JPRS 84524

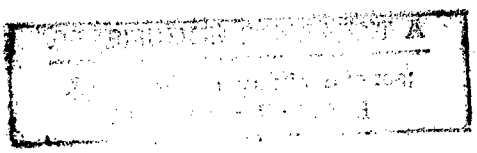
13 October 1983

China Report

SCIENCE AND TECHNOLOGY

No. 210

CHINA EXAMINES SCIENCE POLICY -- III



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CONTENTS

SCIENTIFIC AND TECHNOLOGICAL WORK MUST BE GEARED TO ECONOMIC CONSTRUCTION

Beijing RED FLAG in Chinese No 10, 16 May 83 pp 34-37, 39

[Reprinted from JPRS 83923, 19 July 1983 China Report RED FLAG No 10, 16 May 1983]

[Article by Zhao Dongwan [6592 2639 1354]]

[Text] At the 12th CPC National Congress it was strongly underlined that the key to achieving modernization in industry, agriculture, and national defense is the modernization of science and technology, and that the latter is one of the strategic focal points of economic development. At the national award giving ceremony for science and technology, Comrade Zhao Ziyang pointed out that work in science and technology must be geared to economic construction. In our thinking, our organization, and our behavior we should thoroughly implement this guiding ideology so that science and technology may contribute greatly to modernized construction in China.

I

This basic guiding principle, that science and technology must be geared to economic construction, reflects the objective demands of modernized construction in China and its corresponding strategic stipulations, namely that within the socialist system, science and technology must serve economic development and social advancement. This requires that our scientific and technological departments and our scientists and technicians should, with an eagerness to meet the needs of the state and the people and on the basis of the party's and the state's interests, contribute what is necessary for promoting technological advancement, improving economic results, and developing the national economy. Our great mass of scientific workers must actively throw themselves into the midst of the great practical application of socialist modernized construction, researching studiously how to solve key scientific and technological problems in order to produce great economic results and social fruits in economic construction and social development.

Science and technology are a productive force. Not only can science and technology provide new products, new techniques, and new methods for material production, they can at the same time constantly develop new areas of production and new production industries so that mankind may improve on nature to previously unseen extents and depths, thereby creating enormous material wealth. The development of the modern atomic power industry, the microelectronics industry, and the macromolecular compound industry, as well

as the extensive applications of biotechnology in industrial and agricultural product, are all the results of creative invention in new technology, based on accumulated scientific knowledge and breakthroughs in scientific research. The development of these newly emerged industries are ample illustration of the great dynamic initiative in mankind's understanding and adaption of the world. They also illustrate that as soon as science and technology are closely integrated with economic construction, enormous economic results and social fruits are created, representing an important force in the catalyzing of social advancement. The labor production rate is an important yardstick for measuring the speed of economic development and improvements in the labor production rate are to a very great extent determined by scientific and technological advances and the application of science and technology in production. It is especially true in this age of increasing modernization of industrial and agricultural production that continued improvements in the labor production rate cannot depend only on increased investments or increased labor strength but should instead depend mainly on new means and techniques of production furnished by science and technology. Today, economic growth in some economically developed countries depends on the extent of scientific and technological advancement and this dependency has already reached more than 50 percent. After the war, Japan's economy developed very quickly and this was inseparably linked to technological development and successful application of technology. Since the 3d Plenary Session of the 11th CPC Central Committee, production in China's rural areas has developed rapidly as the contract responsibility system has been implemented on a general scale. Now the peasants are no longer content with past production methods and they are demanding that science and technology be used to lead production, and thus enthusiasm to study and apply the sciences has grown to unforeseen proportions. Developing and promoting the application of science and technology in agriculture has meant that traditional agricultural production technology is now being constantly improved while at the same time there is a constant deepening and widening development of agricultural production. China's rural areas will in the future develop a series of new industries and enterprises such as food product processing industries and fodder factories. In addition, the rural areas will be making new demands in the areas of energy, communications, and building construction. All of this will without doubt demand that science and technology play a role. In recent years active use of new technology in many of China's industrial and mining enterprises has meant that production output value and profits have increased severalfold. These facts illustrate that only if science and technology are geared to economic construction and are actually applied in production can they become an extremely effective social productive force.

Gearing science and technology to economic construction reflects the objective laws of coordinated development between science and technology and the economy and society. In addition it is also one of the requirements for the development of science and technology themselves. Engels said: "As soon as science occurs and develops it is determined by production." ("Selected Works of Marx and Engels," Vol 3, p 523) Modern science and technology develop to an even greater extent on the basis of the development of major industrial production. The enormous changes which have

occurred in social production have not only put pressing demands on science and technology, they have also presented science and technology with a pool of research areas and the means to realize these research areas, thus these changes have created social conditions and requirements for the development of science and technology. On the one hand, the level of production directly affects the basis on which development in science and technology depends. Work in science and technology must start out from the present levels of production and the instruments and equipment that are needed must be provided by production sectors, thus only with constant development in production can society possibly amass funds and be able to provide science and technology work with the necessary financial aid. On the other hand, as production develops in every sector of industrial and agricultural production, a great many technological questions need to be answered and many natural phenomena await further explanation and investigation and this should thus greatly encourage the thinking of scientific and technological workers, stimulating constant new achievements in science and technology. As developments in social production bring about changes every day and as people constantly make newer and even greater demands former scientific and technological knowledge no longer comes anywhere near satisfying present demands and this must inevitably stimulate development in every area of science and technology and the emergence of newer science and technology. Thus gearing science and technology to economic construction is not only necessary for developing new technology and developing applicable science, it is also necessary for developing basic sciences. This then opens up vast opportunities for scientific and technological personnel to develop their talents and knowledge and carry out inventive creations.

II

In order to implement the guiding ideology of gearing scientific and technological work to economic construction, our most pressing immediate task is to carry out some reforms in the areas of science and technology, especially within the system of science and technology.

At present there are many faults in the scientific and technological setup which make gearing the latter to economic construction more difficult. One of the most prominent is the existence of decentralized management, decentralization of personnel, decentralization of research projects, decentralized structure and decentralization of funds throughout all sectors of science and technology mainly due to gaps between departments. This state of overdecentralization and diversification is not in accordance with the demands of modernized science and technology's development nor does it correspond with the principles of the planned socialist economy. Only by changing this situation can the role of science and technology be fully exploited.

In reforming sectors of science and technology there must be all-round consideration, thorough organization and studious research, including into such questions and problems as the structure of science and technology itself, policies, and management. Reforms in the system of science and

technology must correspond to reforms in the economic system. They must be effective in breaking down gaps between different departments, in solving the problem of decentralization, and in strengthening collective unified leadership and guidance. They must respect the developmental laws of science and technology itself and they must improve the efficiency of technological and scientific work and promote scientific and technological development. They must be effective in further mobilizing the enthusiasm and initiative of technical and scientific workers so that they may fully express their potential. They must be effective in ensuring that technological developments and scientific results are quickly transformed and applied in production sectors, thus promoting economic development. In conclusion then, reforms in the scientific and technological system should all be based on the extent to which they are of benefit to the most fundamental of all demands--socialist modernized construction, and thus detailed examinations and research should be carried out, as well as pilot schemes and experimental assessments, so that a complete and totally feasible set of reforms may be constructed.

Some comrades fear that carrying out reforms on the system of science and technology, emphasizing the gearing of scientific and technological work to economic construction, may weaken fundamental research. Such worries are uncalled for. When we speak of gearing science and technology to economic construction, what we are referring to is the question of the relations between science and technology and economic construction, and when we talk about the strengthening or not of fundamental research, what we are referring to are questions of relations within science and technology, and thus there exists no insoluble contradiction between the two. At the Fifth Session of the Fifth NPC, Comrade Zhao Ziyang said: "While we emphasize the expansion of practical and developmental research we must strengthen fundamental research." This is the accurate conclusion to the question of how to correctly handle the question of relations within science and technology, based on China's present, actual situation, on assessments of past experiences in scientific and technological development, especially recent new experiences, and on all-round considerations of the short-term future demands of economic construction on science and technology. For a long time now, China has had the capacity to tackle the development of the most advanced and frontier areas of science and technology but has been backward in the wide and large-scale production technology necessary. In order to change this situation it is extremely important that we emphasize the development of practical and developmental research. At the same time we should take note that carrying out fundamental research, especially fundamental research with practical possibilities, is extremely important in strengthening China's scientific know-how and in improving standards of science and technology. Of course, as far as fundamental research is concerned, there are still some areas that cannot as yet be applied in production, and thus we should rationally organize these kinds of exploratory topics within the permitted limits of our ability. We should coordinate applied research, developmental research, and fundamental research so that economic development becomes integrally linked to scientific and technological development.

III

The following few paths should be taken for successfully gearing science and technology to economic development now and for a fairly long time to come.

1. We should gradually establish a characteristically Chinese technological system based on China's present actual situation by carrying out domestic research and by importing technology from abroad, gradually popularizing on a very basic level advanced production technology which suits our needs and which has already come into general use in economically developed countries during either the 1970's or the early 1980's. In this way China's industrial and agricultural production will gradually be transformed onto a new technological basis, cutting consumption of raw materials and energy, improving production quality and processing potential, and thus producing great economic results.

2. Some new, technologically concentrated industries should be established by means of technological development in some new areas, such as biotechnological industries, information technology industries, industries using new structural materials, computer software industries and fodder industries.

3. Early research work for major construction projects and major technological research development work during construction should be well organized so that new enterprises are able to make full use of advanced technology. For example, major water conservation projects, the construction of nuclear power stations and large-scale mines all involve a great many scientific and technological questions, and when these questions have been properly solved we can be sure that major construction projects can be founded on advanced technological bases.

4. We must fully get to grips with "the four applications transferals" so that there is application from the laboratory to the enterprise, transferal from purely military use to both military and civilian use, transferal from coastal regions to inland regions, and transferal from abroad to China. As to what technology should be transferred, from or by whom and how etc., we should draw up regulations and organize their enforcement in a guided and step-by-step way.

5. At the same time as strengthening applied and developmental research we must thoroughly organize some fundamental research projects which have applied potential, thereby providing China's long-term economic development with the necessary store of scientific and technological know-how.

In order to gradually achieve these few tasks we must today get to grips fully with three key issues.

First of all, we must organize well key problems in science and technology. These key issues in science and technology are effective and important ways of concentrating the best of our strength to solve key scientific and technological problems. During the 1950's and 1960's China's scientific and technological forces were, comparatively speaking, still rather backward and

the economic foundations of the time were not very solid, and thus scientific and technological forces were organized together and fought in coordination, achieving outstanding successes in the major tasks that confronted China at that time (such as large-scale forging water presses, large-scale extrusion presses and so on, in total nine large-scale pieces of equipment or newly designed defense, military and industrial materials). Today, the scientific and technological tasks facing us are far more complex than those and thus there is even greater need to focus our strength and tackle these key issues. Key projects should be carried out in stages. On the basis of the scientific and technological topics thrown up by economic development, the state, departments, regions and even enterprises should adopt measures of "trilateral integration" of cadres, workers and intellectuals and the "trilateral integration" of education, research and production in organizing their forces to carry out these key issues. This should be done level after level, with one batch being carried out when one batch is completed so that within a certain amount of time the necessary manpower, material power and financial power has been gathered together to complete several vital undertakings. In organizing these key scientific and technological issues it is important that topics are selected well. Topics and issues which are related to major construction programs or new areas of science and technology should all be included in planning and organized with preferential treatment. The ultimate goal of these key issues is to create productive forces. We should pay particular attention to ensuring that the results of these key issues are speedily transformed into production, promoting further development and exploiting their potential, thus increasing economic results for the country.

Second, we should organize technological and scientific personnel to make active contributions toward the technological transformation of enterprises. We must make sure that production is shifted onto a new and more advanced basis and the most important thing to do is to get to grips with technological transformations in existing enterprises. An important task for today's scientific and technological personnel is helping enterprises carry out technological transformation. Technological transformation in enterprises should be carried out in a planned and step-by-step way. Scientific and technological departments should help relevant departments by evaluating the standards of present technological transformation in existing enterprises, and helping to pinpoint the aims and standards of technological transformation in important enterprises and businesses. At the same time we must organize scientific and technological forces together to help backbone enterprises carry out technological transformations, primarily popularizing production technology already in general use in advanced countries in these backbone enterprises.

Third, we must get fully to grips with applying the results of scientific and technological work. This is an important and most significant link in the way science and technology promotes economic development. The large number of important scientific results that we have amassed are a valuable treasure, if they could be speedily transferred or adapted into application then they would produce great economic results and social fruits. In recent years the Chinese Academy of Sciences has approved a total of more

than 400 major invention programs which have produced more than 10,000 important scientific and technological results. An example might be the technology which has enabled the moving northward of rubber planting areas which has thus smashed the world accepted rule that rubber trees can only be planted in areas within 15 degrees latitude north or south of the equator. In China we have had great success in large-scale planting of rubber trees in areas which fall between 18 and 24 degrees north of the equator. Today, the planting area is now over 6.4 million mu, making it fourth largest in the world. Annual output of dry rubber is now 120,000 tons, making China the sixth biggest producer of rubber in the world. Another example is the hybridization of maize, and today in China there are 36 different varieties growing in large areas throughout 24 provinces, towns and autonomous regions. Every year maize takes up over 50 million mu of land while production increases have reached between 20 and 35 percent and every year potential production output increases in maize stand at several billion jin. The comprehensive use of Jinchuan's natural resources through the application in production of the results of eight scientific and technological research items which were successfully tested meant that nickel output increased by more than 50 percent without increasing the amount of selection and smelting equipment. Thus profits handed over to the state by the enterprise doubled. All of these examples illustrate that the application of the results of scientific and technological research play an important role in economic development. We should assess and sort out all existing scientific and technological results and concrete plans should be drawn up to specify what should be propagated and implemented, and how.

IV

The most fundamental thing to be done in accurately gearing science and technology to economic development and construction is good organization and utilization of existing scientific and technological personnel, allowing them to give full expression to their roles.

At present in China there is overall a large shortage of scientific and technological personnel but at the same time there is also a great deal of idleness due to poor organization and thus a great deal of wastage. How to mobilize the enthusiasm, creativity and positive initiative of all scientific and technological personnel in China and make the best use of them, is a major question that needs answering.

In 1982 there were more than 6 million natural scientists and technologists in China. An army of scientists and technologists of this size is not sufficient for a country as large as China with the demands of economic and social development that it has. However, in comparison with the 1950's, the figures have already increased severalfold and in comparison to 1965 the figures have doubled and thus we do have a very definite strength. Naturally, as far as the distribution of scientific and technological forces is concerned, the situation is very unbalanced, with scientific and technological personnel in the first line of industrial and agricultural production still very weak. There is also a very irrational distribution of scientific and technological personnel between different sectors while

there are also some irrational things to be found within the internal make-up of scientific and technological forces.

