The poorly thought-out system of moral and material incentive for scientific associates is making itself felt.

And so, moral incentives. It must be confessed that the scientific associate is often "assessed" from whether or not he has prepared a dissertation, whether he writes articles and monographs (and the more the better), and whether he passes in his accountability reports in good time... And here indicators such as the scale of technical decisions, the sale of licences he has been involved in, the economic effect derived from realization of his inventions, and the conclusions of his scientific research work are either pushed to one side or completely ignored.

Therefore, given this kind of assessment of the activity of the worker, the winner is often the one who has published articles and defended a dissertation rather than the one who is striving to implement the results of scientific research work and create inventions. There is no doubt that articles, books and the propaganda of scientific achievements are a necessary product of activity, but we cannot be satisfied just with this.

For example, at the republic academy of sciences Institute of Mechanics there is no methodology for determining the effectiveness of scientific research nor instructions on socialist competition. There, the contribution to science is determined from the number of published articles, public work and the introduction of basic research in production. Another example. At the Institute of Fine Organic Chemistry imeni A. Midzhoyan it is possible to gain a greater number of points by writing two scientific articles than by an invention. Similar paradoxes are encountered quite often.

I think that there is a most acute need to establish qualitatively new criteria for the activity of the scientific worker.

One most important criterion should be the development of inventions, their realization, and the economic effect derived from the introduction of inventions and scientific research work.

"It is essential to enhance the responsibility of scientists for the introduction of the results of research," says academician of the Armenian SSR Academy of Sciences M. Kas'yan. "A typical situation is the following: an institute has passed on to a plant blueprints, calculations and a pile of documentation and then suggests that the matter is closed, that it can be introduced. And what can be introduced? Paper?"

Many institutes do not have an appropriate experimental base. They lack facilities for fabricating test models of machines and installations. And the enterprise managers, not knowing in essence the kind of return that can be expected from introduction of a proposed development, decide not to take the risk. For it is a question of hundreds, thousands or even millions in state assets. And what if the calculations are wrong? And so things go into local oscillation: the institute has no material base, the plant has no right

to "take a risk." And the solution? Obviously, there should be two phases for each development: the experimental models are best fabricated at the introduction project, for it is there that testing and adjustment and introduction can be done better than under the semi-industrial conditions (and this is a best case situation) of the institute base.

Here it is a matter of promising ways to find solutions, such as the organization of special subsections headed by a deputy director for production integration who will actively seek out partners in the sphere of material production and organize the partnership. These deputy directors should be energetic, creatively thinking, initiative-filled, enterprising workers who possess commercial skills and a "breakthrough mentality."

Neither is everything favorable with material incentive. Scientists should, of course, receive bonuses. But only when an increase in profit is actually realized at an enterprise from the introduction of developments and the administration has amended the plan indicators upwards in accordance with the effect achieved. This will obviously provide real material incentive to realize developments.

Provision should also be made for the same incentives at the enterprise where the innovation is introduced.

It is essential that introduction questions should be based on a well-thought-out system of material and moral incentive so that it becomes a truly nationwide cause.

As was pointed out at the CPSU Central Committee June (1983) Plenum, there is short-circuiting of inherently "dissertation" and group interests, and an obvious triviality and a weakening of party influence have appeared in the activity of many scientific subdivisions. It was stressed that more attention must be given to questions of planning and organization for research and style and methods in the work of scientific collectives. The question of incentive within the system of skill enhancement for scientific workers is also inadequately considered. The "foundation" of the system is fine: after a candidate dissertation has been defended, wages are increased 30-40 percent. This process is also profitable for the state: it reckons to increase the effectiveness of the return from science. But two circumstances lead to a situation in which these hopes are not fully justified.

The first lies in the duration of the procedure for preparing, formulating and defending a candidate dissertation. Aspirants and even postgraduate students spend 5 to 7 years on this process. And sometimes longer. During the "pre-defense" period the scientific worker begins to be of some use. It would be essential to use this time to derive the maximum from his creative activity. However, what happens is often quite different. The organization where the aspirant is working is obliged to create privileged conditions for him so that he can work on his dissertation. His work load is reduced or completely eliminated and he is given the opportunity to travel on business connected with his dissertation and so forth. Moreover, the entire system of creative leave of absence for the actual writing of the dissertation lasts

up to 2 years. During this time the author is concerned exclusively with preparing for the upcoming defense and collecting references.

Finally, however, all this is behind him: he has received his candidate or doctoral diploma. And it happens, as has already been repeatedly noted in discussions on this subject, that the creative activity of the worker declines and moral incentive fails to focus his activity in the necessary direction. His return becomes less than the return during the pre-dissertation period. In this connection there is sense in the suggestion that provision be made for the conferring of a scientific degree without the defending of a dissertation for a certain category of workers even during their initial periods at sector institutes, VUZ's and planning organizations, if their activity is especially useful and can be evaluated on a points system.

If, for example, the economic effectiveness of an associate's applied developments has promoted an actual increase in profits for an enterprise, or if he has introduced highly effective inventions or sold licences abroad and so forth, why not confer on him the degree of candidate or doctor of sciences if his activity over a certain period of time can be assessed on a points system? For the points reflect the high effectiveness of his creative activity! Then a scientist will not "lose" his best years on preparing and defending a dissertation.

In the future, perhaps, the following formulation of the question may be confirmed: a scientist with a degree is obliged to confirm his contribution to science over a 5-year or 10-year period. If there is no confirmation with specific practical matters the degree is withdrawn and the wage increase based on it becomes invalid. It is considered that this latter measure is especially effective: it may sharply increase the activity of scientific workers, particularly young workers.

