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19 June 1980

USSR Report

HUMAN RESOURCES

(FOUO 4/80)

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EDUCATION

COOPERATION OF UNIVERSITIES, ACADEMY OF SCIENCES IN SCIENTIFIC RESEARCH

Moscow VESTNIK AKADEMII NAUK SSSR No 4, Apr 80 pp 4-17

[Report from the Presidium of the USSR Academy of Sciences: "On Strengthening Ties between the Universities and the Scientific Establishments of the USSR Academy of Sciences"]

[Text] A joint convocation of the Presidium of the USSR Academy of Sciences and the Collegium of the USSR Ministry of Higher and Secondary Specialized Education was held, at which the work of the universities and their interaction with the system of scientific establishments of the Academy were discussed.

In its decree, "On the Further Development of the University and Increasing the Quality of Training of Specialists" (July 1979), the CPSU Central Committee and the USSR Council of Ministers recognized the necessity of taking measures aimed at further improving the activities of the university, expanding its role in socio-economic and scientific-technical progress; and furnishing more skilled cadres to the leading sectors of the nation's economy. The task was assigned to raise the level of training of the future specialists. Toward these ends, it has been proposed to enlist more broadly the academicians and associate members of the USSR Academy of Sciences, and other leading scientists, for scientific-pedagogical activities in the VUZ's. The decree points out the necessity for improving the organization of scientific research work in the VUZ's and to utilize their scientific potential more effectively.

Establishing close creative ties between the Academy of Sciences and the university was at the center of attention of those participating in the session, at which an address was made by V. P. Yelyutin, USSR Minister of Higher and Secondary Special Education, and Associate Member of the USSR Academy of Sciences.

"Bilateral ties between science and higher education," said V. P. Yelyutin, "is an objective reality of the intellectual life of a modern society. In their historical development they have gone along arm in arm. The modern aspect of the university assumed its present form under the definitive

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influence of science. In the past and at present it continues to reinforce science with its graduates, and in its capacity as a scientific establishment itself actively participates in the process of accumulating new knowledge and its practical materialization. However, our modernity and the entire pace of further perfecting the society of developed socialism requires a new concept of the interrelationship of science and education, and a new approach to the realization of its creative union.

"Comrade L. I. Brezhnev stated at the 25th CPSU Congress, that 'The success of the scientific-technical revolution and its beneficial influence on the economy and on all aspects of the life of society cannot be assured by the efforts of the scientific workers alone. Enlisting all those participating in social production in this historically-significant process is assuming an ever-greater role in all sections of the economic mechanism.' On the basis of the principal instructions of the party, the university must first of all significantly increase the level of training of specialists; and secondly, support the enlistment of all of the many millions on its staff in the process of the scientific quest, and significantly increase its scientific potential and the effectiveness of its utilization.

"Those who have gathered here today to discuss the designated problems," continued V. P. Yelyutin, "Officials from the Academy of Sciences and the Ministry of Higher and Secondary Special Education, are carrying out a direct commission of the CPSU Central Committee and the USSR Council of Ministers, which adopted in April 1978 the decree, 'On Increasing the Effectiveness of Scientific Research Work at the Higher Educational Institutions,' containing a host of provisions the realization of which requires strengthening the contacts between the USSR Academy of Sciences and the universities. An extensive program for perfecting science at the university, contained in this document, proposes further strengthening of the role of the university in the national system of scientific institutions, and transforming it into a powerful inter-sectorial scientific complex, capable of conducting active research in practically all spheres of knowledge, and providing for the introduction of these achievements into the national economy.

"Even today an intensive quest for research is being carried on in practically all of our 870 universities and institutes, in which nearly one-half million scientific-pedagogical personnel are concentrated. Among these are 18,000 doctors and 175,000 candidates of science; and this is nearly half of all the workers with scholarly degrees and titles in our country. More than 500 academicians and associate members of the USSR Academy of Sciences, and the academies of science of the union republics, are working at the universities. And here it is fitting to pause on the question of combined jobs. At one time it was forbidden to hold more than one office in a university, in order to weed out abuses in this area. But in fact this has led to a situation where a significant part of the university's qualified cadres was lost. Subsequently a number of amendments to the normative act were adopted, which permit more latitude in recruiting prominent scholars and workers from the various sectors of the national economy for scientific-pedagogical activities.

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And the 57,000 graduate students at the university have made no small contribution to science; of these, 1,800 have been enlisted for research work.

"Along with the more than 30,000 faculties—the basic link in the academic organization at the VUZ—there is an extensive system of scientific institutions. Among these are 60 scientific research institutes, about 1,500 problem and industrial branch laboratories, as well as computer centers, botanical gardens, observatories, museums, experimental design bureaus and about 450 scientific research sectors. The organization of the North Caucasus Science Center, which was established through the combined efforts of the university and the USSR Academy of Sciences, has proved its worth. Possessing such a powerful intellectual potential and broad organizational capabilities, the higher educational institutions are expanding their activities in the main channel of the development of Soviet science. They are carrying out a large amount of the work connected with the tasks in the state plans for the economic and social development of the USSR and the union republics; with the various government decrees; with work programs on solving basic scientific and technical problems; with plans for scientific research in the spheres of natural and social sciences; and with the industrial sector and republic plans for scientific research work in utilizing the achievements of science and technology in manufacturing.

"In the last six years alone, expenditures for scientific research work in the system of Minvuz, USSR [Ministry of Higher and Secondary Special Education], have grown by more than two times, and in 1978 were in excess of 1.02 billion rubles. At the returns to science rendered by the VUZ's have grown as well. In 1978, for example, scholars at the VUZ's produced more than 3,000 monographs, an equal amount of textbooks and educational materials, and contributed 130,000 articles to all-union and foreign scientific magazines. More than 11,000 certificates of authorship were granted for inventions, as well as 320 foreign patents; and a number of licenses have been sold. Industry confirms that the economic effect from the use of studies carried out by the VUZ's, in 1978 alone amounted to nearly two billion rubles, which exceeds by nearly two times all the expenditures for science in the universities.

"Nevertheless," noted V. P. Yelyutin, "The state of scientific research work in the universities cannot be deemed wholly satisfactory. As was pointed out in the decree of the CPSU Central Committee and the USSR Council of Ministers, 'On Increasing the Effectiveness of Scientific Research Work in the Higher Educational Institutions,' the scientific potential of the universities and their skilled personnel are not being fully utilized in solving the most important scientific-technical and socio-economic problems; there are still few important, complex research projects carried out at the higher educational institutions. The CPSU Central Committee and the Soviet government have assigned to the State Committee on Science and Technology, to the Academy of Sciences, and Minvuz, USSR, the task of more extensively involving the VUZ's, which possess skilled cadres, in carrying out basic scientific research and practical studies in accordance with state plans for the development of science and technology.

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"It has been shown that it is necessary to implement a number of practical measures for concentrating forces and resources on the most important problems of science and technology; to provide for fundamental improvements in the planning and coordinating of scientific research work in the VUZ's; and to create the conditions for strengthening the ties between the processes of education and research."

In this regard, the speaker paid special attention to the development of basic research at the university. It is well-known that accelerating the rate of scientific and technical progress is not possible without advanced development of fundamental and exploratory research, the results of which serve as the basis for highly-efficient technical solutions and the creation of principally new, progressive technological processes. The development of such research in the universities is required, in order to train skilled specialists with a broad background. However, the proportion of fundamental scientific work in the total volume of scientific research work in the VUZ's is constantly declining, primarily as a result of insufficient funding of science at the VUZ's in the state budget, the amount of which in 1978 totalled little more than 14 percent of all funds received by the VUZ's from various sources. The VUZ's monies are for the most part fixed by contract and they cannot be used for fundamental research.

Experience shows that by far the most scientific research in the areas of the natural and the social sciences is found in those VUZ's which actively collaborate with the scientific institutions of the USSR Academy of Sciences and the academies of sciences of the union republics.

The speaker considers that on the whole, the state of the creative ties between the higher educational institutions and the institutions of the Academy must be rated favorably. The Presidium of the USSR Academy of Sciences continually renders assistance to the universities. A significant contribution to increasing the level of training of specialists was made in the implementing of the plan worked out jointly by the Minvuz and the USSR Academy of Sciences, containing measures for carrying out the decree of the CPSU Central Committee and the USSR Council of Ministers, "On Measures for the Further Perfection of Higher Education in the Nation." The educational plans and programs of the VUZ's have been reexamined by scholars from the scientific institutions; and twelve scientific-methodological councils and commissions on the disciplines taught in the VUZ's are headed by academicians and associate members of the USSR Academy of Sciences.