Looking at the tasks of scientific and technological work and comparing today with the 1950's and the 1960's there are enormous differences both in depth and width. Constant improvements in production technology have meant that the renewal and replacement period for commodities is becoming shorter and shorter. As for the renewal and replacement period for foreign products, in most cases it was around 10 years during the 1950's. By the 1960's it had already shrunk to 8 years and today some products are replaced by new ones within as little as 4 to 5 years. This thus demands that scientific and technological work must speed up its pace of research and development, constantly providing production development with the fruits of advanced technology. At the same time, only in very few cases do present breakthroughs in areas of science and technology depend solely on research in one area of science or technology. Most breakthroughs now require coordinated work between many branches of science and technology. As the national economy quickly develops, all businesses and industries have been putting greater and higher demands on science and technology, requiring more and more key areas of research of greater and greater complexity. All of this thus demands that we strengthen the construction and organizational management of the ranks of scientific and technological workers.

In order that some scientific and technological workers may exploit their potential to an even greater extent, we should make more concentrated utilization of them, based on the requirements of each task and under the guiding ideology of gearing science and technology to economic construction. We should collectively organize the scientific and technological forces of all sectors together by drawing up long-term plans, outlining technological policies, organizing scientific and technological key issues, participating in the preliminary work of major construction projects, setting up technological development centers in various areas of industry and business, and carrying out concrete tasks involving technological transformations in enterprise and business. We must pay particular attention to drawing off a certain proportion of scientists and technologists from those departments and units with relatively strong scientific and technological forces, so that they may take part in and help important state projects. At the same time we can to certain extents carry out unified job recruitment on the basis of state and regional requirements. We must adopt suitable measures to encourage scientific and technological personnel to go and work in rural and distant regions. In conclusion we must adopt effective measures and many different ways of quickly gathering a scientific and technological force which can involve itself in economic construction, thereby guaranteeing the completion and victory of the task of economic construction.

CSO: 4004/35

ZHAO ZIYANG TIES ECONOMIC GROWTH TO PROGRESS IN S&T

HK281030 Shijiazhuang HEBEI RIBAO in Chinese 8 Jul 83 p 4

[Article by Zhang Pingying [1728 1627 5391]: "A Tentative Talk on Technical Progress--Notes on Studying the 'Government Work Report'"]

[Text] In his "Government Work Report" delivered at the First Session of the Sixth NPC, Comrade Zhao Ziyang gives equal importance to the technical renovation of existing enterprises and the construction of key projects and puts forward the guiding thought that "our economic prosperity must depend on our scientific and technical progress." This is of great significance in promoting our socialist modernization.

By technical progress, we mean the the use of advanced technology, processes, methods, skill as well as appropriate tools and equipment of production in equipping various sections of our national economy in order to rapidly turn science and technology into a productive force. The development of productive force is determined, to a great extent, by the improvement in the tools of production and in production experience and work skill. The development of science and technology plays an important role in both improving the tools of production and production experience and work still. Under the conditions of mechanized mass production, the wealth from social production no longer depends mainly on the lengthening of working hours or on increases in manpower; instead, it is determined by the degree of the progress of science and technology. At present, 60, 70 or even 80 percent of the increase in the national economy of some developed capitalist countries is achieved directly or indirectly through new technical achievements. Moreover, many new industries are absolutely the result of the progress in science and technology. At present, science and technology have given a massive impetus to economic development. In our socialist economic construction, science and technology must be of an even greater importance. Furthermore, as socialist modernization develops, science and technology will become a decisive factor for the long-term development of our economy. Therefore, in order to achieve the strategic goal of quadrupling our annual gross industrial and agricultural output value by the end of this century, we must devote major efforts to promoting technical progress.

At the present time, the promotion of China's technical progress consists of the following two aspects: 1. We must carry out technical renovation in existing enterprises. This means that we must substitute modern and advanced

machines, equipment, technology, and methods for outdated and backward ones in order to develop our productive force and raise our technical level. Judging by the situation in existing enterprises, the batch of backbone enterprises established at the initial stage of the founding of the people's republic are equipped with old equipment and are using backward technology, producing outdated products, earning a low rate of profits, and having poor economic results. Therefore, we must carry out technical renovation in existing enterprises in order to reduce the disparity in technical level between our country and some advanced countries. 2. We must utilize new technology in new projects, especially in key construction projects. The key construction projects that are to be undertaken in the Sixth 5-Year Plan period have a special position and function in the national economy, but in the meantime they are also prominent weak links in the economy. When completed and put into production, they will promote the development of our entire national economy. Therefore, we must link the construction of new projects, especially key ones, with the tackling of major technical problems and with the development, introduction, and popularization of technology.

In order to promote technical progress, we must mainly rely on our own scientific and technical force and the scientific and technical achievements that we have already obtained. These scientific and technical achievements are the fruit of the wisdom of our scientific and technical personnel and our staff and workers. Utilizing our existing scientific achievements requires less investment and can bring about quick effects and speedy training of scientific and technical workers. The vigorous popularization of effective scientific and technical achievements and prompt application of these achievements in various sections of our national economy will greatly quicken the pace of our technical progress.

In order to promote technical progress, we must, moreover, introduce advanced technology from abroad. Introduction of advanced technology from abroad will not only enable us to accelerate the technical renovation of our national economy and develop our social production, but will also raise our scientific and technical level and facilitate the training of the ranks of our scientific and technical workers. In the process of introducing advanced technology, we can directly take part in the construction of projects that have been introduced and thus train our ranks of scientific and technical workers. Moreover, we can start with the latest science and technology and raise our scientific and technical level in the process of becoming acquainted with and mastering advanced technology that has been introduced.

Furthermore, in order to promote technical progress, we must adopt a series of corresponding policies and measures. Scientific and technical progress is achieved by transforming backward production technology. In order to make a breakthrough in our scientific and technical field, the most important thing to do is to bring into play the creative spirit of the scientific and technical workers. We must create opportunities to give play to this creative power by restructuring and various other effective means. The comrades in all production departments and the administrative departments at all levels must encourage and support scientific and technical workers in every possible way and help them to overcome the difficulties that will emerge in the application of new technology

and the tackling of major technical problems. We must realistically improve their working and living conditions in order to give full play to their wisdom, ability, and creative power. At the same time, we must reasonably raise and use our funds and adopt preferential methods in the form of loans, taxes, prices, and foreign trade. We must establish a national patent system, adopt international standards, restrict and put an end to the production of backward products, issue production licenses, and so forth. By so doing, we will give full play to the initiative of our scientific and technical workers and of our enterprises in developing new technology and new products. In order to promote technical progress in our factories, mines, and scientific research units, apart from relying on the leading cores which are in conformity with the requirements of the four modernizations, we must, in the final analysis, rely on those who have the technical know-how. Therefore, we must adopt effective measures and make great efforts to raise the ideological and technical level of our existing staff and workers, train a large number of engineers and technicians who not only understand the theory but are also good at practice, and select and employ a number of enterprise leaders who have courage, insight, and ability and are really professionally competent. As long as we do our work well in all these aspects, we will be able to quickly raise our production technology to a new height.

CSO: 4008/184

DISCUSSION OF NATIONAL POLICIES TO PURSUE SCIENCE, TECHNOLOGY

Lanzhou GANSU RIBAO in Chinese 27 May 83 p 4

[Article by Ai Xiaoming [5337 2556 2494]: "To Do Many Types of Work Attach Importance To Science and Technology"]

[Text] Science and technology are the basis for productivity and economic development. The progress in economic development is proportional to the degree of materialization of science and technology in the production process. The larger the amount of scientific and technological achievements being materialized in the production process, the higher the productivity and the faster the economic development. The much higher productivity of today's society is primarily due to the higher degree of materialization of science and technology. As pointed out by comrade Deng Xiaoping: "With the same amount of labor and same amount of time, today's productivity is tens or hundreds of times higher than that of the past. This tremendous increase in productivity and production efficiency is primarily a consequence of science and technology." The human perception of the society and of nature is under continuous development improvement; and the development of science and technology has no bound. Hence Engels had stated: "The human productive power is unlimited." (Complete Collection of the Works of Marx and Engels, p 616) In order to develop China's economy, we must change our attitude in the past and elevate the priority of science and technology.

Recently, the importance of science and technology has been recognized in this country, but this does not mean that all the problems have been solved; there is still a great deal of work to be done.

To conduct research and development of science and technology requires a certain amount of funds. The rate of scientific development is closely related to the amount of expenditure. In this country however, because of the prolonged attitude of de-emphasizing science and technology, the amount of research and development funds is a very small fraction of the gross national product; not only is it smaller than those of developed countries, it is also smaller than those of many developing countries. For example, in the mechanical industry, the funds allocated for research in 1955 were only 1.5 percent of the total production. But in subsequent years, even this low ratio could not be maintained; by 1980, the ratio had decreased to 0.2 percent. Such low expenditure can hardly meet the requirements of

scientific development! According to a Japanese industrialist, if the research and development expenditure of an enterprise is just one percent of sales, this enterprise is doomed to failure; if the ratio is 3 percent, it may survive; if the ratio is 5 percent, it can begin to compete; and if the ratio is 8 percent, it will have a chance to grow. The amount of expenditure on scientific research has a definite impact on the development of science and technology, on productivity, or even on the development of the entire economy. Therefore, in carrying out the policy of emphasizing science and technology, we must increase our expenditure of research funds to ensure normal growth of scientific research and application.

The development of science and technology requires a large number of scientific personnel who must be trained by educational organizations. Therefore, education is the foundation of science and technology. Since the establishment of the People's Republic, significant progress has been made in education, but compared with developed countries and with needs of economic development, it is still inadequate. Like science and technology, education in this country had been in a state of neglect for many years. There had been little funds allocated for education, and they were often used for other purposes. As a consequence, the quality of education and the ability to produce trained personnel were affected to such a degree that education simply could not meet the demands of economic development.

For example, the number of agricultural technicians in China is only 0.4 percent of the farm population; the number of engineers is only 2.8 percent of the total number of industrial personnel. The situation is actually more serious because 20 percent of the population are illiterate. Therefore, we must emphasize education which provides the essential groundwork for developing science and technology; we must regard education as an important investment in the nation's intelligence. Only by devoting our efforts to all phases of education can we cultivate large numbers of useful human resources.

Not only must we emphasize scientific research, but we must also emphasize the practical application of science and technology. In order to fully realize the productive power of science and technology, they must be implemented in actual production. They must be transformed from a "state of knowledge" to a "practical tool for the society". In the past, we have devoted very little efforts in applying and extending scientific and technological achievements. Many new technologies and new products developed by research organizations remained in the stages of samples and prototypes; on the other hand, the techniques and products of many industries never changed for several decades. It is estimated that the utilization rate of our scientific achievements is only 10-30 percent, whereas in developed Western countries it is generally over 80 percent. Considering the inherently poor economic conditions and limited scientific research expenditures in this country, yet we are still ignoring most of the results of scientific research, what a tremendous waste! The failure to utilize and distribute the results of scientific research is primarily due to human elements. The main problem is the management system. The current management system does not reward producers for outstanding achievements in production,

hence there is no incentive for industries to utilize new technologies. In addition, a series of problems with current policies governing technologies further hamper the application and extension of new technologies. To correct this situation requires reforms in both the financial management system and government policies. We feel that with the technology level in China being generally below standard, it is of particular importance to apply and extend the achievements of science and technology.

Science and technology provide a significant driving force for economic development; they also represent an important productive power. As long as we recognize this principle and apply it in practice, the tremendous productive power hidden in the labor force will undoubtedly be unleashed by science and technology.

3012
CSO: 4008/124

RELIANCE ON SCIENCE, TECHNOLOGY VIEWED AS IMPERATIVE

Chengdu SICHUAN RIBAO in Chinese 27 Apr 83 p 3

[Article by Zhang Guoqi [1728 0948 4388]: "Why Does Quadrupling Output Depend on Science and Technology"]

[Text] From 1981 on our country's overall goal in economic construction has been to quadruple the gross value of our industrial and agricultural output by the end of this century. To be able to achieve this grand goal, we must provide various favorable conditions; one of the extremely important ones is the development of science and technology, because advanced science and technology, once it is applied in our production practice, can turn into a powerful social productive force and cause production to advance by leaps and bounds.

Everybody knows that manpower, capital and new technology are the important factors for the development of the economy and increased production. For the development of our production we used to rely mainly on manpower, material and financial resources and an expansion of the scale of capital construction. This method is necessary at certain times and under certain conditions; however, from a long-term viewpoint and as a fundamental method, it is also necessary to expend great energy to develop new technologies. In this respect we have learned a profound lesson. Our socialist system is incomparably superior, but for a certain time the way in which our national economy developed was far from ideal. What was the reason? Apart from political and other such reasons, the main reason was that for a long time science and technology were seldom regarded as productive forces, and the question of relying on science and technology to develop the productive forces was given insufficient consideration. To a certain degree this impeded the progress of our science and technology, and as a consequence had a certain adverse influence on the development of the economy. Whenever the question of developing production was raised, many people demanded increases in manpower, material and financial resources and the expansion of capital construction, as if there were no other way. Moreover, in our capital construction during a certain period of our past, 1 yuan of investment created approximately only 0.70 to 0.80 yuan of fixed assets. In the state-run enterprises and industrial units of our province, 1 yuan of fixed assets could realize only a little over 0.90 yuan of output value

per year. This means that the ratio of investment to output was not even 1 to 1, a very low economic result. To quadruple gross output value while remaining at this level of technical and economic results, we would first of all have to quadruple our investment, but this is out of the question. As to increasing manpower, this too would require a corresponding increase of capital, which is also impossible. What is the way out? It involves the following measures: first, adopting advanced science and technology, instituting step-by-step technical reforms, using scientific and technological forces to raise productivity and fully utilizing our presently available industry; second, readjusting the economic structure, the management of our national economy, and strengthening business management. The latter items actually also involve utilizing science and technology to raise productivity.

Can reliance on science and technology really achieve our goal of developing production? The answer is yes. According to statistics from certain developed countries, the proportion of increased productivity realized through the development of science and technology within the total increase in productivity at the beginning of this century was only from 5 to 20 percent, but by the 1970's it had increased to over 60 percent. The reason is that the direct transformation of scientific and technological discoveries and inventions to productive forces becomes faster and faster, and the cycles of technological replacement become shorter and shorter. These facts show that reliance on science and technology to develop production and promote the economy existed in the past and will be even more important in the future.

Since quadrupling output must rely on science and technology, it is also undoubtedly true that it must depend on scientific and technological personnel and the fullest utilization of the intellectuals, because scientific and general knowledge is fairly concentrated in the intellectuals now and will continue to be so for a fairly long period. The intellectuals are therefore a brain trust and a precious asset that is absolutely necessary to our country's socialist modernization drive; thus we must respect and rely on the intellectuals in the same way as we respect and rely on the workers and peasants.

If we emphasize the important role of science and technology in the economic development, does it mean that we may neglect such important conditions as manpower, material and financial resources, or neglect capital construction? Of course not. Without them, quadrupling our output would be equally impossible. However, increasing manpower and expanding capital construction require certain material and financial resources, and where will they come from? In the final analysis, we have to seek the solution in the progress of science and technology, because an important invention and creation in science and technology, once it is introduced in the production process and widely applied, can frequently increase several fold or several dozenfold. As noted above,

to quadruple output without relying on science and technology it would be necessary to guadruple investment, which is obviously impossible for us. Therefore, if we want to realize the goal of quadrupling our gross industrial and agricultural output value by the end of the century, we must rely on scientific and technological progress.