Defending a dissertation should not become an end in itself. For each scientist this is an ethical matter, a question of conscience. The scientific councils are obliged to carry responsibility for the establishment of future candidates and doctors of science. Aspirants should be closely questioned on the introduction of scientific developments in production. Conditions in the institutes should be such as to enable the fabrication of test models of instruments and the development of new technologies on the basis of proposals made in dissertations.

Successful resolution of the tasks set requires a precise rhythm, good organizations, and useful creative activity in the work of all elements in science and production. And this rhythm can be established only with a businesslike approach and responsibility on the part of each specialist. The main thing is to create in the scientific collective an atmosphere of general exactingness and principledness in evaluating attitudes toward work.

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ESTONIAN ACADEMY OF SCIENCES DEVELOP USER-FRIENDLY PROGRAMS, MODEMS

Tallinn SOVETSKAYA ESTONIYA in Russian 26 Aug 83 p2

[Article from Estonian Press Agency: "Science for the National Economy: Working With a Computer, by Telephone"]

[Text] New methods for programming and working with computers have been developed at the Cybernetics Institute of the Estonian SSR Academy of Sciences. The principle of the new methods consists of establishing maximum dialogue with the computer. Until now, a significant part of working with computers was required for compiling programs, which occupied nearly all the resources of the institutes. Teaching the computers to understand the language of the specialists, Estonian scientists are performing a service to make computer technology more readily accessible to engineers in the various spheres of the national economy.

Serving these goals are the PRIZ and MEMO programming systems developed by the institute. Workers at the Slantsekhim [Slantsy Chemistry] Association are being helped by a computer system for controlling the process of producing carbamide, developed at the institute. Development work is under way for new control systems for the enterprises of the food industry, and agriculture as well.

An entire complex of fundamental and applied tasks is being solved by the institute's scientists and specialists. A powerful computer, the ES-1052, is in operation at the scientific research institute's computer center, the services of which are employed by many institutes of the republic Academy of Sciences. Direct telephone communication with a computer will be a new feature at this multi-user computer center. Without leaving his laboratory, a scientist will be able to contact the data bank of a given center and quickly receive the information he needs, or request execution of required mathematical calculations.

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## BRIEFS

YOUNG SCIENTISTS' MOSCOW CONFERENCE--A Moscow city conference of young scientists and specialist ended yesterday. Its participants discussed the development of information science, computer technology, automation and the introduction of the achievements of science in the national economy. More than 1,000 young scientists, engineers and designers present at the conference represented 120 enterprises and organizations in the capital. Nine comprehensive creative youth collectives presented reports on their work. Leading scientists from Moscow and the leaders of a number of the major institutes and laboratories of the USSR Academy of Sciences and the sector scientific research institutes and design bureaus participated in the discussion of the reports and the scientific discussions. [Text] [Moscow MOSOKOVSKAYA PRAVDA in Russian 7 Dec 83 p 3] 9642

NEW SUPERCONDUCTOR DISCOVERY--A new discovery by Moscow scientists, Lenin Prize laureates and corresponding members of the USSR Academy of Sciences A.A. Abrikosov and L.P. Gor'kov, was yesterday entered in the State Registry of USSR Discoveries. The subject of their research was the so-called superconductors. Phenomena were discovered whose use will help in developing such materials with important new properties, namely their indifference to large electrical currents or powerful magnetic fields. And these kinds of superconductors can be used in many sectors of power engineering and in machine building. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 2 Dec 83 p 3] 9642

DONETSK SCIENTIFIC POLICY CONFERENCE--An all-union scientific-practical conference devoted to problems of improving the management of scientific and technical progress at the regional level in light of the decisions of the 26th CPSU Congress has been held in Donetsk. The following presented reports: secretary of the Donetsk party obkom V.G. Kucherenko; the chief editor of EKONOMICHESKAYA GAZETA A.F. Rummyantsev; chairman of the Donetsk Oblast Trade Union council F.S. Sderzhnikov; chief of a department at the CPSU Central Committee Academy of the Social Sciences, professor V.G. Lebedev; deputy chairman of the USSR Academy of Sciences Council on Economic Problems of the Scientific and Technical Revolution doctor of economic sciences K.I. Taksir; member of the Ukrainian SSR Gosplan board V.P. Shevchenko; and director of the Ukrainian SSR Academy of Sciences Institute of Economics of Industry N.G. Chumachenko. In the section meetings there was detailed discussion of questions concerning the formation and realization of scientific and technical programs, the management of scientific and technical progress and the introduction of

leading experience, and organizational-political support in the acceleration of scientific and technical progress at the regional level. Secretary of the Donetsk party obkom G.P. Yerkhov delivered the concluding remarks at the meeting. The conference adopted specific recommendations aimed at further improving work to realize measures of scientific and technical progress. Special attention was given to the formation and effective use of the system for introducing leading experience. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 50, Dec 83 p 4] 9642

NEW CHEMICAL ENCYCLOPEDIA--An encyclopedic chemical dictionary has gone on sale at the Moscow House of Books (No 26 Kalinin Prospect). This dictionary is a continuation of a series of books first published in our country by the "Sovetskaya entsiklopediya" publishing house. Readers are already familiar with an encyclopedic dictionary of physics and a philosophy dictionary. Next year it is planned to publish dictionaries on other branches of the sciences. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 7 Dec 83 p 3] 9642

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