The close collaboration of the institutions of the USSR Academy of Sciences and the VUZ's is the creative basis on which instruction was organized in an entire series of new subjects; also established were special departments for refresher training of the cadres in the new, forward-looking directions of science and technology. It is considered exceptionally important that the specialists are being trained in these departments in the most up-to-date, rapidly-developing directions of fundamental science and new technology, such as the physics and technology of magnetic memory; the theory and technology of laser communications; automation of experimental research; robots

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and manipulators; optimization of engineering solutions; uninterrupted control methods; and so forth. Taking part in the work of the departments are scholars from the institutions of the Academy, specialists who have mastered the very latest achievements in the corresponding areas of knowledge.

At the same time, V.P. Yelyutin believes, these departments can be utilized for increasing the qualifications of the research fellows of the Academy of Sciences itself, for training groups of special-purpose specialists in particular, with the aim of supporting the introduction of the results of scientific research into manufacturing. The first such experience, which concerns a new area of science and technology—powdered metallurgy—is already being conducted; simultaneously, new equipment is being introduced and specialists are being trained who will use the new technology and equipment.

Collaboration with the VUZ's on the part of prominent scholars of the USSR Academy of Sciences in organizing the educational process and conducting scientific research has become a tradition. In the 1977-78 academic year alone more than 650 research fellows at the institutions of the academy, among whom are 30 academicians and 47 associate members of the USSR Academy of Sciences, traveled to the higher educational institutions to deliver lectures to the students, and assisted the professorial-instructor staff of the VUZ's in their educational and scientific work.

Scholars at the academy's scientific institutions are taking an active part in creating textbooks and educational materials for the universities. During this five-year plan, for example, there were 37 academicians and six associate members of the USSR Academy of Sciences among the authors of books for university students. "It is a pleasure to note," the speaker emphasized, "That some splendid textbooks are being turned out by our prominent scholars. Several of these, such as 'Obykvennyye Differentsial'nye Urovneniya' [Plain Differential Equations], by Academician L. S. Pontryagin; and 'Tekhnicheskaya Termodinamika' [Industrial Thermodynamics], by Academicians V. A. Kirillin, A. E. Sheyndlin and V. V. Sychev, were awarded USSR State Prizes.

Industrial and practical familiarization, and laboratory classes, are being organized for students at the facilities of the academy's institutions, and accredited course work leading to diplomas is being conducted. Thus, the University of Novosibirsk and the Moscow Institute of Physics and Engineering are organizing educational pursuits for upper-level students within the very walls of the institutions of the USSR Academy of Sciences.

Cooperation with the Academy of Sciences is also being developed in the matter of training science instructor personnel. Many institutes of the academy are conducting special-purpose training for graduate students at the provincial and at the new VUZ's. At the same time training of special graduate students in a number of specialities is being conducted in the leading VUZ's for the republic academies of sciences. And the USSR Academy of Sciences is rendering assistance to Minvuz, USSR, in increasing the qualifications of the instructors.

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V. P. Yelyutin reported, that scholars at the higher educational institutions are becoming oriented toward opportunities for more active participation in work in accordance with the plans of the USSR Academy of Sciences and the academies of sciences of the union republics. As a result of this, and owing to the cooperation of the departments and scientific councils of the USSR Academy of Sciences the number of scientific research projects in the VUZ's coordinated by the academy is growing year by year. Whereas in 1975 there were fewer than 4,300, in 1978 there were 6,000 projects.

Scholars at the universities and the Academy of Sciences are cooperating successfully in publishing the results of scientific research, in the preparation of monographs and collections of scientific works; and in organization of regional, all-union and international scientific-technical conferences, congresses and symposia.

It is especially fitting to speak of the now-traditional ties between the social science scholars of the USSR Academy of Sciences, IMEL [Marx-Engels-Lenin Institute] at the CPSU Central Committee, the academies of sciences of the union republics and the higher educational institutions of the nation. The fruitfulness of these ties is manifested in particular in the preparation and publication of basic textbooks on Marxist-Leninist theory. Thus, textbooks were prepared and published on scientific communism, edited by Academician P. N. Fedoseev; on political economics, edited by Academician A. M. Rumyantsev; on Marxist-Leninist philosophy, edited by F. V. Konstantinov; and on the history of the CPSU, edited by B. N. Ponomarev. The aforementioned textbooks have gone through several editions and were translated in many socialist countries. One can say without exaggeration that these books have become familiar to all who are study Marxist-Leninist theory.

A number of VUZ collectives have been recruited by academy departments as co-executors in working out actual, far-reaching scientific problems. The speaker expressed the desire, that this work will become still more deeply rooted and that it will be coordinated with the problem councils of the USSR Academy of Sciences.

Concerning the scale of student participation in scientific research projects, in the opinion of V. P. Yelyutin, the results of the annual all-union competitions for the best student scientific work in the natural, technical and humanitarian sciences are good examples. The increase in popularity of these competitions is to no small degree promoted by the establishment of the medals of the Academy of Sciences, with prizes for the students at the higher educational institutions. The VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin], the Academy of Medical Sciences, and the USSR Academy of Pedagogical Sciences followed the example of the "great" academy in this respect and have also established medals for the best student scientific work in their respective areas. In all, 400 such medals have been established.

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As a rule it is possible to solve the major scientific problems and make the fundamental discoveries capable of accomplishing great changes in science and technology, at the modern stage of the scientific-technical revolution, only through the efforts of large scientific collectives and associations of specialists of diverse backgrounds, who possess capacious laboratories and experimental facilities. "It is just for this reason," the speaker confirmed, "That we ascribe especially great significance to the organization of joint research by scientists at the universities and at the scientific establishments of the academy. There are numerous shining examples of such joint research work, which have provided great scientific and practical results. Suffice it to say that a significant amount of the work for which Lenin and State Prizes have been awarded and which has been registered as scientific discoveries, was carried out by scientists at higher educational institutes with the co-authorship of scientists of the institutions of the academy."

Thus far, the material-technical base of the departments and scientific institutions of the VUZ's and the condition of equipping them with unique and costly instruments and computer facilities, still lags far behind that of the leading institutions of the academy and the industrial sectors. Creative cooperation among the collectives of the VUZ and the scientific research institutes of the academy permits use of the laboratory and experimental facilities while carrying out joint research projects at the most modern methodological and technical-experimental level. As examples, V. P. Yelyutin cited the work carried out by the staff of scientists at the Physical Institute imeni P. N. Lebedev of the USSR Academy of Sciences, the Atomic Energy Institute imeni P. N. Lebedev, and at the University of Moscow on developing the physical principles and on creating and researching gas lasers energized with the use of ionized evolution. The use of instruments of the Byurakanskaya Astronomical Observatory of the Armenian SSR Academy of Sciences, as the speaker stated, permitted the scientists at the University of Yerevan to solve a number of the most important problems in astrophysics.

While evaluating the condition of the ties of the university with the USSR Academy of Sciences as good, V. P. Yelyutin nevertheless acknowledged that in this area everything is far from finished, and by far not all the existing capabilities have been utilized. One would hope that the academy's scholars would participate more in the educational-training process in the VUZ's and in training and increasing the qualifications of the scientific research cadres. This task requires imparting to the ties a long-term, systematic character. In the draft resolution of the Presidium of the USSR Academy of Sciences and the Collegium of Minvuz, USSR, a proposal was included on creating a special joint organization for coordinating the contacts between the universities and the USSR Academy of Sciences, for defining the long-term directions of joint scientific research work, and for generalization and dissemination of progressive experience in this area. At the same time, it is proper to provide closer cooperation between the scientific problem councils of the USSR Academy of Sciences and the section of the Scientific-Technical Council of Minvuz, USSR. Mutual representation in them of scientists from the universities and the institutes of the academy must be expanded; the conducting of joint sessions should be put into practice; in a word, permanent business contacts should be established in this area as well.