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CSO: 4008/112

'RENMIN RIBAO' ON SCIENCE, PRODUCTIVE FORCES

HK310343 Beijing RENMIN RIBAO in Chinese 25 Mar 83 p 5

[Article by Lin Zongtang [2651 1350 2768]: "Several Questions on Turning Science and Technology Into Productive Forces"]

[Text] In China's development of science and technology, there exists the following situation: On the one hand, we have succeeded in attaining a high level in extremely difficult theoretical subjects and sophisticated technology and on the other hand, we are considerably behind in production techniques and industrial products which are huge in quantity, vast in range and not difficult in degree. The scientific and research departments have developed quite a number of pieces of new technology and new products. However, they more often than not remain at a stage of being presents, exhibits or samples and "there has been little improvement for two decades" in the technology and products of factories. This has to do with the fact that scientific research is divorced from industrial production rather than being closely integrated. If we do not carry out an overall and systematic reform in this respect, no matter how many scientific research institutions we have, how strong our scientific research force is, how much money we spend on scientific research and how new the achievements of scientific research we achieve, we will have no possibility to swiftly turn them into a real productive force.

How can science and technology be turned into the productive forces at a faster place? I would like to discuss my own views.

There Must Be a Fundamental Turn in the Thinking Guiding the Economic Work

We must foster this idea: The growth of the national economy must be solidly based on scientific and technological progress. Only when China's production is gradually developed on the basis of its existing old techniques, old technologies, old equipment and old products into production carried out on the basis of new techniques, new technologies, new equipment and new products, can economic results be constantly improved and the gap between us and world advanced levels be steadily narrowed. However, this question is very often easily neglected.

Years of experience have told us that in economic construction there are two tendencies which call for our particular attention and prevention: In production, we concentrate on output value and quantity to the neglect of quality, varieties and technological progress; and in construction, we give exclusive consideration to constructing new factories and undertaking new projects and give little consideration to the technical transformation of old enterprises.

Some of our factories are very capable of "quadrupling output value" in the absence of economic results. They do whatever is economically good and whatever yields huge output value. They report their output before their machines are installed and insist on "overfulfilling" the plan, knowing that their molten steel is poor in quality. With the quadrupling of output value in this sense, the bigger the increase is, the greater losses the state will suffer. The enterprises are held responsible for this state of affairs but they must not be entirely blamed for it. There are companies, bureaus, departments and commissions above enterprises. Sometimes, the units at a higher level know perfectly well that the enterpises are doing things wrong but they turn a blind eye to it. This means in fact that they have taken an encouraging and admiring attitude toward their wrong doing. A small discrepency in the guiding ideology of the higher authorities will lead to an error of a thousand li in the specific actions of the lower levels. This lesson is worth bearing in mind.

The 12th CPC Congress clearly pointed out that we should shift the whole of economic work onto the path of focusing on attaining better economic results. The leadership at all levels and in particular, the leading departments such as those of state, economy and planning must correct their thinking and bring about a thorough change in guiding ideology, and in this way, the correct policy decisions of the CPC Central Committee can be implemented.

In addition to the factor of the system, the reason why our economic results are poor lies mainly in our backward science and technology. To attain better economic results, the fundamental way out is to rely on scientific and technological progress.

We Must Vigorously Strengthen the Research and Exploitation of New Products and New Technology

Basic research, applied research and exploitation research must all directly or indirectly serve economic construction. The industrially developed countries in the world attach, in general, particular importance to the exploitation research of new products and new technology. The ratio of their spending on basic research, applied research and exploitation research is approximately 1 : 2 : 7. Basic research is very important but the ratio of expenses needed in this respect should not be necessarily large and is generally about 10 percent. The remaining 90 percent is used in applied research and exploitation research. If we attach one-sided importance to the research of basic theory to the neglect of applied research and the exploitation research of new products and new technology, then the

theories, no matter how advanced they are, will hardly be transformed into a real productive force. While making arrangements for scientific and technological work, the state must pay particular attention to this point, organize the technical forces of the research units, institutions of higher learning, factories, mines and enterprises, share out the work and cooperate with one another and vigorously carry out research and exploitation work. We have a long, long way to go in this respect. For example, Japanese entrepreneurs hold that if the expenses of an enterprise for research and exploitation constitute only 1 percent of the total sale volume of products, this enterprise is doomed to failure; if they account for 3 percent, it will manage to sustain itself with a great effort; if they make up 5 percent, it will have the possibility to compete; and if they hold 8 percent, it will very likely develop to a certain extent. The proportion of some enterprises in Western Europe in this respect is a bit larger. Take the Chinese Ministry of Machine-Building Industry for example. The expenses for research and exploitation in 1965 constituted 1.5 percent of the total output value; later on they decreased in proportion year after year and they dropped to 0.2 percent in 1981 with no more than 100 million yuan in a year. If we do not put this state of affairs to an end in time, we will be fundamentally unable to realize the four modernizations. We must devote a lot of effort and energy to the research and exploitation of new products and new technology and strive to make a new breakthrough in this respect as soon as possible.

We Must Firmly Grasp Technical Transformation

One important reason for the failure to promptly turn many scientific research achievements and imported technology into a real productive force is the lack of necessary means of production. Therefore, while conducting the research and exploitation work and the importation of technology, we must firmly carry them on with technical transformation through to the end in a coordinated sequence and not stop our endeavors until production capacity takes shape. This is a very important experience and lesson which we must never ignore.

The ultimate aim of industrial production is to produce high-quality and reasonably-low-priced products to meet the material and cultural needs of the people. The aim of technical transformation is to transform the existing production conditions and to produce new high-quality and reasonably low-priced products. Therefore, we must pay close attention to new products to promote technical transformation, and technical transformation must serve new products; in no case must we carry out technical transformation for the sake of transformation. It must be clearly defined that technical transformation does not definitely mean expanding reproduction on the basis of old technology in an oversimplified manner, but is aimed at gradually shifting the growth of production to the basis of new technology, that is to say, turning scientific and research achievements or imported technology into a productive force and producing new and practical high-quality and reasonably low-priced products. The technical transformation projects which do not tally with this requirement must be in all cases suspended.

As far as the substance of technical transformation is concerned, we must transform what we lack and concentrate our energies on raising standards in accordance with the needs of new products and new technology rather than building houses and buying equipment as it is usually interpreted. In light of the formidable objective formulated by the CPC, every trade must work out a long-term policy for technical development and a practical and feasible plan for technical development.

There must be a corresponding reform in the state's economic system. At present, those who are in charge of scientific research only take care of scientific research affairs; those who are in charge of technical transformation only look after technical transformation affairs and those who are in charge of production only manage the affairs of production, each running his own affairs. Their relationship is not close enough and they even argue with each other. To closely combine the three, the best bet is to put them under the unified administration of a department so as to reduce arguments and raise economic results.

We Must Firmly Grasp Technology and Equipment

Scientific and technological progress can be in general turned into a productive force through technology and equipment (tools of production). One important reason why some of our scientific research achievements remain at the stage of being samples and exhibits is that our technology and equipment lag far behind demand.

The machine-building industry is a department of technology and equipment of the national economy. The way it develops decides, to a greater extent, the level of technical development of all sectors of the national economy. Comrade Shen Hong, a well-known specialist in machine engineering in China, recently pointed out that China's machine-building industry can play the lead in manufacturing equipment needed in the four modernizations program. This is entirely correct. However, the technical foundation of China's machine-building industry is still considerably weak and there exist serious shortcomings and defects in such aspects as variety, quality, the ability to form a complete set and service. If we fail to be determined to carry out a series of reforms and to rapidly overcome these fatal weak points, it will be impossible for the machine-building industry to play the lead in a satisfactory way.

To play the lead in a satisfactory way, the machine-building industry must firmly foster the idea of serving the users whole-heartedly and meeting the needs of the users in every conceivable way. Comrade Bo Yibo said: "The machine-building industry is a service industry and must serve the people heart and soul." In the past, the machine-building industry used to "sit facing south" and ask the users to come to it for purchase and delivery of goods. In the last few years, it has been hungry for more trade and its attitude toward the users has got better to a certain extent. Once it has enough to do again, the old problems will probably crop up once more. The users therefore do not quite trust it. When selecting and promoting

a leading cadre, we must first see whether or not he has the firm notion of serving the users whole-heartedly. Only when those who have an adequate knowledge of science and technology and of operation and management, have certain practical experience and are really willing to serve the users are allowed to be at the helm, can China's machine-building industry genuinely have bright prospects. To play the lead in a satisfactory way, what counts is to produce varied, high-quality and reasonably low-priced products. Among the existing machinery products throughout the country, only 5 percent have reached the international level of the 1970's and most of the remaining products have relatively old structures poor properties, high energy consumption and comparatively short service life. If we arm the various departments of the national economy with these old products, not only will the four modernizations be hardly accomplished but instead the disparity between ourselves and the world's advanced levels will widen. In order to protect the national machine-building industry, the state must strictly limit the importation of equipment. This is necessary at present. However, if things do not go well, we are bound to protect what is backward. The best bet is to gradually help the machine-building industry enter the great storms of international competition to be tempered there so that most of its products can reach the international level within 15 years, and proceed to undertake the mission to arm the national economy as a whole.

To play the lead in a satisfactory way, the machine-building industry must lay a technical foundation in a down-to-earth manner and be determined to increase basic machines and basic components. It must put an end to the past practice of attaching one-sided importance to products to the neglect of bases, proceeding from the study of basic theories, basic materials, basic technologies to basic spare parts and from the tackling of technical key problems and the distribution of production to the formation of production capacity. If we firmly grasp this work in the coming two 5-year plan periods, we can thus put the development of our machine-building industry on a solid technical foundation.

To play the lead in a satisfactory way, the machine-building industry must pay particular attention to the manufacturing of several complete sets of major equipment. In the 1980's, centering around energy and transport, it must select 20-30 complete sets of major equipment, establish a body which is small in number but highly effective, institute a strict technical responsibility system, "simultaneously grasp the seven matters" of study, experiment, designing, manufacturing, examination, installation and use, grasp them to the end without a letup and strive to reach the international levels of the 1970-80's.

We Must Attach Great Importance to the Training of Personnel

Man plays a decisive role in pushing scientific and technological progress ahead. Without leading cadres who really know the business and are enthusiastic in technological progress, without technical personnel who are both theoretically competent and good at doing practical work and without skilled workers who are well-trained and have a perfect mastery of basic skills,

technology and equipment, no matter how good they are, it will be difficult to function properly and the scientific research achievements and imported technology, no matter how numerous, will hardly be turned into a productive force. We must take several years for readjustment in training, in rotation, all leading cadres, engineering technical personnel and skilled workers of our enterprises in a planned and orderly way. The focal point for study of our leading cadres is to change the guiding ideology in operation; that for our technical personnel is solve the question concerning the aging of technology; and that for our skilled workers is solve the question concerning basic skills.

In accordance with the needs of the research and exploitation of new products and new technology, the scientific and technical personnel of the scientific research units, institutions of higher education, factories and enterprises must break through the shackles of the "system of ownership by the department" and carry out exchanges among themselves. The scientific research units and institutions of higher education are encouraged to draw factory technical personnel to take part in subject studies or send selected research personnel to participate in tackling key problems in the forefront of production. The majority of senior research personnel trained by the scientific research units and institutions of higher education must go and work in factories and enterprises. In order to encourage scientific and technical personnel to plunge themselves into the great practice of economic construction, the wages for the scientific and technical personnel who work in the forefront of production must be higher than those who work in the organizations, schools and scientific and research units.

We Must Particularly Resolve to Solve the Problem of the Source of Funds

At present, there exists the following situation: at the mention of the strategic objective, people are full of vigor and while talking about the strategic measures, they also appear impressive but as soon as the question of expenses is touched on, they are very often beset with difficulties and can find no way out.

During the period of readjustment of the national economy, there cannot possibly be a big increase in state revenues. The funds needed in promoting scientific and technological progress must be solved mainly by means of changing the proportionate relations between the investment in capital construction and the expenses for science and technology.

To constantly expand the social reproduction capacity, it is entirely necessary for the state to maintain a certain volume of investment in fixed assets and carry out some new capital construction projects. At present, concentrating the national strength on doing a good job in the key development projects with energy and transport as the center and speeding up the construction of compound fertilizer bases are all the more a pressing task which admits of no delay. However, it must be noted that the gross scale of capital construction must correspond to the national strength. Blindly expanding the scale of capital construction or undertaking or dismantling

capital construction projects in a massive and drastic way can make the state's economy suffer major setbacks. At present, we have already had a considerable industrial base whose role is far from being brought into play. Apart from the urgently needed key development projects, we must no longer use more funds in expanding production capacity with a general level. Now the total volume of investment in capital construction throughout the nation in a year has been excessive. Failure to strictly control capital construction will surely cause overall strain and disproportions once again in the national economy.

Therefore, it is entirely possibly and necessary to put the scale of capital construction under strict control and concentrate strength on ensuring key development projects; to improve the management of capital construction, extensively tap the potential of capital construction and try and save 5-10 percent of investment in capital construction and use it in promoting scientific and technological progress. This will do good to capital construction, give a great impetus to scientific and technological progress and be extremely conductive to the harmonious development of the whole economy. In addition, it will be able to save a certain amount of money resulting from the curtailment of circulating funds and use it in supporting scientific and technological progress. Seen from the strategy of the country as a whole, carrying out such a reform is worth our while and we ought to have such a strategic determination.

CSO: 4008/75

ROLE OF SCIENCE, TECHNOLOGY IN ECONOMIC, SOCIAL DEVELOPMENT DISCUSSED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI /SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY/ in Chinese, No 2, 10 Feb 83 pp 7-9

/Article by Hu Yuanchao /5170 0337 2600/, Beijing Office, Jilin Province People's Government: "Some Views on the Coordinated Development of Science, Technology, the Economy and Society at the Province and Prefecture Levels"/

/Text/ 1. Why Coordinated Development?

Use of the force of science and technology to promote rapid economic development of province and prefecture economic construction is an extremely important, currently relevant topic now facing the provinces. One key to the question of whether science and technology can play an active stimulating role in economic construction is whether they can achieve coordinated development with the economy and society.

Coordinated development means assuring a suitable interrelationship, close coordination and mutual support between factors, resulting in optimum development, by means of organic control and regulation, so that the optimum capabilities of all of the factors unite into the optimum effectiveness of the whole.

The relationship of science and technology to economic and social development involves necessary historical laws and a process from unified development to separate development to coordinate development. These three factors both promote one another and are in contradiction. As science and technology become highly subdivided and highly integrated, the question of coordination becomes increasingly important. In the 1970's, an antiscientific attitude developed in the United States and Europe, partly because of the belief that science brings disaster to the human race. Although this "ism" is absurd, it gives us a negative warning that in developing science, technology and the economy, we must pay attention to the ecological balance in the natural world, environmental protection and other social questions, consider optimum economic results and good social results, and achieve coordinated development within the overall system. Engels said that "only the society that acts in accordance with an overall plan to organize its productive forces in coordinated fashion can allow industry to be distributed in accordance with the principles most suited to its own development and the maintenance or development of other productive factors." Today, carrying out planning, organizing and developing the

coordination of science and technology, education and the economy and society in a centralized, systematic, scientific matter is an important guarantee of vigorous regional development.

Some provinces and prefectures have similar economic bases but considerable differences in their degree of economic development. The problem is to make thorough use of the force of science and technology in coordination with the economic and social development of the area. Historical experience proves that development requires coordination, this is a necessary law of social development.

2. How to Conduct Coordinated Development

a. Utilize Local Advantages, and Base Scientific and Technical Development on the Region. Jilin Province, for example, has a good natural resources situation, with abundant forest resources, a large western grassland suitable for developing stock raising, petroleum and chemical engineering resources, and the world-famed "three treasures of the northeast": it produces 60 percent of the country's ginseng, 40 percent of its stag antlers and large amounts of famous medicinal materials such as thorny acanthopanax /ciwujia 0459 0063 1367/, frogs, and the like.

Rationally developing these resources and using them more effectively is a major problem of the economic and research departments.

b. Institute Scientific Decision-Making and Scientific Management. Economic development depends on both decision-making and science and technology. Our major current problems in developing science and technology and the economy are management problems. Management is a science, and if we improve management we can achieve results rapidly and utilize much latent potential.

Effectively raising the management standards of leadership in all sectors at all levels is an urgent task in creating a new situation in socialist construction.

It is urgently necessary to establish independent, scientific "brain trusts" to study policy-making in order to carry out coordinated development.

c. Coordinate Scientific Research Forces To Serve Province and Prefecture Economic Construction. Local scientific and technical development should be based on satisfying the must basic, pressing local needs, and promotion of regional economic development should be made the central task of scientific and technical work.

It is by no means an easy matter to coordinate the various scientific research forces to serve a province's economic construction. For a long time, the major scientific research forces have each had their own system and have been separately managed. In terms of vertical organization, the three types of research are out of proportion and are divorced from production; in horizontal terms, projects are duplicated, and some topics are out of touch with technical feasibility and economic rationality, while nobody is working on certain production problems which urgently require solution. In order to determine a

correct orientation for science and technology, we must overcome the outlook of focusing solely on one's own scientific field and being concerned only with its scientific development, with no thought of unification, integration or systematization with other fields, with the economy and with society. Jilin Province has a fairly strong scientific and technical contingent; the number of technical personnel involved in natural science places the province 12th in the country, while it is 13th in the number of scientific and technical personnel with a higher education, and 10th in the number of scientific and technical personnel per 10,000 population. This solid scientific and technical contingent should be centrally organized and coordinated within the province and prefectures, the various scientific research focuses should be clearly identified, and a rational research structure should be established and should serve the development of the prefectural economies.

d. Energetically Promote the Union of Production and Research. The economic production departments are gradually realizing the uses of science and technology and treating technical progress as an important way of developing production. In 1965 the Changchun Institute of Physics cooperated with the Changchun Nonferrous Alloys Plant in a study of reprocessing aluminum alloys from scrap aluminum. After the results were put into production, 10 years' production work created more than 70 million yuan in output value, and the plant went at one stroke from its previous languishing condition to an average annual output of 50,000 yuan. Because of the conservation of large amounts of pure aluminum, it saved large amounts of electric energy for the country. The "four cities on the plain" in Jilin Province and more than 50 scientific research units and major specialized schools have established a cooperative system, and these units have furnished 158 research results to the cities, which are expected to produce more than 10 million yuan in output value. After the Jilin City and Changchun branch academies cooperated, in just half a year they solved more than 40 long-standing technical problems.

The industrial departments' scientific research contingents urgently need to be strengthened. According to statistics from the end of 1979, only about 40 percent of Jilin Province's 123 local industrial research units have developed real research capabilities. As of August 1980, 510 plants, or only 5 percent of the total number of local enterprises, had established scientific research organizations, and the number of technical personnel involved in research accounted for only 8.8 percent of the entire province's engineering and technical personnel. Technical personnel in the province's industrial departments account for only 1.6 percent of the total number of employees.

In addition to strengthening the scientific and technical forces in the manufacturing enterprises, we also should take various approaches to promoting the unification of research and production and make integrated use of the entire province's scientific and technical force to solve local and industrial-branch economic development problems. With declining economic results in province and prefecture industry, it is all the more necessary to accord due importance to science and technology, to focus on the intensive factors in development, to utilize new technologies, and to continually raise the technological standard of production.

e. Speed Up the Rate of Materialization, Focus on the Incorporation and Dissemination of Scientific and Technical Results, Establish Bridges for Converting Science and Technology to Productive Capabilities. We should establish an attitude of reaching out in regard to province and prefecture economic development, and make learning from and importing suitable foreign and domestic scientific results and advanced technologies one of our major approaches. Currently, because we lack an organic link between research and production and have no effective channel for exchange and utilization of scientific and technical achievements, research and production do not mesh together. In general, applied research institutes complete their tasks when they have carried out their research program and passed a technical evaluation; they do not have sufficient funds and manpower to carry out practical intermediate tests, process improvements and other development research. Most of the industrial enterprises lack technical manpower and funds for intermediate tests of scientific research results and study of production technologies and are incapable of solving a variety of problems ranging from models to production. Certain scientific research results which have potential economic effects have long failed to be disseminated and utilized because there was no specific organizational structure to do this work. Perhaps the provincial economic commission and scientific and technical commission should carry out overall planning and coordination and establish province-level scientific and technical development centers on a suitable scale so as to build a bridge between research and production. These centers would study all new foreign and domestic scientific results, new techniques, processes and materials, assimilate them and innovate from then in accordance with the province's conditions and disseminate them among the production departments for use; in addition they would mobilize the economic departments to submit their difficult problems in production technology. In order to carry out timely, correct, effective technical development, we must always keep aware of the foreign and domestic market situation, collect and study scientific-technical and economic information, and strengthen information feedback measures.

f. Coordinate the Development of Education with Scientific, Technical, and Social Development. Modern economic competition boils down to competition in education, and the question of whether science and technology can rapidly be converted into powerful capacities depends not only on whether the education departments can continuously train high-quality scientific and technical personnel, but also whether they can rapidly raise the scientific and technical level of existing cadres and the people at large. This is a basic condition for absorbing and disseminating scientific research results and further developing the economy. We should be clearly aware that education is the source of scientific-technical and economic development and the cradle of a civilized society. For economic management and science and technology to be holding back economic development is not as bad as for outmoded education to be holding it back: "economics is for today, science is for tomorrow, and eduation is for the day after." The spread and improvement of education is not solely the concern of the education departments, but should be accorded extremely great importance by the economic departments as well; when drafting economic plans, they should treat material production and the training of qualified personnel as a unified process of expanded reproduction for society.

We must raise the scientific culture of the people as a whole and cast off a thousand years of traditional feudal and small-producer thinking. To make China prosper, a militant spirit of competition, modernization and progress is even more inseparable from the social development of education. Effective coordination of education with the development of science and technology, the economy, and society is of inestimable importance not only for remaking China, but also for the long-term vigor and development of our country and people.

The superior socialist system and the guidance of the party are the most reliable guarantee that we can achieve unified planning of science and technology, the economy and society and can develop them in coordinated fashion. If we can assimilate the lessons of many years' experience, we can and should achieve more coordination between science, the economy and society, and create a new situation in all aspects of socialist modernization.

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CSO: 4008/92

ROLE OF SCIENTIOLOGY IN REACHING CHINA'S ECONOMIC GOALS

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 6, 20 Nov 82 pp 2-5

[Article by staff editorial department: "Let Every Phenomena on Earth Shine on the New Goal of the Four Modernizations--On the Proper Role of Scientiology in Ushering In a New Situation"]

[Text] The 12th CPC Congress has come to a successful close. The congress fully affirmed, enriched, and developed the party's line, principles, and policies since the 3d Plenary Session of the 11th CPC Central Committee; put forward the magnificent goal of industrial and agricultural output value by the end of the century; and formulated the strategic foci and strategic steps for attaining this goal. "Let every phenomena on earth shine on the new goal of the four modernizations"--this was a congress that gave people confidence, hope, and immense heartening strength, and a congress that mobilized the people of the entire country to work hard for the attainment of this new great goal.

How should we workers in scientiology contribute our strength to the fulfillment of the battle tasks put forth by the congress?

In his report to the congress, Comrade Hu Yaobang reiterated: "The key to the four modernizations is the modernization of science and technology." He repeatedly stressed the key role of modern science and technology in the construction of socialist modernization. He pointed out: From now on we must in a planned way push forward large-scale technological transformation, spread the various technological achievements that have already led to good economic results, and vigorously adopt new technologies, new equipment, new industrial arts, and new materials; we must strengthen research in applied science, attach importance to research in basic science, and organize strength in all quarters to "storm strategic passes" in key scientific research projects.

The report particularly stressed the important role of the management of science and the science of management in the construction of socialist modernization, pointing out: We must strengthen research and application in the science of management, and constantly raise the level of planning and management in the national economy and the administration and management level of enterprises; no matter whether in a state enterprise or a collective enterprise, the responsibility system for administration and management must be conscientiously practiced.

The report stressed: Without the high zeal for labor of the hundreds of millions of the masses, without the creative initiative of countless production units, and without the active struggle of all places and all departments, the vigorous development of the cause of building socialism will be impossible. It pointed out: We should adopt a positive attitude, conscientiously sum up experiences, and look for and create specific systems and methods that suit our own characteristics and that are both able to insure the state's united leadership and to bring into play the initiative of the unit and the individual.

The report once again unequivocally affirmed: "Just like workers and peasants, intellectuals are our reliable force in building socialism." It emphastically pointed out: we must comprehensively usher in a new situation in the construction of socialist modernization; in particular we must attach importance to fully bringing into play the role of intellectuals, strive to implement the party's policy on intellectuals, focus on their characteristics in improving our ideological and political work, and as far as possible create all sorts of conditions so that the vast number of intellectuals will be able to have ease of mind and aroused spirits for contributing their strength to the people.

The report incisively expounded on the effect of building spiritual civilization. Socialist spiritual civilization not only plays a tremendous role in promoting the building of material civilization, but also guarantees the correct direction of development of material civilization. The building of spiritual civilization, which includes science, is both an important condition for building material civilization and an important condition for raising the ideological consciousness and moral level of the masses of people. Therefore, it is an important feature of socialism and also an important manifestation of the superiority of the socialist system.

We deeply feel: Comrade Hu Yaobang's report to the 12th Party Congress as a representative of the 11th Central Committee put forth many extremely important guiding ideas, was extremely rich in content, and was permeated with Marxist dialectics. Citing only from what we have mentioned above, they are: recognition of the importance of science and technology; recognition of the importance of the role and position in society of scientists and technicians; recognition of the important significance of arousing the enthusiasm for labor of the ranks of scientists and technicians; recognition of the dual role of science in building material civilization and spiritual civilization; as well as the active role played by theories, principles, methods, and policies in studying these several kinds of problems in the above-mentioned aspects. It can already be seen: we scientific workers bear an unshirkable responsibility, because these problems are the objects and contents that scientiology must study. Scientiology should and can actively play its own role in initiating the construction of socialist modernization and make its own contributions.

1. Scientiology Must Deeply Study and Constantly Publicize the Key Role and Significance of Science and Technology in Economic Construction and Social Development. Science and technology are engendered amid production experiences and labor skills; from a look at the entire process of scientific and technological development, we see that the production level determines the technological level and that the production and technological levels also determine

the scientific level. But, in the course of their development, the role of science and technology becomes greater and greater, and beginning with modern times, in many important fields of industrial production there have gradually appeared the phenomena of the scientific level determining the technological level and the scientific and technological levels jointly determining the production level. At present, the technological transformation of production, the scientific transformation of production and technology, and their organic blending into science-technology-production have already become important features of modern society. To a very large degree, the actual strength of a country depends on the actual strength of its science and technology. The key to modernization of industry, agriculture, and national defense is the modernization of science and technology. Our country's science and technology are still comparatively backward, and if this situation is not changed as fast as possible it is bound to seriously affect our country's rate of construction. Because our country before the revolution was a semifeudal, semicolonial society, and during the revolutionary period it was engaged in an intense military struggle, it was unable to carry out industrial construction on a fairly large scale; after the founding of the state, for a period of time, because of the ideological influence of the "left", economic construction suffered serious disruptions, and a considerable portion of the cadres and masses had an insufficient understanding and realization of the importance of science and technology in the building of socialism, and in practice the coordinated relationship between science and technology on the one hand and the economy and society on the other hand was not handled well, causing our country's construction undertakings to take many detours and suffer big losses. Scientiology workers should get deeply involved in the study of the history of social and economic development, the study of the history of the development of science and technology, and the study of the state and role of scientific and technological development in contemporary countries; earnestly sum up experiences and lessons and then elucidate and publicize them from the standpoint of theory; analyze the ideas and their source for the mistaken treatment of science and technology; and let science and technology play their proper role by giving the cadres and masses a correct understanding of the importance of science and technology.

Speaking of scientific and technological work per se, scientiology should, proceeding from reality, study the development strategy for science and technology and the policy basis for science and technology in the country as a whole and in each place in it; conscientiously make scientific forecasts and give systematic proofs; and provide consultation, advice, and opinions for the country as a whole and the places in it to decide on key scientific and technological projects, to formulate plans for scientific and technological development and to organize a coordinated "storming of the strategic passes" by science and technology. This will make science and technology truly able to play their role in economic and social development of the country and the places in it. Based on the national condition, scientiology must deeply study our own experiences in integrating scientific research with production, and from a theoretical standpoint sum up a new approach to the country's development of science and technology and its promotion of economic development. From scientific research and the achievements therefrom to their results in the national economy, there are normally four links: research, development, batch process, and in-service popularization. Research must rely on basic

science to achieve the "profound" and rely on technological science to achieve the "new"; development must strive for reliability, consistency, interchangeability, and finished product rates to achieve the "superior"; the characteristics of the batch process must be "strictness"; and in-service popularization should be large in quantity, wide in area, and enthusiastic. The four links are mutually joined and closely related, and there must also be a division of work with each link having its own focus. The process of finishing a scientific project is actually a relay process, and the key to it is to grasp the general organizational structure and insure that the relay points in the four aspects are unblocked. Scientiology also must earnestly study various technological questions and actual situations in science's and technology's achievements in the "four transformations," and put forward suggestions for improvement in the two aspects of policy and management.