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Worthy of attention is the proposal on organizing complex scientific associations composed of institutions of the USSR Academy of Sciences, higher educational institutions, industrial branch design organizations and the industrial enterprises which have been designated for working out concrete, long-term problems. There is already positive experience to substantiate this proposal. A tripartite agreement on the introduction of electronic ray technology is being successfully implemented among the Kursk Polytechnical Institute, the "Akkumulyatory" Plant and the Electric Welding Institute imeni E. O. Paton of the UkSSR Academy of Sciences. A similar agreement is being concluded between the Krasnoyarsk VTUZ [Technical VUZ] Plant, its base enterprise and the Institute of Physics of the Siberian Department, USSR Academy of Sciences.

Still another important question is connected with the practice of concluding complex long-term agreements on cooperation between the higher educational institutions and the institutes of the USSR Academy of Sciences, which has become widespread in recent years. It would be expedient to conduct thorough joint analysis of the existing experience, and make recommendations for broad utilization of this intelligent form of standard agreement on creative cooperation between the VUZ's and the scientific establishments of the system of the Academy of Sciences, embracing all aspects of the joint activities: the educational process, training of the scientific-pedagogical cadres, and the scientific research.

The joint session, dedicated to the strengthening and development of creative ties between the USSR academy of Sciences and the university, is being held for the first time. The speaker introduced a proposal to recommend to the ministries of higher and secondary special education of the union republics and to the presidiums of the republic academy of sciences, to hold similar meetings as well. Their results will open new possibilities for developing creative ties among the VUZ's and the scientific institutions.

Each forward step made by science requires new forward movement in the area of education. But the success of scientific thought depends also on the rate of progress in education. "Permit me to express my conviction," V. P. Yelyutin stated at the conclusion of his report, "That the collectives of the VUZ's and the scientific institutions of the USSR Academy of Sciences, jointly strengthening their creative cooperation, will make a worthy contribution toward the joint development of our native science; toward the acceleration of the scientific-technical and socio-economic progress of Soviet society; and toward raising the standard of living of the people and strengthening the might of our Motherland."

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During the discussion of the report, Vice President of the USSR Academy of Sciences, Academician G. I. Marchuk, called attention to the fact that the number of instructors and research fellows in the universities is much greater than the number of scientists in the system of the academy. "Here," he said,

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"We have a matter of enormous scientific potential which we are not utilizing completely, although science has put down deep roots in a number of VUZ's, not only in Moscow and Leningrad but in the provinces as well. For example, in Tomsk there are two first-class scientific research institutes: the Siberian Physico-Technical Institute and the Institute of Nuclear Physics. These institutes, which are at higher educational institutions, are playing a very great role, and according to the level of research being conducted are in no way inferior to the academy.

"When speaking of the training of cadres in the university for the Academy of Sciences, one must note that the close ties of the academy's institutions with the VUZ's—especially in Moscow, Leningrad and Novosibirsk—permit selection of intelligent people for science; but their state of preparedness is not adequate.

"The party requires that the scientists find new concrete forms for the ties between academy and VUZ science. In the Siberian Department of the USSR Academy of Sciences regional programs have become bases for this work; in particular, the entire complex of the 'Sibir' program, in which a large number of scientists have been active including those of the VUZ. Joint preparations are being made for scientific conferences, to include international conferences.

"For the VUZ's in the provinces a well-placed special-purpose graduate program in the scientific institutions of the Academy is especially important; this is also one of the forms of contact between the Academy and the universities. The Siberian Department has established ten chairs in the universities and institutes of Siberia and the Far East. And Minvuz, USSR, has taken special note of this initiative."

Right now, in five cities in which there are affiliates of the Siberian Department of the USSR Academy of Sciences, there are five universities; the activities of these and others are well-coordinated. "They have hardly done everything possible," G. I. Marchuk considers; "But it is better to begin with the concrete: for example, with the establishment of joint expeditions; expanding special-purpose graduate fellowships at the VUZ's; and organizing workers' conferences on determining the direction for research."

Deputy Minister of Higher and Secondary Special Education, RSFSR, E. K. Kalinin, speaking on the subject of what has been done by the higher educational institutions and Minvuz of the Russian Federation, for strengthening cooperation between the university and the USSR Academy of Sciences, reported that: "Specifically, in 1978 scholars at the VUZ's had conducted research on 1,414 topics which were included in the coordinated plans of the Academy. New educational and scientific complexes are being established jointly. One of those functioning successfully is organized on the facilities of several faculty departments of the Irkutsk Polytechnical Institute and the Siberian Power Engineering Institute of the Siberian Department, USSR Academy of Sciences. In general, very good cooperation has been established between the VUZ's and the institutes of the Academy in Siberia; the agreement concluded earlier in 1979 between Minvuz, RSFSR, and the Siberian Department is taking

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on special significance. In addition to that which has already been mentioned, they envisage, for example, joint use of experimental facilities and collective use of unique equipment. The most important aspect of the agreement is the organization of a number of programs for regional complexes by Minvuz, RSFSR, and the Siberian Department of the USSR Academy of Sciences on developing the natural resources of Siberia. A complex program on automation of scientific research is being organized jointly with the USSR Academy of Sciences. The goal of this program is to develop the means of automation in the interest of the Academy and the university. And there is preliminary agreement with the Academy for organizing yet another complex program on power engineering.

"Preparations are in progress for development and manufacturing in the 10th Five Year Plan of unique and hard-to-get scientific equipment and instruments for joint research. It is envisaged that no matter what kind of instrument is developed in the university, its manufacture in quantities required for both the university and the Academy of Sciences will be assured. And the Academy will do the same.

"Proposals are also being developed concerning scientific-educational centers for the Academy and Minvuz along the Volga, in Siberia and the Far East. The question has been decided concerning organization of such a center at the Kuybyshev Institute of Aviation. At the initial stage it is proposed to create a laboratory of the Academy on automation of scientific research there. The corresponding departments of the VUZ will be attached to it, as well as experimental production facilities. Being structurally a subdivision of the VUZ for planning and methodology, this laboratory should be placed under the USSR Academy of Sciences."

"The general directions of the research, the principles of cooperation and coordination of the work in the area of the social sciences," said Vice President of the USSR Academy of Sciences, Academician P. N. Fedoseyev, "is determined for the long run in each five-year plan at joint sessions of the USSR Academy of Sciences and the Ministry of Higher and Secondary Special Education of the USSR, and then is defined concretely by problem councils of the Academy. In this manner, significant results have been achieved on a number of important scientific problems, especially on questions of the history of the USSR, the history of social thought, and literature. At the same time it is fitting to point to the fact that the activity of the scientific councils concerns primarily the scientists in Moscow and the VUZ's in the capital cities. For example, in Saratov there is the respectable Povolzhskiy Scientific Council—or, to put it more aptly, center for social sciences—which brings together hundreds of skilled specialists in the social sciences from the Volga area. But the Academy's problem councils are not well connected with these. The complaints expressed to the Academy's councils on this matter by the workers of the provincial VUZ's are completely justified. And after all, in solving economic problems, cooperation in sociological research is especially important, not only with the capital but also with the provincial higher educational institutions. And the same can be said of questions on the history of the USSR.

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"The fruitful cooperation of the scientists of the Academy and the universities in working out the 'Sibir' program was already spoken of at the conference. But during the study of the problems of the Non-chernozem Belt such cooperation was, unfortunately, lacking; although support to the VUZ cadres of sociologists, economists and especially agrarian economists, is sorely needed.

"It is obviously appropriate to think through and define a system and structure for the ties between the Academy's councils on scientific problems and the extensive system of VUZ's, bearing in mind that representation of one VUZ or another at the council will still not solve the problem since all VUZ's cannot be included in this manner. Evidently, the councils should depend on an association of certain VUZ's in their work. In general, the questions of the work, the composition, functions, tasks and obligations of the Academy's councils on scientific problems should be among the most important.

"And still another remark: It is very important to delineate in the scientific work those crash programs and those sectors, where the assistance of the VUZ cadres is especially needed."

Vice President of the USSR Academy of Sciences, Academician B. N. Petrov, expressed his opinion that the Academy's scientific councils have played a large role in bringing together the scientists and workers of the various ministries and departments, as well as the universities. The creation of the gamma telescope, which was accomplished by the efforts of the Institute of Space Research of the USSR Academy of Sciences and a number of other Academy and VUZ organizations, can serve as an example. A good beginning was made with the organization of a scientific association in Leningrad, composed of the scientific research computer center of the USSR Academy of Sciences, the Leningrad Electrical Engineering Institute and the "Krasnaya Zarya" Association, for the study of problems associated with the use of computer technology in scientific research projects. A large project, in which a number of the Academy's scientists are participating, is being conducted by the Moscow Institute of Aviation.