2. Scientiology Should Make a Point of Studying and Publicizing the Important Role and Significance of the Management of Science and the Science of Management in the Construction of Socialist Modernization. Science and technology are important developments of society and important undertakings of the state. The undertakings of modern science and technology possess a gigantic scale, a complex system, and an enormous influence. Modern science and technology must carry out the management of scientific transformation. The work of production management is a new factor in the productive forces of modern society. The work of managing science and technology is a component part of scientific and technological undertakings. Together with scientific and technological research work, it serves the development of scientific and technological undertakings. Without macro-management, "middle"-management, and micro-management of scientific and technological undertakings, their development will be seriously affected. At present not only is our level of science and technology comparatively low, but in fact our level of management is even lower; the habits of the handicraft industry-style management of the small producer and the management patterns that make administrative measures primary are still deeply ingrained in the management departments of scientific and technological undertakings, and this situation urgently demands to be rapidly changed. In the system structure of scientiology, the study of the management of science and technology is a major part of applied scientiology, and its task is to arm the minds of cadres who manage science and technology with the knowledge of modern scientific management. Scientiology workers should thoroughly study and constantly publicize general and specific policies, programs, and plans, systems and structures, scientific capabilities, scientific research organizations, scientific research projects, scientific research key elements, and the scientific principles and scientific methods in the aspects of the changes and spreading of the achievements of scientific research--all concerning the management of science and technology--and should sum up the experiences and lessons in science and technology management work, in order to raise the management level of scientific and technological undertakings and to display the proper role of scientiology.

If we want good management work to be done, we should pay particular attention to arousing and displaying the enthusiasm of every category and level of personnel. In the development of scientific and technological undertakings, the scientists, and technicians and the management personnel--from first to last--are the two principal forces. Modern management science stresses:

guiding and encouraging people's enthusiastic behavior is the central link in doing good management work. This is completely in accord with the principles of historical materialism. Even capitalist countries now also have no choice and are forced to put the stimulating of people's enthusiasm in a position that "cannot be neglected." Ours is a socialist country led by the Communist Party and guided by Marxism in which the laboring people are the managers and masters, and we always consider that the idea of being the masters and the spirit of devoting one's life to the revolution are the most valuable qualities of the masses of people. Attaching importance to the work of ideological and political education is a good tradition of our party, and the main goal of this work is to arouse the people's socialist enthusiasm; in this respect we have accumulated many effective experiences, which especially now need to be conscientiously summed up, carried forward, and developed. Because the situation and tasks of revolutionary construction have changed and developed, shifting from making military and political struggle primary to making economic construction primary, some of the experiences are already inadequate and are unable to meet the new requirements, our ideological and political work needs to be strengthened and made more scientific. With regard to how to integrate truly and organically material encouragement and spiritual encouragement so that they conform in a focused manner to specific situations and specific characteristics, and how to put them on a scientific basis and get the best results, there are many scientific principles: among them, one very important requirement is that they certainly must conform to the different psychological laws of different people. Scientiology, particularly workers in the psychology of science, must thoroughly study and constantly publicize the knowledge contained in the psychology of creation in science, the psychology of science and society, and the patterns and methods of stimulating and arousing the zeal for labor and the enthusiasm for work of scientific and technological researchers and managers. This is an unshirkable responsibility that we should bear.

3. In Particular Scientiology Must Study Hard and Repeatedly Publicize the Major Role and Significance of Scientific and Technological Workers in Economic Construction and Social Development. Scientific and technological workers are the heirs and transmitters of the excellent legacy of science and technology, and are also the creators and developers of the modern achievements of science and technology. Scientific and technological research work is a kind of high-level complex labor, and is labor of a productive nature that creates spiritual wealth and material wealth. Modern science and technology occupy a key position in the construction of modernization, and the creator of science and technology should of course have its corresponding position in society. For us to attain our magnificent goal, we rely on science and technology--this key force--and in the final analysis it is a matter of how to arouse this group of people who have mastered the knowledge of science and technology so as to give play to their enthusiasm and role. The central authorities have always stressed that without intellectuals we will not be able to do things well. We must establish a mighty contingent that persists in taking the socialist road and that possesses specialized knowledge and capabilities. History proves: the vast number of our country's intellectuals love the motherland, love the party, and love socialism. Side by side with the workers and peasants, they play an enormous role in revolutionary construction, and are an indispenable important force in socialist modernization.

The higher the level that society develops to, the more important is the role of science and technology, and the more prominent and distinct is the role of scientific and technological workers. We should fully recognize this law of development, and we cannot again neglect or underestimate the role and important position in society of scientists, technicians, and intellectuals.

However, because the influence of the "leftist" mistakes of the past have not been thoroughly eliminated, to this day there are still leading cadres in some areas and units who do not have an adequate understanding of the position and role of intellectuals in the new era, do not have an adequate understanding of the harm caused to the construction of socialist modernization by the "leftist" mistakes in the past policy on intellectuals, do not conscientiously implement the relevant policies of the central authorities since the 3d Plenary Session of the 11th CPC Central Committee, and especially do not show sufficient concern for young and middle-aged intellectuals so that their specialities cannot be fully displayed and their difficulties in work, study, and life are not satisfactorily resolved...directly affecting our progress in construction of the four modernizations.

Scientiology workers must conscientiously study the nature and character of scientific labor; study the role and position of scientists and technicians in economic and social development; and study the laws of the social pychology of treating scientists and technicans and the laws of the personal pychology of scientists and technicians.... From the theoretical and practical standpoint, they should expound on and repeatedly publicize: analyze and correct mistaken ideas and mistaken feelings in the treatment of scientists and technicians to overcome themselves certain of their shortcomings and drawbacks; and by improving society's understanding of the important role of scientists and technicians, by formulating and implementing policies on scientists and technicians, and also by helping to raise the ideological and political level of scientists and technicians, to give fully play to the role of scientists and technicians.

From the above one can see that scientiology can and is able to play its important role in socialism's building of material civilization and spiritual civilization, and in the process of realizing the general task of our country in the new historical period. Material civilization is the level of material production and material life, and spiritual civilization is the level of spiritual production and spiritual life; the building of spiritual civilization also includes the aspects of the building of culture and the building of ideology. Theoretical scientiology and its important branches--history of science, systems of science, capabilities of science, economics of science, and sociology of science--study and provide understanding of the essence, structure, relationships, and laws of development of science and technology. Applied scientiology and its important branches--forecasts of science, policies of science, methods of science, pedagogy of science, pyschology of science, ethics of science, aesthetics of science, and methedology of science--study and provide knowledge of the tenets, principles, and methods of macro-, "middle"- and micro-management of science and technology. They play an active role in raising the level of scientific and technological research, in raising the level of the management of science and technology, in stimulating and

arousing the zeal for labor and the enthusiasm for work of scientists and technicians and scientific and technological managers, and in raising the level of understanding on the part of the vast number of cadres and masses of people with regard to science and technology and their ranks. In a word, scientiology should and can play its important role in the building of socialist material and spiritual civilizations, and it can make a contribution to realizing our country's general tasks in the new historical period. At present, scientiology workers must further improve their understanding of the objects, tasks, and role of scientiology; strengthen their sense of responsibility to history; get deeply involved in a focused manner in studying and publicizing topics; together with the workers in the management of science and technology sum up experiences and lessons in work; and focus on providing suggestions of an advisory nature on major and urgent problems in the development of scientific and technological undertakings. Speaking of the country as a whole, scientiology workers in all provinces, cities, and areas should further strengthen their ties with each other, and effect a rational division of work and coordination of the focus of research and the carrying out of topics; and they also should strengthen their ties with the economic front and the educational front, and regularly carry out focused academic interchanges and discussions, so that the work of managing science is closely integrated with economic work and educational work. We hope and believe that, following a new high tide in our country's economic construction, there must appear a new high tide in scientiology's research and publicizing.

(Edited by He Zhongxiu [0149 6988 4423])

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CSO: 4008/69

ANHUI VICE GOVERNOR INTERVIEWED ON SCIENCE, TECHNOLOGY WORK

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 6, 20 Nov 82 p 13-16

[Article by staff reporter Yong Qian [0515 3577]: "Scientific and Technological Work Must Serve Economic Construction"--Interview with Professor Yang Jike, Vice Governor of Anhui Province]

[Text] Professor Yang Jike was born in 1921 to a family of intellectuals in Songjiang County, Jiangsu Province. During the war of resistance against Japan, he passed through Yunnan and Guizhou, studying at Yunnan University, Jiaotong University, and the Mining and Metallurgy Department of Tangshan Engineering Institute. In 1947 he passed an entrance examination and went to America at public expense, where he obtained an M.A. in metallurgy. In America he also studied civil structural engineering, biology, applied mathematics, and statistical methods, so that his knowledge became extensive. In 1955 he returned to China, and worked in succession at the Chemical Engineering and Metallurgy Institute and the Biophysics Institute of the Chinese Academy of Sciences, and became assistant professor of mathematics and professor of biology at the China University of Science and Technology. During this period, he gave a course of lectures, wrote teaching materials, earnestly imparted his knowledge of statistics to members of the same profession in scientific and technological circles, and served researchers in many academic disciplines in science, engineering, agriculture, and medicine, all of which was deeply welcomed. Professor Yang is dilligent in writing. His written academic treatises and translated articles total 4 million words. In 1977 he was selected to be vice governor of Anhui Province and put in charge of scientific and technological work.

Comrade Yang Jike has vigorously initiated and put into practice scientific research and technology in the service of the economy, and has made important contributions to developing the utilization of our country's natural resources. In 1980, he organized experts of 14 learned societies in the China Scientific and Technical Association to carry out an investigation concerning the exploitation of the natural resources in the areas north and south of the Huai He and in western Anhui, from which came a plan for their strategic exploitation. In 1981, he organized 168 experts and professors in East China to study the energy policy for East China. This year, he is one of the leaders of the team of experts that is leading experts and professors of seven learned societies

to formulate a 15-year economic rationalization plan for the exploitation and utilization of the coal resources in the areas north and south of the Huai He, Comrade Yang Jike pays much attention to conscientiously getting a good grip on the overall development of agriculture in Anhui Province. Recently, in the province, he issued a directive that importance is to be attached to developing the acquatic products industry and to solving the problem of "not having fish to eat," and the directive was fully approved by the responsible comrades of the central authorities and by the departments concerned.

On the morning of 5 July, I made a special trip to the Anhui provincial government to interview Comrade Yang Jike, who was just getting into a car to go to the airport, from where he would fly to Beijing to report on the plan for exploitation of the coalfields in the areas north and south of the Huai He. Therefore, we made full use of the intervening time to hold an intimate conversation in the car and in the airport's waiting room.

Scientific Research Work Must Stress Its Timing With the Economy

Comrade Yang Jike said that in discussing the management of science and technology there are some things that make people sigh with emotion a good many times. A small number of scientific research units and institutions of higher learning basically do not know what the state requires today and what it will require after 5 or 10 years. The results of their scientific research and the people they train are unable to serve our country's construction of modernization. We often ask: how can the modernization of science and technology serve the three other modernizations? I think it must stress being in tune with the economy. Economic construction must first pay attention to the distribution of space and second to the rational use of time. In these years, we have not paid much attention to the timing of economic work, and the planning for what to do first and what to do afterward has not been good. Scientific research and educational work has also been seriously out of line with economic construction, almost as if there were no concept of timing. This has created an extremely bad state of affairs. Our country's science and technology and its educational undertaking are comparatively backward, and it is very difficult to make new achievements in research or train experts in a special field of study, so they cannot play a role in our country's construction of modernization. This cannot but be said to be a fault in our scientific and educational work. Speaking of nuclear power technology and thermonuclear technology, the former is a mature advanced technology, and throughout the world, 247 nuclear stations have been built, with reactors and turbines reaching the standards of producing 900,000 to 1.3 million kilowatts of electricity; as for the latter, there are many difficult points that have not yet been tackled, even though countries that are advanced scientifically and technologically hope to use it in industry in the next century. Our country has extensive nuclear fuels, and naturally it should first import and master the technology of nuclear power stations, after which it will have the forces to produce thermonuclear electric power. What is hard to understand is that there are people who are enthusiastic about thermonuclear energy but are not interested in nuclear power stations. This type of problem also exists among graduate students selected to study abroad. It may be asked: are other people training talent for us, or are we training

talent for other people's work. I am not saying that these achievements of scientific research are useless, and am also not saying that the knowledge learned by students studying abroad is useless, but I am saying that the timing is not correct! If the timing for the economy is not proper, it will be hard to see actual results!

I think that our scientific research and educational work should "synchronize watchers" with the requirements of economic development, in order to act in coordination and unity with it, like all the commanders synchronizing their watches before a battle begins. The standard time at which the "watches are to be synchronized" is the economic construction plan. If the "watches are synchronized well" and the proper timing is effected, there will be mutually close coordination. This is not to say that science and technology must follow behind economic development and cannot go ahead of it. No, science and technology can and should go ahead of it, but by how much it goes ahead must depend on the plans and forecasts of economic development.

Staff Officers and Advisers Must Get Deeply Involved in the Study of the Policy on Technology

Comrade Yang Jike said there is also the above-mentioned blindness in the action of people engaged in the technological sciences. Therefore, he said, I advocate that that technological sciences must be integrated with the social sciences and the natural sciences. Take agriculture for instance. The study of air temperature, amount of rainfall, and soils belongs to the natural sciences; collected human body waste used as fertilizers, plant protection. and prevention and control of diseases in domestic animals and fowl belong to the technological sciences. However, without a correct policy, it will be hard to make full use of natural resources, and science and technology will not be able to play their proper role. If the policy is to be put on the right track there must be investigation and study, tests conducted at selected points, summing up of experiences, and a gradual perfecting. In management science, this is called the PDCA cycle, and it tallies with Comrade Mao Zedong's "Practice, knowledge, more practice and more knowledge" and is within the category of the social sciences. When I was studying at Jiaotong University, there was a Professor Wang Junhao [3769 6874 6275] who taught us the technology of iron and steel smelting, but in his first class he lectured on economics, on the principles of using coal to make iron, and on the irrational distribution of Chinese metallurgy. I think that this is a good tradition in technological education. If technological sciences are separated from economics, management science, sociology, and natural sciences, they will either be unable to display their efficacy in society or major economic losses will be incurred.

This form of integration is the study of the technological policy. Those doing scientific and technological work, especially comrades engaged in the work of managing science, have the responsibility to act as good staff officers and advisers for the economic development of industry and agriculture. They must study the technology policy, and the guiding idea in this study is more, faster, better, and more economical, and its subject is economic efficacy. For example, when the subject of science and technology is raised, many

people cannot avoid liking the new and disliking the old, and always think of high-grade, precision, and advanced industrial products. If one studies the technology policy, one comes to know that the matter is not that simple. Whether or not we value a certain technology, we cannot divide the technolgies by their degree of newness or oldness, but should divide them by their economic results. For example, in the area of Hexian, Chaoxian, and Wuwei counties in Anhui Province, among the people there is a traditional technology of artificial incubation which is quite brilliant. Although this technology uses quite a lot of manpower, there is little investment, electricity is not used and there is no worry about power failures, and the economic results are outstanding. This technology, which is not advanced, suits the conditions of natural resources and technology of Anhui, should be encouraged and popularized, and should be studied by the scientific method, so that it is carried on and developed. With this kind of understanding, when importing foreign technology and equipment, blindness in action can be avoided. For example, in foreign countries here are some mature technologies that require comparatively much work; in some developed countries, owing to high labor wages it is profitless to use a technology in production. However, the products produced by this kind of technology still have markets internationally. Importing this kind of technology is a shortcut to getting foreign exchange. After the war, the Japanese took this path, and Singapore, Hong Kong, and other places in recent years have also taken this path to prosperity.