The activity of many scientific councils, in particular the Scientific Council of the USSR Academy of Sciences on Problems of Traffic Control and Navigation, is organized such that a number of sections are headed by scientists from the VUZ's. The USSR National Committee on Automatic Control has its own territorial groups in all the republics and the largest regions of the nation. Many VUZ's, institutes and independent laboratories of the VUZ's have already achieved a high level of work. Take for example, the Institute of Mechanics of the MGU [Moscow State University]. In terms of the depth of the research, this is an Academy institute, and that is why the activity of the institute is reflected in the coordinated plans of the USSR Academy of Sciences. All of these are individual examples, and one could have cited more.

The undertaking of Minvuz connected with developing complex programs deserves high marks, particularly that on the automation of scientific research. Obviously, such programs could become the basis for establishing experimental scientific-technical associations of the Academy, the university and industry.

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An important role is played by discussing at the VUZ's the research being carried out at one or another of the Academy's institutions. The Department of Mechanics and Control Processes, and the Department of Physical Chemistry and the Technology of Inorganic Materials of the USSR Academy of Sciences have conducted guest sessions at the MAI /Moscow Aviation Institute/ and at the Moscow Institute of Chemical Technology imeni D. I. Mendeleev (MKhTI). The work of a number of laboratories was carefully examined there, and one could become acquainted with various concrete studies. Such guest conferences should be held more often.

It is undoubtedly proper to support the initiative of Minvuz in the plan for creating educational-scientific centers. But this initiative is being delayed because of the lack of accommodations and proper equipment. Equipment for such centers was demonstrated in Moscow at an exhibit devoted to joint projects of the socialist nations in the area of computer technology. A selection of such equipment could have been made the basis for equipping the VUZ educational-scientific centers with modern instruments and computer technology facilities.

The Rector of MKhTI imeni D. I. Mendeleev, Associate Member of the USSR Academy of Sciences, G. A. Yagodin, stressed the necessity for expanding and strengthening the creative cooperation of the USSR Academy of Sciences and the university in solving the historic problem of combining the gains of the scientific-technical revolution with the advantages of the socialist system of management, and the necessity for studying and disseminating the experience of the progressive VUZ's in this area. Scientific research work in the VUZ's is an important means for improving the quality of training of specialists. It has an influence on the entire pedagogical process, on the quality of the lectures and practical studies, and on the psychology of the instructors and the students. The active cooperation of the VUZ's with the USSR Academy of Sciences is an effective method for increasing the topicality and quality of the scientific research conducted at the university.

Ties between MKhTI and the Academy of Sciences have become a tradition; seven of its graduates have become academicians and 17, associate members of the USSR Academy of Sciences. Work on special-purpose scientific-technical programs is going well at the institute. There are 18 such programs at the institute, and they bring together 65 themes the development of which occupies more than a third of the professorial-instructor staff. In its work, MKhTI is associated with 20 institutes of the USSR and the republic academies of sciences. The Academy's institutes have offered the "Mendeleevka" the opportunity to utilize their unique equipment. Research fellows at the institute publish up to 1,000 articles per year, about half of them in the magazines of the USSR Academy of Sciences. Scientists at the institute are working in 16 of its problem councils and are members of a number of the editorial boards of the Academy's magazines.

V. V. Rzhnevskiy, rector of the Moscow Mining Institute, spoke of the necessity of enlisting specialists of various backgrounds from Moscow's VUZ's for work on the coordinated plans of the Academy of Sciences. He stressed the importance of the VUZ's scientists and students in exploratory research (projects in

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applied science are also carried out under economic agreements), as well as in introducing the results of basic scientific work into practice. "Perhaps," he said, "For these purposes it makes sense to conclude agreements on cooperation between the VUZ's of an industrial sector and the corresponding institutions of the Academy."

Academician Secretary of the Department of Geology, Geophysics and Geochemistry, B. S. Sokolov, considers that neither the VUZ's nor the Academy's scientific potential is yet being used effectively: "The VUZ's and the Academy have much in common, above all the fact that the students at the VUZ's represent the future of all Soviet science. Their training must be conducted at a strictly modern level. At the same time many departments in our VUZ's are poor in terms of research equipment; in some of them it has not been modernized in decades. Furthermore, both the instructors and the students are weighted down by the mandatory academic 'obligations'. A person who must teach from 700 to 800 hours during an academic year cannot be profitably occupied with science; for, in practice the number of hours is doubled and even tripled! Obviously, Minvuz itself must reevaluate in the most serious manner the system of academic workload of the instructors and the students, significantly increasing the latter's time for independent work. At the same time it is fitting to increase the participation of personnel at the Academy's institutions in the educational process. On this plane, the University of Novosibirsk can serve as an example: Its students, beginning with their sophomore year, perfect their knowledge in the institutes of the Academy. Here, the training of specialists by the piece has become a reality, if one may put it that way. The same could be achieved in a number of the VUZ's of Moscow, Leningrad, Kiev and other cities, where there is a strong academic and industrial branch scientific research base."

The rector of the Moscow Higher Technical School imeni N. E. Bauman, Academician G. A. Nikolayev, expressed agreement with the speaker quoted above, with regard to training scientific personnel in the VUZ's. However, he considers the system of training engineers for the national economy—designers, technologists, economists and so on—has its own peculiar features. "I am particularly impressed," said G. A. Nikolayev, "With the proposal made at the session on creating associations among the Academy, the VUZ's, the OKB [Special Design Bureau] and manufacturing. At the same time, of course, one need not necessarily have an entire VUZ in mind; this can apply to only a certain individual direction of its work."

From the point of view of the speaker, science should not be separated into Academy science or VUZ science; science is one, although there are special features. Therefore, the basis for an idea on joint work should originate at the Academy, be thoroughly developed at the VUZ, and then be sent to the OKB and subsequently to manufacturing.

G. A. Nikolayev welcomed the establishment of base VUZ departments at the institutes of the Academy, and at the same time called attention to the administration of the fundamental disciplines by the departments (mathematics, physics, chemistry), which are very seldom headed by members of the Academy.

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In this sphere, the Academy's assistance has been essential. And, evidently, it is necessary to indicate the need for close ties — above all between the Academy and the so-called basic VUZ's, which should become foremost with respect to the scientific. It would also be useful to organize a special section in the Moscow Council of Rectors to deal with questions of ties with the scientific establishments of the Academy.

Vice President of the USSR Academy of Sciences, Academician A. V. Siderenko, declared that, "The question examined at the conference is especially important just now, at the present stage of coordination of the efforts of all of Soviet science directed toward development of the national economy."

"The various geological councils of the Academy," the speaker reported, "To a great degree consist of scientists from the Academy and from the university and have never been divided in terms of departmental subordination by anyone. But that is at the center, whereas in the provinces the situation is somewhat different. Therefore, the prestigious councils on scientific problems would be well advised to devote some thought to organizing a complex of scientific establishments of the Academy and the university—corresponding with the branches of the councils in the localities. The editorial staff of the magazines which are published along the lines of 'Sections of Earth Science,' as a rule are made up not according to departmental criteria but according to the prestige of the scientific personnel. This practice should be expanded.

"The USSR Ministry of Geology at one time had established base geological administrations and expeditions for conducting student practical work. The utility of this measure was never in doubt. Course work completed by the students at the basic geological organizations, in a number of cases served as the basis for future degree work and candidate dissertations. It would be fitting to make certain scientific research institutes into bases for conducting probationary work for mastering new methods; having specified in special documents the appropriate ties between the Ministry of Geology and Minvuz, between Minvuz and the Academy of Sciences, and between the departments of the VUZ's and the subordinate units of the scientific research institutes."

A. V. Siderenko stated that, in his opinion, there is one essential mistake in the training of the professorial-instructor staff of the VUZ's that must be corrected: year in, year out it is made up of its own graduates. Very few instructors have completed a good industrial school or school for scientific work in the system of the Academy.

It would be expedient to enlist more widely the outstanding scientists, to deliver lectures in the VUZ's on scientific problems; to teach small independent courses where the fundamentals of the most important achievements of modern science could be brought to light. This would facilitate enhancing the knowledge of the professors and instructors as well as the students. Probably every member of the Presidium of the USSR Academy of Sciences, and every prominent scientist would be able to take part in this work.

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Rector of the Kuybyshev Institute of Aviation, V. P. Lukachev, dedicated his speech to one of the new forms of ties between the Academy and the university. He reported that in Kuybyshev there are about 74,000 students; that the city's higher educational institutions are working on dozens of scientific programs which have industrial branch, republic and union significance, and that the Kuybyshev VUZ's have begun to take part in projects which are being carried out jointly with a number of ministries, and with many industrial branch and Academy institutions. In order to better and more fully utilize the existing scientific potential, the speaker proposed organizing in the Volga area special scientific-educational centers in the university framework, which would cooperate in conducting research in accordance with the programs of the USSR Academy of Sciences. With the establishment of Academy laboratories in the VUZ's, it is necessary to strengthen their material base as well. This base can be used also for better training of specialists for the national economy.

The Academician Secretary of the Department of Biochemistry, Biophysics and Chemistry of Physiologically Active Compounds, A. A. Bayev, stressed the importance of scientific projects and programs as the basis for joint work by the Academy of Sciences and the university.

The question of the quality of training of specialists by the universities was formulated by Academician N. N. Inozemtsev. "Apparently," he said, "The situation varies according to the various disciplines; but the situation with respect to training economists cannot be considered satisfactory. One of the main reasons is the unsatisfactory level of the basic instructor staff at the university. And the fact that the overwhelming number of graduate students in economics are concentrated in the VUZ's which have an insufficient number of highly-qualified instructors leads to a proliferation of poorly-prepared specialists. Incidentally, in such Academy institutes as the Institute of World Economics and International Relations, the yearly flow of graduate students is only ten people. And this, with 75 doctors of science! It is by all accounts expedient to sharply redistribute the spaces for graduate students in favor of those scientific institutions which are able to provide the required level of training for specialists. It is high time to do this, if we are genuinely concerned about the future of science, and about the future of higher education.

"As far as special-purpose graduate fellowships are concerned, these should also be restructured. Because right now, if you call a spade a spade, there are two types of graduate students: those who have passed through competition, and the 'sedentary types' to whom passing an examination with a score of three is sufficient, in order to remain in graduate school. Are there really only a few talented people in the country? Should not genuine competition be set up for everyone so that those selected for graduate school are truly the best?"

In his summary of the discussion, President of the USSR Academy of Sciences, Academician A. P. Aleksandrov, remarked that: "The most important task of the session was to promote the capability of the higher educational institutions to turn out specialists who are capable of creative work. And such a genus of specialists can be trained for our science, industry and agriculture only in the process of creative research activity in the VUZ's and the institutes of the Academy."

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From the many questions raised during the discussion of V. P. Yelyutin's report, the president selected the question of equipping the VUZ's with modern research technology. "Obviously," he said, "This problem will be solved more quickly in the Academy will take it up together with the VUZ's. This will permit enlisting the student-designers in the affair also, and will permit overcoming the difficulties connected with producing the instruments in small lots." The Academy is transferring a part of its equipment to the VUZ's. "But in addition," said A. P. Aleksandrov, "We are asking that the equipment which is transferred be handled with care. And the Academies of Sciences and VUZ's now must pay the most serious attention to automation of experiments in physics, chemistry, biology and the other sciences. The complex of instruments manufactured by the industry of the socialist countries permits extensive automation of experiments." A. P. Aleksandrov stressed the need for a unified ideology, and standardization in establishing the facilities for a mechanical experiment.

In the opinion of the president, familiarity with computer systems and technology used in the Academy's institutes is of great advantage to future VUZ graduates. Thus, the young specialist entering industry will have mastered modern systems and can participate in work on introducing the results of basic research into the national economy.

In conclusion, A. P. Aleksandrov suggested that those participating in the conference who did not have the opportunity to speak, submit their proposals in writing so that they might be taken into consideration in the resolution concerning the question which was discussed.

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In the resolution which was adopted, it was noted that up to now the forms of cooperation between the university and the USSR Academy of Sciences which have taken shape have fully justified themselves: such as, participation of the VUZ's in joint research with the scientific establishments of the USSR Academy of Sciences on coordinated plans in the area of the natural and social sciences; conducting scientific research work on the basis of agreements on scientific cooperation; publication of joint scientific projects; participation of VUZ scientists in drawing up programs on solution of the most important problems in the area of the natural and the social sciences for the years 1976-1990; tours by members of the departments of the USSR Academy of Sciences to the provincial VUZ's for familiarization with organizing educational and scientific work in the localities, rendering scientific and methodological assistance, and delivering lectures; jointly conducting international congresses, all-union conferences, seminars and symposia; and participation of scientists of the USSR Academy of Scientists in training highly-skilled scientific cadres, through special-purpose graduate fellowships at the nation's higher educational institutions.

However, the resolution points out, there are serious shortcomings and unused capabilities in the development of cooperation between the university and the USSR Academy of Sciences. Highly qualified scientific-pedagogical cadres at

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the university are not fully utilized in research projects on the most important scientific-technical and socioeconomic problems; and far from every VUZ in the country has been enlisted to perform scientific work in accordance with the coordinated plans of the USSR Academy of Sciences. There are still few important complex research projects carried out in the VUZ's. The subject matter of the research projects carried out in accordance with economic agreements with enterprises and organizations, in a number of instances, are of a casual nature.

University personnel are inadequately enlisted to perform joint research projects on the facilities of the Academy's scientific establishments, and in particular for work on the unique installations the USSR Academy of Sciences possesses. The proven practice of establishing branch university chairs at the leading institutions of the USSR Academy of Sciences is not yet sufficiently developed. Prominent scientists of the USSR Academy of Sciences seldom take part in preparing up-to-date textbooks and educational materials, nor in the work of increasing the skills of the VUZ instructors.

In the interests of furthering the development of scientific research in the nation's higher educational institutions, and strengthening the ties between the university and the scientific establishments of the USSR Academy of Sciences, the Presidium of the USSR Academy of Sciences and the Collegium of the USSR Ministry of Higher and Secondary Special Education have resolved to approve the activity of the sectors of the Presidium of the USSR Academy of Sciences; of the departments, scientific research establishments and scientific councils on problems of the USSR Academy of Sciences; the Scientific-Technical Council and its sections; the Main Administration of Scientific Research Work, the Educational-Methodological Administration on Higher Education, the Administration for the Leading and Scientific-Pedagogical Cadres of Minvuz, USSR, and Higher Educational Institutions, for strengthening the cooperation between the USSR Academy of Sciences and the university, and to recommend that they take every measure for further expansion and perfection of this cooperation; proceeding from the tasks defined in the decree of the CPSU Central Committee and USSR Council of Ministers, "On Increasing the Effectiveness of Scientific Research Work in the Higher Educational Institutions."

It has been deemed expedient to form at the Presidium of the USSR Academy of Sciences and Minvuz, USSR, a council on ties between the USSR Academy of Sciences and the university for solving the problems concerning strengthening and perfecting the scientific and scientific-pedagogical cooperation between the VUZ's and the scientific establishments of the USSR Academy of Sciences, as well as long-term planning for training scientific cadres. The basic tasks of the council have been defined. Its leadership has been placed on Vice President of the USSR Academy of Sciences and Rector of the Moscow State University, Academician A. A. Logunov.

It has been recommended to the scientific problem councils of the USSR Academy of Sciences and to the sections of the Scientific-Technical Council of Minvuz, USSR, to constantly maintain close contact in working out coordinated plans, and defining the prospects and directions of joint scientific research projects by the Academy's scientific establishments and the VUZ's, etc.

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A request has been made to the Scientific Council of Problems of Scientific-Technical and Socioeconomic Forecasting at the Presidium of the USSR Academy of Sciences and the USSR State Committee on Science and Technology (Academician A. A. Kotel'nikov), to examine the question of more extensively enlisting the VUZ's in developing the Complex Program for Scientific-Technical Progress for the Next Twenty Years, in the interests of more completely reflecting the contribution of the university in the development of the nation's science, technology, economy, and culture.

It has been deemed expedient to conduct at joint sessions of the Presidium of the USSR Academy of Sciences and the Collegium of Minvuz, USSR, as well as those of the presidium of the union republic academies of science and the collegia of the republic Minvuz's, periodic discussions of the results of scientific research work and the prospects for development within the framework of coordinated plans of the USSR Academy of Sciences and the academies of sciences of the union republics.