The study of technology policy not only must look at short-term results, but also at long-term economic results. In agriculture, the way of doing things that "concentrates only on one thing," only thinking of the present and not considering long-term manifestations. The ecological balance, cropping system, and the simultaneous development of the "five undertakings" should be studied comprehensively, merging technology and the economy into an organic whole. This is an important part of the agricultural and technological policies.

Improve the Efficiency of Scientific and Technological Work by Having the Posture of Masters

Speaking of economic results, Comrade Yang Jike said that he should speak about the efficiency of scientific and technological work itself. Over the years, we have spent a lot of money on science and technology, but their efficiency has not been high and there is a large potential in manpower and material resources. On his return from the Massachusetts Institute of Technology, a comrade said that the professors there did not have tasks unrelated to industry and mining. The research goals, costs, and deadlines of the tasks they undertake are all fixed in contract form; competition is fierce, and they do not dare to be the least bit slack. I think it would not be an exaggeration to say that two of us equal one of them. We not only have a waste of human talent, but also have a big waste of instruments and equipment. First, the utilization rate is not high, and second talented people are used for trivial tasks, and a large butcher's knife is used to kill a small chicken. For example, our computer utilization rate is very low. Last year, a West German expert visited one of our research institutes, where he saw that the cameras we used were all West German and very expensive. He said: "We can't buy them. We are only able to buy Japanese goods." If we think of and

devise ways to raise efficiency, so that one instrument's efficiency is equal to that of two instruments, and one person's work achievements are equal to those of two persons at present, then under existing conditions, efficiency will be raised by four times. How large a potential is this!

How will we be able to display the potential contained in scientists and technicians? The key lies in correctly implementing the Party Central Committee's policy on intellectuals, and at present there are many questions that need to be addressed gradually. At the same time, scientific and technological workers also should have the posture of active masters. Comrade Hua Luogeng [5478 5012 1649] can be called a model. Over 70 years old, he personally went to the first line of production and at a 600-meter-deep pit construction site sought out technicians and workers to discuss and understand the situation, pursuing his studies in a spirit of simplicity. On this occasion, the experts led by Old Hua, using the method of planning as a whole, studied and analyzed 23 mine pits one by one, and found the most economically rational feasible plan, so that the time limit for the project was reduced by 2 to 2.5 years as compared to the original plan. For the East China areas, where the gap between supply and demand is becoming bigger and bigger, this means a chain of economic results reaching several tens of billions of yuan. Old Hua said with pride: "If production is lengthened by one inch, it will be a pity for the old and sick to face the dusk." If every person did things in this way, there would be no worry about efficiency being low, and how could economic results not be large?

Have in Mind the Integration of High Administrative Levels, Readjust the Proportion of Academic Disciplines in the Academy of Sciences

At this point, I asked Comrade Yang Jike to discuss his ideas about readjusting the proportion of academic disciplines in the Chinese Academy of Sciences.

Comrade Yang Jike said: In recent years I have mainly been engaged in local work, so it is hard to avoid limitations. I fear that my way of looking at this question is restricted in vision and shallow in understanding, and I am only entitled to offer a few commonplace remarks by way of introduction so that others may come up with valuable opinions.

In the 20th century, in the development of science there has appeared the characteristics of mutual permeation, promotion, and merging of the sciences, and marginal academic disciplines have emerged as the times required. Of the major research topics raised by our country's construction of modernization, the ones most urgently requiring solution mostly fall into the comprehensive research categories of technological sciences, natural sciences, and social sciences. This is a synthesis of high administrative levels and is also a marginal academic discipline. This kind of topic should be the main direction of attack for the Academy of Sciences. For example, the investigation, exploitation, comprehensive utilization, and protection of natural resources; the broadening of sources of income and reduction of expenditures in energy; the division of agriculture into districts, realignment of territory, and biological control; the ecological balance, environmental protection, and broadening of the gene bank; the deployment, scale, and timing of industrial

development, the division of the economy into districts, and the construction of small and medium-sized cities and towns; the standard measurements, scientific and technological information and information engineering, network systems, and process engineering; etc. Speaking of the energy question, the Academy of Sciences does not have one energy research institute, the institutions of higher learning do not have one energy department, and the state has not made energy engineer a professional title. This does not match the urgency and importance of the energy question. None of the research institutes of the Academy of Sciences should be restricted by the sign above its entrance or by a simple change of this sign. For example, there is no harm in calling the Chemical Engineering and Metallurgy Institute the Process Engineering Institute, and including in it processes from ore dressing to tea making, not limiting it to chemical engineering and metallurgy. Not only is this the case, but the application of process engineering must be integrated with its social and economic effects, so as to carry out research of a comprehensive nature. There is no harm in changing the Metals Research Institute and the Ceramics Research Institute into the Materials Engineering Research Institute, and we must not be fettered by old concepts.

The crux of the problem in the Academy of Sciences is its imbalance in proportion, and it must first of all readjust the classification and proportion of its individual academic disciplines, so as to reverse the situation of emphasizing science and slighting industry and agriculture. I think that it would now be comparatively rational and feasible to put the disciplines into four big divisions: philosophy, politics, economics, and management division; agriculture, industry, communications, and medicine division; law, plans, letters, and science division; and finance, accounting, commerce, and statistics division.

Why are science and letters put together? Here I am referring to pure science. Its actual effects on the economy and society are comparatively close to those of literature, music and art, and fairly distant from those of the industrial and agricultural sciences. A big country such as ours cannot be without people studying in disciplines such as abstract mathematics and particle physics, but the amount of manpower and financial resources used to develop these disciplines must be carefully weighed. If they were to become fashionable over the whole country, the result would certainly not be good.

In importance, the four big divisions can be put on a par. However, the distribution of funds for them should be differentiated according to the requirements of economic development. Agriculture, industry, and communications should be given the largest proportion. Professor Yang Zhenming [2799 2182 1337] says that America distributes its funds for applied and developmental research and for theoretical research in the proportion of roughly 1:10. We lack talent and have difficulties in raising funds, so we can only distribute them in a higher proportion. I suggest that from the present situation there by a yearly transition, so that by 1985 the proportion of funds for the four big divisions by 1:7:1:1, and by 1990 it should be 1:17:1:1.

In conclusion Comrade Yang Jike said: "I have hurriedly talked so much only because of my hope that my colleagues in scientific and technological circles will contribute their strength to the economic construction of the motherland. I welcome everybody's discussion of these views."

(Edited by Zhao Beiweng [6392 0554 2598] and You Siyi [3266 1835 1837])

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CSO: 4008/69

ECONOMIC POLICY REGARDING INDUSTRIAL TECHNOLOGY DISCUSSED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 3, 10 Mar 83 pp 28-30

[Article by Wu Shimin [0702 0013 2404], Office of Science and Technology, Ministry of Chemical Engineering: "Economic Policy for Accelerating Enterprise Technical Progress"]

[Text] At the national science and technology award ceremony, Premier Zhao Ziyang pointed out that we must increase the enterprises' motivation for technical progress and that to open the way for this technological progress, we need to solve a series of economic policy problems regarding finance, loans, taxes, price, commerce, materials supply and foreign trade. In this article we make a preliminary investigation of economic policies for encouraging technological progress.

I. Price Policy Must Adhere to the Principle of Pricing According to Product Quality

Whether in a socialist society or in a capitalist society, the price of commercial goods has the same regulatory effect on production; only the forms and consequences are different. In a capitalist economy, the regulatory effect of the law of value acts through random fluctuation of price around the value. In a socialist economy, the law of value achieves its regulatory effect through various price forms such as unified prices, floating prices, contract prices, and free prices. In the past, since we allowed too little flexibility in price policy, there were only unified prices and no floating prices; and especially since we did not adhere to the principle of setting price according to quality, new product development and quality improvement were hindered. For example, Dibaichong [dipterex] is a major pesticide made in China; sold in lump form, it is difficult to package, causes pollution problems in transportation, and is inconvenient to use. Some units have developed 80-percent strength powdered Dibaichong and improved its packaging, transportability and usability considerably at an increase in production cost of 30 yuan per ton. Because of improved working conditions and reduced losses in transportation and use, the overall economic gain more than offset the increase in production cost. However, the commercial departments did not set price according to the overall quality of the product, and the unit that had improved the overall quality and efficiency of the product had to bear the increased cost of production. This always impedes the development of new pesticides and many new products have encountered similar problems.

To achieve a price policy based on product quality, we should both encourage new product development and limit the production of old products and phase them out. In our current system many new products are uniformly priced and sold by the commercial departments and the losses are subsidized by the financial departments. To a certain degree this practice encourages the development of newer products but it actually hinders the development of really new products, because once the price is set, it often remains unchanged for many years, and, after years of improvement in manufacture technology, the production cost gradually declines and real profits exceed the originally specified levels; then, for the sake of high profit, the enterprises often refuse to give up old products and are reluctant to develop new products. Hence it is very important to change the current pricing policy and to adhere to the principle of pricing based on quality, penalizing outdated products in terms of price.

Generally speaking, new products go through the phases of test production, mass production, entry into the market and final phasing out, so that their life cycle can be divided into four stages: trial, maturity, saturation and decay. In order to encourage and assist the enterprises in updating their product line, a "staged price system" should be adopted. In the trial period, since the quantity is small, quality is unpredictable and the consumers are not familiar with product performance, the sales and profit will be low and there may even be some losses. In this period, the enterprises should be allowed to sell the product themselves; they should be allowed to set a favorable price and to be exempt from taxes. As the products enter the maturity and saturation periods, the production costs drop, production volume and sales increase rapidly, and the profit gradually reaches a peak. In this period the product should be sold mainly by the commercial departments at a normal price. After the product enters the decay period, the sales tend to stagnate; at this time the state should set a penalty price to urge the enterprise to update their product.

II. Tax Policy Should Encourage Technological Progress

Taxation is the principal source of the state's financial income; it is also the state's lever for regulating the market economy and for controlling the production and operating activities of the enterprise. To encourage the development of new technologies and new products, the state should use the tax rate to limit the manufacture of outdated and hazardous products. The production of pesticide "666" [benzene hexachloride] accounts for about two thirds of the total pesticide production in China; since "666" does not break down, many agricultural and sideline products have high levels of residual "666", which threatens human health and affects export trade. The pesticide "666" should no doubt be placed on the phase-out list. To do so, a new pesticide that is effective and cheap and leaves little residue should be developed as soon as possible to replace it, while the state should also limit the spread of "666" by means of tax measures. In the meantime, the tax should be reduced or waived for the new pesticide for the first 1-3 years, remittance of profits to the higher levels should be waived for the first year, and even in the second year the enterprise may still be allowed to retain 30 percent of the profit so that the new product can be perfected and gradually take over the market.

Tax reductions or exemptions should also be given to those enterprises which adopt new technologies, reduce energy and material consumption, improve old products and create foreign exchange. Reducing or waiving tax for new products for a period of time will not decrease the state's revenue. In 1979 and 1980, Tianjin developed 56 different kinds of new dyes, equal to one-third of the total number of dyes made in Tianjin. The state allowed tax reductions or exemptions for these new products and collected 1.39 million yuan less on tax. But in two years these new products made 3.20 million yuan of new profits for the state, and 18 of them have entered the international market, securing 4.0 million yuan of foreign exchange.

III. Technology Import Policy Should Encourage the Progress of Domestic Technology

To satisfy the needs of domestic production and consumption, it is entirely necessary to introduce appropriate foreign technology and products. This technology import should, of course, promote the progress of industrial technology in China. For example, each year China imports Fu-nan-dan pesticide at a price of US $10,000 per ton; it is then sold to domestic reprocessing plants at a price of 10,000 yuan per ton and the loss is absorbed by the state. Since we are marketing imported pesticide with a state subsidy, why can we not assist the development of new pesticides in China with state subsidies? Furthermore, 23.9 percent of the dyes imported by China could be produced domestically. The purchase costs US $50 million; 12.3 percent of the imported dye varieties, whose importation costs US $23 million, are under development in China. If part of the foreign exchange spent on importing dye could be used to bring in technology and to organize its assimilation and transplantation, the domestic technology would be improved greatly and better economic efficiency could be achieved. The latter approach is obviously more beneficial.

IV. The Policy Should Insure That New Technologies Are Adopted by the Enterprise

It takes a certain amount of investment to adopt new technologies and to develop new products. The initial investment is exploratory in nature; it often has no source and produces no benefit. This has presented a dilemma for enterprises planning to adopt new technology and develop new products. It is therefore very important for the financial departments to solve problem of sources of needed capital. The state has established some regulations recently; for example, funds for technical development have been increased, funds for developing new products have been established, using part of the profits retained by the enterprises, an early-phase research fund has been included in capital investment, and the cost of developing new products can now be treated as production cost. These regulations provide a reliable funding source for technological improvement and product updating. In addition, the following policies should also be considered.

1. Raise the profit retention percentage of small and medium-size enterprises

Today medium-size and small enterprises make up more than 95 percent of China's industry. Since expanded autonomy and protected competition came into existence, medium-size and small enterprises have become increasingly enthusiastic about adopting new technology and developing new products. In 1981, almost all research results in chemical engineering were first tried in medium-size and small enterprises. Through technological progress, the medium-size and small enterprises have become more competitive with large enterprises; the process has also promoted technical improvement and product renewal in the large enterprises. In order to protect them and motivate them to rely on technical progress, funds policy should treat medium and small enterprises preferentially, based on their low output value and small profits. They should be allowed to keep a slightly higher percentage of their profits than that allowed for the large enterprises, and the state may provide some supplemental funds for major technical improvements or product development.

2. Compensated use of research allowances

In principle, the cost of technical improvement and product development should be the responsibility of the enterprise. But if the research and development cost exceeds the financial capabilities of the enterprise, the state may provide supplemental funding amounting to up to 50 percent of the total cost. Such supplements, however, should not be used without compensation; they should be paid back in installments. The compensated use of these research allowances will encourage the enterprise to conduct technical and economic evaluation and market forecasting, and as a result its management standards will be improved.

3. Use of directive quotas

For many years the plan quotas assigned by the state have been based mainly on output value; such targets do not encourage conservation, cutting costs or adopting new technology. It is therefore necessary to change or improve the quota system so as to make the enterprises more concerned about technological progress. The following measures may be taken: the output value resulting from technical improvement and product development may be required to be a certain percentage of the total output value target; phasing out of old products and backward technology may be included among the main evaluation indicators; 0.5 to 1 percent of the annual gross output or sales value should be designated as a science and technology development fund, and if this money is not used, the state may redirect it elsewhere. It is very important today to use directive quotas to encourage the enterprises to put more effort into technical progress.