It has been decided to expand the practice of concluding long-term agreements on creative cooperation between the institutes of the USSR Academy of Sciences and the VUZ's; at the same time, having provided the necessary conditions for enlisting the provincial VUZ's for scientific research; providing their research fellows long-term temporary assignments for work on the unique installations at the Academy's scientific establishments; expanding the practice of allowing students at the VUZ's and above all at the universities to complete work towards their degree at the scientific establishments of the USSR Academy of Sciences.

The Personnel Administration of the USSR Academy of Sciences, together with the Administration for Management and Scientific-Pedagogical Cadres of Minvuz, USSR, have been commissioned to work out a unified plan for VUZ instructors to do their probationary work at the scientific establishments of the USSR Academy of Sciences; and, by means of special-purpose graduate fellowships, train the scholars with the highest qualifications, for the new and the insufficiently staffed specialties.

It has been suggested that the departments of the USSR Academy of Sciences take part in improving educational plans and programs on the basis of increasing the importance of the fundamental sciences in the theoretical and professional training of specialists with a broad background; by more completely reflecting the newest achievements of science and progressive experience while training cadres for all sectors of the national economy, for science and for culture; having stipulated in the educational-methodological documentation the organization of training the cadres and rationally combining theoretical knowledge with the ability to solve practical problems.

The Council on Ties between the USSR Academy of Sciences and the University must assure more active participation by the scientific establishments and the scientists of the USSR Academy of Sciences in preparing textbooks and educational materials, and in working out educational plans and programs for the universities on the natural and social sciences.

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It has been recommended that the higher educational institutions regularly invite prominent scientists of the USSR Academy of Sciences to deliver lectures at the VUZ's to the professorial-instructor staff, to graduate students, and to the undergraduates, and also at VUZ departments for increasing their qualifications; or independent short courses on the most important achievements of modern science. It has been proposed that the departments and scientific establishments of the USSR Academy of Sciences give the VUZ's all possible assistance in these measures.

It has been decided to encourage independent participation by the personnel at the VUZ's and at the Academy's scientific establishments at the scientific conferences, meetings, seminars and symposia conducted by the USSR Academy of Sciences and Minvuz.

The department of scientific instrument manufacturing of the USSR Academy of Sciences, together with the Main Administration for Scientific Research Work of Minvuz, have been commissioned to carry out work on bringing to light completed original development of new instruments for the purpose of speeding up their manufacturing at the enterprises of the USSR Academy of Sciences and Minvuz, and transfer of parts of them for assimilation into industry.

A request has been made to the academies of science of the union republics to discuss the questions touched on in the present resolution with the republic Minvuz's. It has been deemed necessary to examine at the session of the Council on Coordination of Scientific Activities of the Academies of Science of the Union Republics the results of the aforementioned discussions and to plan measures for developing scientific research in the VUZ's of the union republics and strengthening the ties between the universities and the republic academies of sciences, taking into consideration the positive experiences in cooperation of the academies of sciences of the Ukrainian SSR, Belorussian SSR and Lithuanian SSR and the higher educational institutions of these republics.

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DEMOGRAPHY

EMPLOYMENT WITHIN SMALL TOWNS EXAMINED

Moscow VOPROSY EKONOMIKI in Russian No 4, Apr 80 pp 152-153

[Review by Ye. Ruzavina of the book "Zanyatost' v Nebol'shikh Gorodakh (Ekonomiko-Demograficheskiy Aspekt)" [Employment in Small Towns (Economic-Demographic Aspect)] by A. E. Kotlyar, V. D. Zinchenko, I. N. Kirpa, and O. P. Kochetkov. Doctor of Economic Sciences A. E. Kotlyar editor. Izdatel'stvo Statistika, 1978, 207 pages]

[Text] In the final account, the study of the utilization of the labor resources in small towns is related to finding the sources of extensive economic growth. However, complicating the interconnection between intensive and extensive factors of expanded reproduction, economic intensification does not exclude in the least the effect of the latter. As in the past, society remains interested in the fullest possible utilization of the labor mass in the national economy and in its absolute annual increase. This calls for the development of instruments for actively influencing manpower resources in small towns, for "population reproduction problems," as the monograph authors justifiably write, "frequently turn out, in the final account, to be problems of manpower reproduction."

The main purpose of the book is to explain the reverse influence of employment in small towns on the population reproduction system and, above all, on its sex/age structure (p 35). "In terms of sex the 'economic-demographic optimum' corresponds to the balanced use of male and female labor in the urban economy, in providing conditions for developing the necessary base for living resources for the family and, on this basis, a base for the normal development of demographic processes" (p 82).

The employment breakdown by sex in small towns is analyzed in accordance with the sectorial characteristics of the manpower used, the territory to which the population is "bound," and the population structure (p 49). The age structure of the working population is determined by the age structure of the population at large, and the breakdown of those employed by sex, reflecting socioeconomic disparities and sectorial characteristics of the application of labor from the viewpoint of the physical qualities of the

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manpower and education and skill levels. As a whole, a consideration of the interrelationship between sex and age shows that differences among sectors, based on sex, are less drastic compared with age (p 52).

The work provides extensive data describing the dependence of the population structure and its reproduction systems on the structure of the manpower used and, above all, its sex and age characteristics. The authors draw the conclusion that the sex disproportion in the population structure corresponds to its breakdown among those employed (Table 18). They similarly trace the clear correlation between the structure of those employed by sex and those employed in private work (Table 24), and the indicators of marital status (Table 26), birth and death rate and natural population increase (Tables 9, 28), and the results of migration computed on the basis of the settlement coefficient (Table 27).

The study showed that the disproportion in the use of male and female labor has its most adverse effect on the demographic structure of small towns when the share of women among those employed is lower than the 47 percent level and higher than the 55 percent level (pp 99-100). Singling out the group of cities ranging between 49 and 53 percent of the share of women among those employed, the authors consider that demographic processes in such cities develop favorably. It is precisely such cities that should be considered comprehensive in terms of the utilization of male and female labor (p 100).

The authors consider the formulation of an active economic policy toward small and medium-sized towns. The work offers a good work tool for "interested people"--developers of systems for rayon planning, regional population plans, general urban plans, and plans for territorial-production complexes. Thus, the monograph offers breakdowns and statistical assessments of employment factors based on sex, and a mathematical model for developing an employment structure by sex. Let us also single out Chapter 4 which offers a functional classification of small towns and defines the "requirements" of the various realms of labor in terms of the demographic characteristics of the manpower, describing the specific types of production facilities aimed at equalizing the employment structure by sex, and substantiating methods for estimating additional job openings.

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DEMOGRAPHY

BOOK ON URBANIZATION IN GEORGIAN SSR REVIEWED

Leningrad IZVESTIYA VSESOYUZNOGO GEOGRAFICHESKOGO OBSHCHESTVA in Russian
No 112, Jan-Feb 80 pp 80-82

Book review by V.V. Pokshishevskiy of book "Urbanizatsiya Gruzii" (Urbanization of Georgia) by V. Sh. Dzhaoshvili, Tbilisi, "Metsniyereba", 1978/

Text In the abundant flow of recently published geographic literature dedicated to problems of urbanization, most have interpreted individual methodological matters and cast some light (sometimes in regional examples and sometimes on a global basis) on particular aspects of this important social-geographic process. A substantial gap has been the almost total lack of comprehensive monographs which characterize an adequately representative territory of all aspects of urbanization "straight forwardly" and then in their interrelationships. A happy exception to this is the recently published monograph of the well-known Georgian geographer V. Sh. Dzhaoshvili. The book is called "The Urbanization of Georgia", which is broken down into subsections entitled "Genesis", "Processes" and "Problems".. The book is much more comprehensive than is apparent from these three subsections. *

The main thing I wish to point out is the fundamental nature of the book, which is seen in its thorough treatment and the quality of the examination of the many aspects of urbanization and the fact that the author constantly supports his characterizations with a solid base of economic indicators (in passing I will note that because of this the author was able, as if incidentally, "through the phenomenon of urbanization", to largely characterize the economic geography of Georgia - at least in the section on its industrial features, but partially its agricultural features). The richness by economic analysis is shown in the logical adherence to the underlying principles of the Marxist explanation of the growth of cities as centers for the realization of the territorial division of labor (these principles are sometimes "forgotten" in newer works whose authors are concerned with the purely sociological aspects of urbanization while interpreting urbanization in isolation from the basis). Dzhaoshvili shows the final stipulation of the forms of settling apart by the territorial organization

* The comprehensiveness is characteristic of other previous works of V.Sh. Dzhaoshvili, particularly his monograph concerning the population of Georgia (1), which won the Gold Medal *imeni* P. P. Semenov, and also his books on Tbilisi (2), Kutaisi (3) and other Georgian cities.