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CSO: 4008/99

PROBLEMS IN PROMOTING APPLIED TECHNOLOGY SUMMARIZED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] In Chinese No 3, 10 Mar 83 p 35

[Article by Song Hongjiang [1327 1347 3068], Handan Mining Bureau, Hebei Province: "Some Problems in Promoting the Wider Use of Suitable Technology"]

[Text] Today a considerable number of enterprises in China have backward technology and equipment, high energy consumption, low productivity and poor product quality. With limited manpower and money, China has developed a number of valuable new production techniques; but they are not being widely applied. This situation should be carefully studied and a solution must be found. The 12th Party Congress reemphasized that economic development must rely on science and technology. With our available economic resources, technological level and management conditions, we should stress applied technology that takes a small investment and gives a quick return; and under no circumstances should we place undue emphasis on large-scale or foreign technology. In 1980, the Handan Mining Bureau spent several hundred thousand yuan to buy a sophisticated high-grade conventional mining combine and advanced domestically-produced crab-claw rock loading, but due to various limitations, some of the equipment sat unused for years, while some had to be transferred to other places. From this lesson we recognized that certain advanced technology and equipment may not be applicable in our situaiton. In 1981 we promoted the application of oil-free lubrication for air compressor cylinders; the technique was simple (it only required minor machining of the piston ring), the investment was small (only 50 yuan per year for 20-cubic-meter machines), the effect was immediate with large benefits, and it prolonged the cylinder life, insured safe operation and reduced environmental pollution. After one year of use on 15 air compressors of different models, we saved 28,000 yuan on oil alone. In 1982 the Hebei provincial coal mine system and Handan Municipal Scientific and Technical Commission held demonstrations in the Handan Mining Bureau to publicize the new technology of oil-free lubrication. If all 585 air compressors in Hebei's coal mining system had adopted oil-free lubrication, it would have saved 1.24 million yuan per year. If the technology were spread to other industries as well, the economic benefits would be even greater.

Generally speaking, the sophistication of a technology is consistent with its being adaptable to various social and economic conditions, but for specific conditions in plants and mines, many problems need careful study. Some people

think that adopting applied technology simply means copying the results laboriously developed by others over the years. Little do they realize that the tasks involved in adopting and promoting applied technology, such as extensive research, information analysis, making proper choice of projects, summarizing spot-experiment experience, modernizing and upgrading, and training technical staff are precisely the problems research and development are trying to solve. Advanced scientific and technological achievements can be transformed into direct productive forces only by this tedious and detailed work. This again demonstrates the importance of science and technology.

What should be done to promote applied technology in enterprises? From the experience of promoting the oil-free lubrication technique, we recognized the following points.

1. Strengthen technical information surveys and make a proper choice of projects based on the actual situation in the enterprise. In the production situation of the Handan Mining Bureau, the problem was oil consumption. To gather information, we visited the Ministry of Coal Industry, the Beijing Coal Mine Machinery Plant and the Jiangsu Institute of Mining Machinery and collected several hundred thousand words of information. After analyzing the differences resulting from use of the new technology and with reference to the technical manpower, material and equipment available to our unit, we determined that better technical and economical results could be realized by promoting the new technology.

2. Obtain support and assistance from the higher-level leadership and the relevant departments. In promoting a new technology, the first step is to seek approval and permission of the leadership. The support and cooperation of other associated departments should also be sought.

3. Carry out spot experiments, make improvements and continue to perfect applications. First-hand data on major technical characteristics such as working air pressure, exhaust volume, exhaust temperature, oil consumption and electric power should be obtained in the spot experiments. Further improvements are then made. For example, we made the second stage piston clearance slightly greater than that specified in the original design of the model 4L-20/8 compressor and increased it strength. We also changed the straight-cut design of the second stage piston intake-outlet ring to a seated design and improved the closure. This has helped promote the new technology.

4. Consolidate experience for further dissemination. After the new technology has been successfully tested, the experience should be summarized in timely fashion; experience-exchange meetings, on-site demonstrations and technical training sessions should be held to publicize the application. In the meantime, technical guidance and management instructions should be provided and material, equipment, and funding should be guaranteed. The goal is to make every new application a success.

5. Perfect the system and strengthen the results. We referred to the relevant invention and technical improvement reward regulations of the state, adopted them to the local situation, and formulated the "Handan Mining Bureau Scientific

and Technological Achievement Reward Regulations (Tentative)". These regulations provide rewards for scientific investigation, technological innovation, and dissemination of new technology based on its technical level, scope of application and economic value in order to insure the dissemination and application of technological achievements.

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CSO: 4008/99

USE OF TECHNOLOGY IN REGIONAL DEVELOPMENT DESCRIBED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI /SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY/ in Chinese No 2, 10 Feb 83 pp 2-4

/Article by Huang Weiguo /7806 4850 0948/, People's Government, Fushun City: "Regional Development and the Utilization of Technology"/

/Text/ Since the Third Plenary Session of the 11th Party Central Committee, a large number of rapidly developing medium and small-size cities with good economic results and stable social life have grown up in our vast fatherland. They are a string of pearls of China's urban development and have furnished valuable experience in regional growth. But almost all of these cities sprang from a relatively weak industrial base or one focused primarily on light industry, so that the questions of whether their successful experience can be used for heavy-industry cities, particularly during the economic readjustment period, with decreased industry investments in heavy industry and inadequate production work everywhere, and whether heavy-industry cities can make progress, require further study and solution.

Fushun City has been working in this area for several years and has achieved some results.

Fushun is a heavy-industry city based on fuels, raw materials and motive power, whose main products are coal, oil, electricity, steel and aluminum; its industrial output value has reached 4.6 billion yuan, and it remits 1.4 billion yuan in taxes and profits to the higher levels each year. During the readjustment, the problems we face are these: whether our economy can continue to develop with insufficient work for heavy industry and declining output; whether inadequate energy supplies can be overcome in the course of economic development; and whether the problems of urban construction, environmental pollution, employment for youth, and improvement of the people's condition of life can be solved simultaneously.

These mutually contradictory problems, which are difficult to solve simultaneously in a satisfactory way, seem to present an insuperable obstacle to further progress. But because we have resolved to implement the Central Committee's readjustment policy and to rely unwaveringly on the force of science and technology, we have finally taken on a new route to promoting regional development through the utilization of science and technology. Although the output

value of heavy industry has dropped somewhat during the readjustment period, the amounts of taxes and profits paid to the higher levels have continued to rise. At the same time, preliminary results have been achieved in energy conservation, urban construction, youth employment and environmental management.

1. Break Through Sectorial Boundaries and Utilize Technology on a Regional Basis

As a result of various historical factors, Fushun City's departments and enterprises have long tended to go their own ways, and very little attention has been given to cooperation, so that seen in terms of a single department or a single enterprise, it appears difficult to further increase output without large investments. But seen in terms of the entire region, if comprehensive technical development is conducted on a regional scale, it will be possible to utilize resources which could not be utilized before, solve problems which could not be solved before, and realize considerable economic benefit with a relatively small investment.

The cooling water from the Fushun Power Station has a temperature of about 60°C, but in the past no thought was given to utilizing it, and this heat energy was all wasted. In 1981, we gave some consideration to the use of techniques for utilizing waste heat in urban construction, and with a relatively small investment we further increased the temperature of the cooling water and used it for residential heating in the winter. As of the end of 1981, we had utilized capabilities for heat supply to a million square meters of dwelling space, saving 50,000 to 60,000 tons of coal a year, eliminating more than 80 boiler plants and more than 90 smokestacks, and greatly decreasing the amounts of sulfure dioxide, carbon monoxide, carbon dioxide in the city's atmosphere and the quantities of such pollutants are flyash and wastewater, which considerably alleviated environmental pollution. In a few years we will complete stages 2 and 3 of the heat supply engineering, increasing the total area supplied with heat to 3 million square meters. In this way we will be able to save more than 200,000 tons of coal a year, and the city's environment will be further improved.

Every second, the Liaoning power plant located in Fushun City discharges 25 cubic meters of cooling water, of which 10 cubic meters is at a temperature above 30°C. In the last few years, following scientific experimentation, we have used the warm water to raise African carp, achieving an output of 180,000 jin per mu. Since 1980 we have joined together further with suburban vegetable-producing communes, using the warm water to irrigate vegetables, and it is forecast that in winter the yield per mu may be as high as 30,000 to 40,000 jin, 3 to 4 times that of ordinary cropland. This all-around utilization of technology will greatly decrease the transport load resulting from the shipping in of vegetables during the winter and will save large amounts of energy. Fushun City has now invested in these two projects in an effort to materialize them over a large area as rapidly as possible.

Xinbin and Qingyuan Counties in Fushun Prefecture have large amounts of marl. In order to develop and utilize this valuable resource, we organized the counties, the city, relevant scientific research units, major specialized schools, and mining and manufacturing enterprises for a concerted effort to use wood replacements made from marl and wood fragments in building construction;

in the 60,000 square meters of residential buildings already completed, we have saved 60 cubic meters of wood products and more than 20,000 yuan of investments, while the construction price per square meters has decreased by 0.5 yuan. China has insufficient forest resources but abundant resources of marl, amounting to about 27 billion tons nationwide; if a tenth of these resources were used to make wood replacement products, this would be equivalent to about twice the country's current timber resources and would provide an abundant, economical, handy new material for urban and rural construction.

2. Utilization of Technology to Promote the Coordinated Development of Light and Heavy Industry

Fushun City has a solid heavy-industry base, and the question of how to utilize technology to link light and heavy industry together so that they could develop in coordinated fashion urgently requires solution.

Fushun's petroleum industry output accounts for 40 percent of the city's total output value, so that the petroleum industry's advantages have a great influence on regional development. In early 1981, the city's Science Advisory Committee organized many organizations for research and documentation work, and it and the relevant departments drafted a comprehensive development program for petroleum and chemical engineering. On the basis of this program, we will restore the Fushun No 2 Petroleum Refinery's deep cooling and low-pressure polyethylene apparatus, which for many years had been unable to operate normally, and supply the city's chemical fiber plants with starting materials for the manufacture of acrylonitrile, in addition to providing the city with 50,000 to 70,000 tons of low-pressure polyethylene. Implementation of the entire program would increase annual output by more than 20 billion yuan, and tax and profit payments would increase by 5.46 million yuan, so that the entire investment could be recovered in 2 years. The program has been approved by the government, and trial operation is about to begin.

We are also using the gases from paraffin cracking discharged by the No 1 Petroleum Refinery to produce styrene and ABC resins in the No 2 chemical engineering plant; and we are using proplyene from the waste gases of the oil refinery to produce acrylonitrile and acrylic fibers, the output of which will be 50,000 tons and 40,000 tons respectively, providing large amounts of starting materials for the textile industry. After these projects go into production they will allow Fushun City's synthetic fiber, textile, clothing, plastics, building materials and household chemical industry to develop rapidly. According to preliminary estimates, with an investment of 250 million yuan in petroleum refining and chemical engineering, within 3 to 5 years the city's industrial output can be increased by 370 million yuan, and revenues from taxes and profit payment may reach 125 million yuan a year; in addition we will be able to provide employment for more than 50,000 persons, and while producing new chemical products, the No 2 Chemical Plant will also be able to provide 7,000 tons of coal gas for use by the populace, solving the problem of coal supply for 20,000 inhabitants, with a possible saving of 40,000 tons or more of coal a year.

Utilization of technology and thorough utilization of the advantages of existing heavy industry not only has speeded up the development of light industry and realized considerable economic benefits from relatively small investments, but also has helped heavy industry to develop further on a new basis.

3. Use of Technology to Improve the Regional Environment.

Eliminating industrial pollution and protecting environmental quality constitute an important problem of regional development. Coal extraction and tunneling in Fushun result in the release of large quantities of gas, only a small portion of which is utilized, while the remainder is discharged into the atmosphere, which not only wastes resources but produces serious atmospheric pollution. Starting in 1981 we organized the scientific and technical personnel of three coal mines to carry out surveys and research, clarify the nature of gas discharges in the mining district, and compare and document a variety of programs in order to utilize gas discharges, eliminate gas pollution and convert the district to coal gas. According to preliminary calculations, the Laohutai Mine alone produces 2.66 billion cubic meters of usable gas every year, enough to supply 140,000 households for 17 years; with the addition of currently available coal gas and the coal gas which will be provided by the No 2 Chemical Plant it will be possible to supply more than 200,000 households, so that it will be possible to convert the entire city to the use of coal gas within 3 to 5 years. This would make it possible to save more than 300,000 tons of coal a year, decrease sulfur emissions by 9,600 tons and flyash by 33,000 tons, and decrease the use of firewood by 40,000 tons.

The serious pollution of the Hun River, which flows through Fushun, by powdered coal ash from the Fushun Power Plant has been an unsolved problem for several decades; since 1979, as a result of the efforts of the power station, the support of the municipal construction committee and the environmental protection office, and cooperation from the building materials industry, a new two-level wastewater technology has been instituted, so that all of the more than 200,000 tons of powdered coal cinder discharged every year is fully recovered and utilized. The building materials departments use the cinder to make brick, saving 10 million yuan in capital construction investments, 15,000 tons of coal, and 300 mu of agricultural land every year. After this new technique was put into use there was a large decrease in the amount of suspended pollutants in the Hun River, and the water became clear, which was welcomed by inhabitants along its banks.

Utilization of technology is not only the key to development of industrial and mining enterprises, but an important means of regional development as well. As a result of the utilization of technology, districts which originally had had a weak industrial base and were focused primarily on light industry can develop rapidly, and heavy-industry districts can further raise their level of development. In the case of districts which start with well-developed heavy industry, as a result of a variety of long-standing problems of industrial structure, the economic system and technological structure, there is actually great unused production potential on the regional scale, and if we look at the situation in terms of overall regional development and engage in comprehensive development, we will be able to use a relatively small amount of money to solve rather large

problems, resulting in considerable economic benefits. This is the main reason that, although heavy industry's output has been falling during the readjustment period, while increasing the economic benefits of the entire region, Fushun has also been able to promote social development.

Although heavy industrial output is now gradually moving upward again, we believe that we should still make a vigorous effort at comprehensive regional utilization of technology and further readjust the sectorial and technological structure of the district. Only in this way is it possible to continue realizing increased economic benefits with relatively small investments and to solve a variety of social problems, so that the entire district develops more rapidly.

The experience of the past few years has convinced us that if we use technology ably, heavy-industry districts too will be able to take a route involving small investments, high economic benefits and rapid development. In the future, if we continue to implement the various policies mapped out at the 12th Party Congress, we will be able to create a new situation in socialist modernization in Fushun City; we are fully confident of achieving the objective of quadrupling our industrial and agricultural output in Fushun District.

(About the author: Huang Weiguo was born in 1923 and graduated from the Civil Engineering Department of Chongqing University in 1949 as a highly trained engineer; he is currently Deputy Mayor of Fushun City and a responsible member of the Fushun City Science and Technology Advisory Committee. He has published technical monographs and many articles in newspapers and journals.)