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of production by the functional-genetic diagram of the classification of cities, the basis for which is one of the important achievements of Soviet geography of population.

Dzhaoshvili gave his monograph the following structure. Following a general characterization of modern urbanization (chapter 1) there is an examination in Chapter II of the historical stages of the development of cities in Georgia ("Genesis"). Then there is a careful examination in their city-forming significance of the sectors of the national economy of Georgia (Chapter III), an overall review of the course of Georgia's urbanization (Chapter IV), and its demographic aspects (Chapter V); all of this is covered in the subtitle "Processes". The next four chapters provide a systematic-structural analysis of the process of urbanization and cast light upon its regional aspects and the formation of agglomerations; these chapters also examine the social-economic consequences of urbanization (in the field of using labor resources, the development of an infrastructure and so forth) and the problems that arise in connection with urbanization, in particular "the strategy of urbanization" of Georgia and the more rational utilization of city space; * these chapters form the final section of the book, which is called "Problems".

The structure itself shows how comprehensive the book is and that the author follows the best traditions of Soviet studies on cities. But in the interpretation, it would seem, of the already established theoretical hypotheses the author, due to the depth of his analysis, finds substantial new nuances, the formulation of which enrich the theory. I shall give several examples - this is all the more appropriate that these formulations, which are spread out throughout the book, are sometimes lost in the expanded text, which may seem to be "quite traditional".

In studying the genesis of cities, Dzhaoshvili directs attention to the substantial historical "emptiness" between the development of pre-capitalist cities and cities whose growth depended upon industrial functions. The rich history of Georgia's cities provides many examples of the inconstancy, frequent fall in the past of those populated areas, the city-forming factors of which were primarily their military and political functions. This principle borderline the author, of course, divides as if "within" the basic stage of city formation based upon the separation of several non-agricultural functions from agriculture. With great expression it is shown that "without modern industry there would be no modern cities" (p 69), just as "all formation of modern civilization took place predominately in the city environment" (p 90); moreover urbanization extends not only the possibilities for the production of material and spiritual good, but also their consumption. (p 6)

* This aspect is particularly important in Georgia: according to the author's estimates (p 24) city land occupies up to 4 percent of the republic's inhabited land, for which on the whole is characteristic, on the one hand, a great need for land and, on the other hand, an increased value of land for agricultural and recreational purposes.

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In the book we find harsh criticism of popular efforts to use formal mathematical theories to compare the growth rates of cities of different sizes (pp 108-110). The author shows that not only is it unfair to compare the dynamics of the number of cities of various classes (in view of the variability of the composition of cities comprising these classes), but also the dynamics of the population in constant groups of cities: after all in each of them a portion of the small cities "grow into" large cities. The author correctly concludes that "on the basis of the growth of cities of different classes rests not the size of the city but the place occupied by the city in the entire system of settling apart. Population is the result not the reason for the development of a city (p 110)." The specific conditions for the growth of cities of any class come about "in relation to how new industrial enterprises or other city-forming projects are sited (p 110)." All of this is expressively shown in the picture of the development of 109 present (1975-1976) city settlements of Georgia (the Table in the Appendix is very valuable for displaying the functional-genetic types of all of these settlements).

Dzhaoshvili attaches much importance to the functional-genetic characteristics in evaluating the process of urbanization, so much so that he concludes Chapter VI (Concerning the Systematic-Structural Analysis of the Entire Process of Urbanization) with a classification of Georgian cities based on these two indicators. In this chapter we see quite a few new formulations which enrich the theory of geographical study of cities. Important among these formulations are the linked examination of the units of settling apart and the sectoral links of the national economy (p 157) and his pointing out of the great complexity of understanding the "external environment" in applying to social systems and of the importance of the stability of their ties with it (p 161).

City agglomerations are interpreted by the author in the manner of the writings of G. M. Lappo (4) and F. M. Listengurta (5), but he recommends clarifying their proposed criteria by using several other indicators (the formula is on page 185). The recommendations are an original contribution by Dzhaoshvili to the discussion of the far from solved question concerning the delimiting of agglomerations. In Georgia the author defines four "first rank" agglomerations (Tbilisi, Kutaisi, Batumi and Sukhumi); the linear nature of the last two is well shown. He also names smaller agglomerations that are now being formed; I believe that the author has mistakenly failed to examine the prospect of the "growing" of the local agglomerations of Chiatura-Sakheri and Zestafoni-Shorapani into the Kutaisi "macroagglomeration".

Dzhaoshvili is no stranger to the very "latest" methodological approaches to urbanization as a central modern phenomenon of city geography. The monograph devotes adequate space to the analysis of Georgian cities using a mathematical model of their system according to Zipf-Medvedkov. But the author does not absolutize the mathematical ratios. In noting that "Mathematical analysis .. is only a way to confirm truth obtained by "common sense" concerning the "great gap in population of Tbilisi and the other

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cities of Georgia" (p 169), he seeks if only correlative ties between the degree of urbanization of the economic regions of Georgia and the per-capita volume of gross public product or national income (p 179). The obtained coefficients of the ranked correlation (.542 and .595 respectively) are not great and the author again gives the usual economic and geographic explanations for this "based on common sense" (p 179).

The soberness of the entire analysis is most apparent when Dzhaoshvili formulates constructive tasks for the future "strategy of urbanization". In rejecting both the doctrine of optimal sizes for cities and the unlimited growth of large cities, he demonstrates that for practical purposes the republic will in the future need "any" cities depending upon their role in the territorial division of labor and specific city-forming factors. The management of the course of urbanization must be linked with the development of production forces (pp 226 - 227). The author sketches a future (for the year 2000) hierarchy of the cities of Georgia in this manner: the capitol polyfunctional center with a population of up to 1.5 million; large industrial and polyfunctional cities (Kutaisi and Rustavi with a projected population of 220,000 to 300,000 and Batumi and Sukhumi - up to 180,000 inhabitants); medium sized cities - regional centers (with 50,000 residents); mining and extracting centers (of 30,000 to 40,000 people); "recreation cities" (up to 30,000 or 35,000 residents); centers of "regular" administrative rayons (up to 15,000 to 25,000 people). The linear-systematic grouping of cities in the basins between mountains and along the sea coasts is emphasized.

"The Urbanization of Georgia" must be highly praised. One can, of course, make some critical comments about it, (but there are few of them). For example, on page 127 he has used outdated data on population growth and industrial product in several foreign countries. On page 135 the author hardly comes up with an accurate depiction of the influx of population into the cities of Georgia as "spontaneous", since it was determined by the planned development of city-forming projects; he should have found another, more adequate definition for the migration that has taken place. From an editorial point of view the phrasing on page 137 is unfortunate: "The positive balance of migration from without the republic...since 1957 has already taken on negative indicators". The drawings on pages 160 and 238 add very little to the text.

A more serious complaint might be that the cities of Georgia are viewed almost completely apart from the entire "macroregional" system of cities of the Trans-Caucasus (or even the Caucasus), although the ties here are near, "close range" and far. But perhaps we should view this complaint as an "order" for the author to write another book?

FOOTNOTES

- (1) Dzhaoshvili V. Sh. The Population of Georgia. Tbilisi, 1968.
- (2) Dzhaoshvili V. Sh. Tbilisi, Tbilisi, 1971.

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- (3) Dzhaoshvili V. Sh. Kutaisi, Tbilisi, 1962 (in the Georgian language).
- (4) Lappo G. M. The Development of City Agglomerations in the USSR, Moscow, 1978.
- (5) Listengurt F. M. Criteria for Apportioning Large-Scale Agglomerations in the USSR. Izv. AN SSSR. Ser. geograf., 1975, No 1.

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DEMOGRAPHY

BOOK ON AGROINDUSTRIAL SETTLEMENTS REVIEWED

Leningrad IZVESTIYA VSESOYUZNOGO GEOGRAFICHESKOGO ORSHCHESTVA in Russian
No 112, Jan-Feb 80 pp 85-87

[Review by B. S. Khorev of book "Problemy agroindustrial'nykh poseleniy"
(Problems of Agroindustrial Settlements) by V. R. Belenkiy, Moscow, "Mysl"]

Text In the book of one of the most important Soviet specialists in the field of the study of rural settlement the economic-geographic aspects of the development and formation of the network of rural settlements, which reflect the more characteristic social-economic shifts in the agrarian sector and particularly the entire process of agrarian-industrial integration and the urbanization of the village, are examined.

The task of transforming the rural settlement takes on particular importance since in accordance with the CPSU Central Committee Decree "Concerning the further development of specialization and the concentration of agricultural production on the basis of inter-farm cooperation and agroindustrial integration" (1976) the switch from the isolated in an organizational sense in the development of the sectors of agriculture and the processing industry to their organic combining, the integration of the agrarian and industrial sector of the economy, is extensively taking place.

It must be said straight away that the contents of the book are considerably more extensive than its title. The book also examines such important, more general questions of rural settlement such as its structural-functional analysis, the place of rural populated areas in the settlement structure of society, the problems of rural settlement throughout the USSR and in individual regions, in conditions of the urbanization of the village and agrarian-industrial integration. Quite a bit attention is devoted to questions of basing rural settlement in the drafts of regional planning of the administrative regions, to the goals and content of optimized estimates, to the principles and methodological foundations of the total organization of rural settlement structures, to the variant analysis of long-term within-farm settlement, to the criteria and quantitative indicators for evaluating the

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the long-term variants using the economic-mathematical apparatus. However, the author, naturally, devotes most attention to the planning of agrarian-industrial settlements and to the influence of the entire process of agro-industrial integration upon the development of rural settlements in the USSR.

Moreover questions of the interrelationship of rural and city settlement are examined both in a methodological and methodical manner; particularly at the level of the centers of the grass-roots administrative regions, where the basic, vitally important and pressing problems of the village are handled. The author understands and clearly develops his thought concerning the fact that to analyze the network of rural settlements without the city-regional centers is to give an unrealistic picture of rural settlement. Therefore, one can with satisfaction note that in the theoretical and methodological sense the author has taken the correct path in examining the problem of agroindustrial settlements not in isolation but through the prism of their place and role in the network of rural populated points and what is more in the unified system of population settlement of the USSR on the whole. The author's theoretical computations, which divide the settlement of population as a relatively integral subsystem of more extensive systems encompassing social and economic factors, are deserving of particular attention; the systems which record the ties of this subsystem with related units which disclose the composition and structure of the settlement network itself.

In analyzing the prospects of the village, the author with complete justification devotes particular attention to agrarian-industrial integration as a factor in the urbanizing of rural areas. In viewing this process as a qualitatively new stage in the development of the agrarian sector of the USSR, the author analyzes the present disparity in various regions of the evolved forms of rural settlement in relation to the requirements of the developing production base and the social factors in the life of the rural population. On the basis of this the author makes a clear differentiation of the content and severity of the problem of rural settlement. The latter is of particular practical significance for it makes it possible to specify the goal, tasks and trends in the reconstruction of the rural settlement network by regions and zones of the USSR.

In continuing the logical development of his topic, the author provides general conceptions of the territorial agrarian-industrial complex as an integral social-economic spatial system and examines the composition and characteristic features of the basic functional types of settlements within such a complex; he also analyzes the tendencies of population development in the agrarian-industrial centers and evaluates the system-forming significance of the latter. It must be emphasized that in this case the author uses rich factual material; for his analysis he uses quantitative methods - a multi-factor correlative analysis.

The methodical foundations for the optimization of the settlement of the territorial agrarian-industrial complexes in the regional lay-out are thoroughly revealed in the book. He not only enumerates the questions to

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be solved (which usually limit the planners and city builders), but also provides extensive recommendations for solving these questions. The comprehensive criterion proposed by the author for evaluating the efficiency of the variants of settlement, the outline and logic of the justifications, the methods for estimating individual kinds of expenditures, - all of this comprises a totally definitive, original and practical contribution to the methodical basis for solving questions of rural settlement in a regional lay-out. Also of value is the fact that in his methodical work-ups the author is orientated on modern mathematical methods and computers, while formulating in terms of dynamic programming the task of the economic-mathematical modeling of optimal settlement in the territorial agrarian-industrial complexes, with the simultaneous justification of the by-stage transformation of the rural settlement network.

The book concludes with a generalization of the experience of specific justifications of the future settlement in territorial agrarian-industrial complexes not only in the USSR but in several other socialist countries. Of particular interest are the work-ups for Moldavia and the sugar beet planting regions of Orlovskaya Oblast, which were done with the direct participation of the author according to a methodology proposed by him.

Such a rich in content, comprehensive and rich in its use of methodical devices work must reach individual conclusions, which, possibly, will serve as an object of discussion or criticism. The author correctly notes that "...on the strength of several objective and to a large extent subjective reasons answers are not provided for all questions connected with the dynamics of the settlement structure in the agrarian-industrial complexes of various types. Some positions will seem to some readers to insufficiently convincing; in some cases other points of view are entirely possible which do not coincide with the opinions presented in this book. Obviously, it is unrealistic to expect in this monograph final solutions without suitable and discussion positions" (1 p 175).

It seems to the reviewer, however, that we are not speaking of the positions of the author, whose monograph is distinguished for its depth of conviction in disputing the basic points of view on various questions, but, what is most important, for its scientific soundness of the positions and recommendations contained in the book, which, unfortunately, is not always the case for all books in the field of long-term rural settlement. Thus, we are not so concerned with the author's positions as with the fact that at the present stage the basic questions of the formation of rural settlement in the USSR, such as the maximum sizes of rural populated points, the question of enlarging villages and of the so-called collective settling, the promise and lack of promise of various kinds of populated points, of the rates and scale of reconstruction, of the trends for capital investments and the use of internal resources of the village for its social formation, of the functions and place of the village in the unified system of population - all of these questions must be considered as unsolved and very controversial and even very involved.

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For several of these questions the author, in my opinion, convincingly and more importantly scientifically vindicates the following positions. The village in the future must occupy in the unified system of settlement a position of a full and structural element, the development of which will be closely alligned with the dynamics of a network of cities, but which will differ in its specific features. The concept of the development of the rural settlement network derives from the apportionment in the composition of the existing network of rural populated points of a limited number of strong centers, in which there must be concentrated a basic amount of new production, housing and cultural and consumer construction, but along with this for the remaining rural settlements it is proposed not that they be eliminated at an accelerated rate but that there be a gradual evolution of the entire network with scales and rates of rebuilding that best satisfy the interests of efficient economic assimilation of a specific territory and which take into consideration the demographic situation of the modern village in the various republics and regions of the USSR, the material and financial capabilities of replacing the existing fixed assets with new ones. In realizing this concept there is need for a specific, limited construction and repair of living and other buildings in those rural populated points which will be preserved for a long period of time. There is also provision for the development of inter-farm systems of settlements in rural regions (2 - 4 systems per region), which is the consequence of the process of a growing inter-farm cooperation and the various forms of the association of agrarian and industrial kinds of activity in the rural location. Therefore there is a noticeable growth in the number of so-called "mixed" by national economic functions rural settlements. There will also be a growth in the number of non-agricultural rural populated points (timber, transport and especially those connected with the recreational use of a territory). It is thought wise to preserve a portion of the small agricultural villages and towns, which are situated near the larger villages or cities having convenient transportation and having a stable population at the present time.

By tradition when reviewing a book it is necessary to point out the shortcomings. This monograph does have shortcomings. Thus, in our opinion, the author should have outlined his conceptual positions in comparison with the concepts of other authors, without avoiding polemics that might be even a bit harsh. The author does not always defend his correct positions - this refers especially to questions of enlarging and collective settling.

However, on the whole the book is based on good quality, well worked-out material. It contains not only new methodological, theoretical and methodical positions, but makes a substantial contribution to the geography of rural settlement, regional lay-out and the planning of rural settlements. The monograph is written in a good literary language and reads easily.

In conclusion I want to express one regret concerning the fact that the book was published in a very small edition and that as soon as it appeared on the shelf it became a hard book to find.

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