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CSO: 4008/92

XIANGFAN'S MEASURES TO UTILIZE SCIENCE, TECHNOLOGY FOR PRODUCTION OUTLINED

Beijing RENMIN RIBAO in Chinese 6 Mar 83 p 5

[Article by Yang Shiwant []799 2514 2489], Beijing Academy of Economics: "We Must Rely on Science and Technology to Develop the Economy"]

[Text] Industry in Xiangfan City, Hubei, has been developing rapidly in recent years. Statistics show that total industrial output value nearly doubled from 1978 to 1981, with an average annual growth rate of 25 percent, the profits of enterprises under popular ownership have increased by nearly 2 times, and many indicators of economic benefits have been making continuous progress. Five main products have won state gold or silver medals for quality, while 40 have won ministry or province designations as superior quality goods. Important aspects of Xiangfan City's unification of the acceleration of industrial development with improvement of economic benefits have been its energetic and effective work in science and technology and its full utilization of scientific and technical personnel.

Xiangfan's leadership comrades realized from experience that invigorating the economy requires reliance on science and technology, and that developing science and technology in turn requires reliance on qualified scientific and technical personnel. They treated the availability of trained personnel as the basic factor and recommended able people with specialized knowledge to leadership posts, while some older comrades with a low cultural level voluntarily withdrew to the second line and willingly acted as advisors and support personnel for scientific and technical personnel.

Vigorously Building up the Scientific and Technical Contingent

First, they attracted specialized personnel from other localities and trained others locally in order to expand the technical contingent. Since 1974, Xiangfan has brought in more than 838 scientific and technical personnel from Shanghai, Beijing, Tianjin, Xi'an and elsewhere; these persons account for more than half of current scientific and technical personnel. In addition, the city also ran advanced scientific and technical training academies, opened ties with the major specialized schools and academies and scientific research units, and expanded both classroom and correspondence education, training a total of more than 200 personnel with higher or secondary specialized education. The proportion of scientific and technical

personnel among all employees increased from 1.4 percent in the city-subordinate enterprises and some enterprises subordinate to the center and the province were organized into a loose technical and economic association, the Fanxing Limited Liability Company, and bound together by suitable financial interests, to implement the responsibility contract system, to carry out long-term multiple technical cooperation duties and to contract for various technical projects; the results have been excellent.

Second, they have boldly promoted qualified scientific and technical personnel. The Xiangfan City leadership has done away with the old fetters of "emphasizing the resume at the expense of competence, emphasizing party membership to the detriment of non-party personnel, and emphasizing class origin while neglecting contributions made" and has boldly promoted able, well-versed scientific and technical personnel who are capable of bringing about new developments, and has trusted them politically, given them important duties, nurtured them organizationally and shown concern for their condition of life. Since the Third Plenary Session of the 11th Central Committee, 417 scientific and technical personnel have been promoted to the post of engineer, and 160 have been promoted to the post of plant director or top leadership cadre positions. Currently one out of every three scientific and technical personnel is a party member. In addition, full importance is being accorded to improving the level of political development of scientific and technical personnel and to developing a communist spirit in them.

Third, they have concentrated on making use of scientific and technical personnel, particularly in economic policy-making, consultation, development of documentation, and participation in key efforts. Some of the city's small plants used to be backward and were in danger of having to close. But several scientists and engineers were dispatched to them, where they modernized equipment and trial-produced new products, so that these plants not only got out of danger but moved toward prosperity. More than 20 plants have been saved in the last few years. By the force of science and technology, these scientists and engineers use the actual situation to make the employees realize that they must rely on science and technology in order to progress.

Scientific and Technical Work Centered on Improving Economic Benefits

Xiangfan City linked production and scientific research together organically and genuinely achieved a situation in which "production proposes the topics, science and technology go into action, science and technology produce the achievements, and production increases economic benefits." Three focal points were preeminent in scientific and technical work.

1. Efforts at scientific and technical modernization. They imported advanced technology on a realistic basis, then analyzed it, assimilated it and innovated from it, producing usable advanced technical equipment. In the past year, because the city's standardized parts plant was using out-of-date processes and lacked a well-balanced complement of equipment, for a long time it had been unable to reach its design capacity of 150 million items. Since 1978 it has studied advanced technology in the same fields in Japan

and Shanghai, has converted its machine tools to multiposition operation, increased operating speeds, converted to cold forging of dies and tools, and changed over to the use of hard alloy for dies and tools, with the result that by 1981 production capacities had reached 230 million items and product quality was improved. In 1981 the plant's rivets were recognized as the country's best. The city's phosphate fertilizer plan carried out four major modernizations of its process equipment in 6 years, its technical and economic indicators abruptly moved up to an advanced national level and it was recognized as one of the "three red flowers" in the national competition of small sulfuric acid and phosphate fertilizer plants.

2. Innovations in energy conservation. In the last few years the city has carried out testing and dissemination of new techniques, new processes, new materials and new products related to energy conservation. It has disseminated such new energy-saving technologies as power factor compensation, far-infrared drying, and oil-water percolation; it has successfully developed a low-energy-consumption method of producing early-hardening cement, low-temperature rapid baking of glazed brick, and other new energy-saving processes; its has successfully developed high-efficiency energy-saving electrical machinery, a variety of silicon-controlled rectifier speed regulation panels and other new energy-saving products; and it has developed and utilized room-temperature cleaning agents, foamed asbestos, ceramics and other energy-saving materials. The electrical energy saved by power factor compensation alone is equivalent to increasing the city's electric power by one-fifth for a year, or to increasing income by more than 3 million yuan. Moreover, 1 kilogram of the room-temperature cleaning agent can replace 5 kilograms of gasoline, and has already been included by the state economic commission as one of the 50 key new technologies for dissemination during the Sixty-5-Year Plan.

3. It has implemented the policy guideline of "making the old nourish the new, getting rid of the out-of-date to make room for the new, and constant change and innovation," has taken the initiative in the battle to modernize and update products and has striven to "produce one product while trial-producing one product, designing one product and conceiving one product."

For example, the art paper plant originally produced mostly single-sided art printing paper, but in order to seize the initiative, while trail-producing a special art paper, it also began developing a wove art paper and worked out the conception of a glossy paper. By constant changes and innovations in colors and patterns, the Tihua Textile Plant has increased its output value by 4.67 times in the last 10 years, while out-of-city sales have increased by 85.6 times and profit has increased by 22.9 times, thus making a contribution to the country. In order to speed up product modernization and innovation, the city's cooperative science information office collected more than 400 foreign product samples in the course of a year, as well as 61 sample cards and over 200 examples of finished goods.

Because the orientation of scientific and technical development was correct, the tasks were made clear and the key areas were well defined, the resulting effect was great. In the 3 years from 1979 to 1981, the mechanical engineer-

ing system alone implemented 1,152 technical innovations, renovated more than 80 pieces of equipment, developed 207 new products, and achieved an average annual growth rate of 10.3 percent.

Expand Channels for Obtaining Scientific and Technical Funds

To raise scientific and technical funds, Xiangfan adopted the approach of piecing together small amounts into a large sum, and brought together funds from local allocations, bank loans, enterprise modernization and renovation funds, funds for technical measures, development funds from the enterprises' retained portion of profits, trial production funds and other technical income (such as transfers of technology, technical achievement exchange meetings, income from technical consulting services and the like) and used them in a planned fashion to assure support for key projects. In 1981 the city raised a total of 15.01 million yuan, which it used to organize 28 technical modernization projects. As of 1982, 16 of them had already produced results or partial results, new output value totaled 105 million, equivalent to 51.7 percent of net output value for the year, and new profits totaled 7.83 million yuan, or 58.9 percent of net profit for the year.

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CSO: 4008/66

DEVELOPING SICHUAN'S SCIENTIFIC, TECHNICAL INDUSTRIES

Chengdu SICHUAN RIBAO in Chinese 12 Mar 83 p 1

[Article: "Develop Sichuan's Science and Technology With High Quality, High Efficiency, and High Results"]

[Text] On 11 March the Chengdu Branch of the Chinese Academy of Sciences, the Sichuan Province Academy of Agricultural Sciences, the Sichuan Province Academy of Social Sciences, the Chengdu University of Science and Technology, Sichuan University, the Chengdu College of Telecommunications Engineering, the Sichuan Province Institute of Forestry Sciences, and the Tenth Institute of the Ministry of the Electronics Industry, jointly proposed the following measures to strengthen unity and cooperation between scientific research departments, to tackle key problems cooperatively, and to develop science and technology in Sichuan with high quality, high efficiency, and high results.

1. Under the leadership of the Sichuan Province Science and Technology Leadership Group, research sections of the social sciences and the natural sciences should get together to tackle key problems cooperatively in order to promote the flourishing of science and technology and the development of society and thus make a contribution to raising the level of science and technology and restructuring the production, circulation, and distribution systems.

2. Strengthen contacts, cooperate closely, utilize the advantages of socialist integration and cooperation, conduct cooperative efforts in key scientific classes, establish experimental technology centers and technical development companies, and jointly run enterprises and experimental plots in order to adapt to the needs of Sichuan's economic development.

3. Break down the boundaries between departments and promote the exchange of qualified personnel. Scientific research departments, universities and technical schools should actively create the conditions for admitting scientific and technical personnel into cooperative scientific research or advanced training, should train personnel with advanced training and graduate students, and should accept university students for study. At the same time they should enable scientific and

technical personnel from their units to go to fraternal units for advanced study or to accept invitations to assume concurrent posts, do some teaching, or work for a set period of time; through negotiated agreement, both sides may support qualified scientific and technical personnel and managerial personnel.

4. Fully exploit scientific and technical resources and research equipment. Library and information materials, precision instruments, and large-scale research installations should be made freely available to fraternal units throughout the province, and prices and fees should be lowered to make them convenient to use. Priority should be given to economic construction projects which have a decisive influence on our province's economy, environmental quality, and production life.

5. While lateral relations between natural science disciplines are being strengthened, ties with social scientists should also be strengthened, technical exchanges between different disciplines and different specializations should be carried out, and the organizations should improve day-to-day professional reception activities, accept assignments at any time, carry out analytical testing and project calculations, hold results-exchange talks, place orders for goods, and offer scientific-technical and economic-technical consulting services.

While issuing these proposals, the leaders, scientists, and professors of the units which participated in drafting the proposals held discussions on implementing them as quickly as possible.

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CSO: 4008/76

CONCENTRATE ON THE TECHNICAL TRANSFORMATION OF EXISTING INDUSTRIES

Chengdu SICHUAN RIBAO in Chinese 10 Feb 83 p 1

[Article by commentator: 'Stress Technical Transformation of Existing Industries']

[Text] Carrying out the technical transformation of existing industries is an important mission in the period of the Sixth Five-Year Plan and an important measure for sustaining technical progress and improving economic results. Doing this well has extremely important significance for comprehensively creating a new situation in modernization.

Except for some enterprises which have been newly built in recent years, the technical facilities of most local enterprises in Sichuan are very backward. In machine building, the facilities of many enterprises have been in service for a long time, wear is severe, the precision of processing is not up to technical demands and about 60 percent of the commodities urgently need to be replaced with new ones.

In textiles, 40 percent of the cotton spinning equipment dates from the 1930's to 1950's; 37.6 percent of all looms urgently need to be replaced or rebuilt. In the chemical industry, 60 percent of the equipment is only up to the level attained by the developed countries in the 1940's. Such old and outdated technical equipment is one important reason why Sichuan's industries produce goods which are low in quality and have high consumption levels, high costs, and poor economic results. For this reason, stressing technical transformation is even more important.

One very important question related to doing this work well is that of further rectifying guiding ideology. For many years now, in economic construction we have considered only the extensive type of development, relying on new facilities to expand productive capacity, but have ignored the intensive aspect of exploiting production potential and carrying out technical rebuilding of existing enterprises. This approach unavoidably led to an overextended capital construction front and poor investment results, so that the facilities of existing enterprises could not be replaced promptly, production capacity could be fully utilized, and the development of the entire economy was influenced. There should be a major turnaround in the guiding thinking of each department and each

enterprise; they should absorb the lessons of the past, rely fully on the more than 40,000 existing enterprises in Sichuan, carry out technical transformation in a planned and focused way, disseminate the various technical results which already exist and which have produced economic results, actively adopt new technology, new facilities, new processes and new materials expand reproduction primarily by the intensive approach.

While rectifying the guiding ideology, it is also necessary to clarify the direction of the main effort and formulate a feasible plan. Here the important thing is to take improved economic results as the central focus emphasize upgrading product quality, increasing varieties, economizing on energy resources, and using natural resources comprehensively and strive to combine this work with reorganization and amalgamation of enterprises and with the importation advanced equipment and technology. The machinery and electronics industries are the equipment suppliers of all sectors of the national economy, so their technical transformation should lead the way in order to provide other industries with technically advanced, and special equipment and sets of equipment of the varieties needed. The departments, regions and enterprises should specify their key areas of effort in accordance with this orientation discriminate important and unimportant, urgent and non-urgent concerns on the basis of their financial and material capabilities, and make overall plans to ensure the smooth progress of technical transformation and the achievement of the anticipated results.

In terms of finances, it is important to arrange for and employ funds rationally. The allocations and loans which Sichuan now uses annually for technical transformation have reached about 700 million yuan; if these funds were used properly there are a great many other things they could do. The present issue is that in the use and distribution of funds the key points are not sufficiently emphasized; most funds are used to expand productive capacity, and only about 40 percent is really used for technical transformation. This situation must be changed. Henceforth these funds should be used by designating projects according to a plan, and designating funds according to the project, so that key points are emphasized and special funds are used for special purposes. At the same time, economic results should be stressed and before a project is settled on there should be proof of feasibility, during execution there should be intensified examination and oversight, and after completion there should be an assessment and checking before acceptance. In view of the volume and extent, of the technical transformation in our province, existing funds cannot satisfy needs. Thus if finances permit, some new policy measures favorable for accelerating the pace of technical transformation should be adopted.

Technical transformation is undoubtedly a task of an extremely technical nature, and thus special attention must be paid to making full use of scientific and technical personnel. The scientific and technical personnel

in Sichuan's scientific research units, universities and technical schools, factories and mines is a main force for carrying out enterprise technical transformation. We should rely on their collective research for decision making and plans for technical transformation and for carrying out technical and economic evaluation, and we should import advanced technical equipment, conduct technical breakthrough efforts, and disseminate and apply advanced technology in order to ensure the quality of technical transformation and promote constant technical progress.

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CSO: 4008/76

TIANJIN ORGANIZES FOR TECHNOLOGICAL TRANSFORMATION

Beijing RENMIN RIBAO in Chinese 25 Apr 83 p 1

[Article: "Tianjin Municipality Organizes Five Scientific and Technological Armies for Coordinated Combat"]

[Text] In the process of implementing the task, approved by the State Council, of expanding the authority for introducing technology in the transformation of medium and small enterprises, Tianjin Municipality reformed the system of managing scientific and technological personnel, destroyed barriers between different departments, organized five scientific and technological armies, and is fighting for the success of 208 recommended projects.

On 14 March, the State Council approved the selection of Tianjin Municipality as an experimental site for the transformation of medium-sized and small enterprises by introduction of new technologies. This resolution will have a great effect in promoting the technological progress of Tianjin's industry. Tianjin Municipality has defined the focus of the technology introduction effort and has arranged 208 projects for this year, giving a total of 327 projects when holdover projects from last year are included.

Tianjin's Municipal CPC Committee has decided to take this favorable opportunity to reform the system of managing scientific and technological personnel and to realistically eliminate the long-standing lack of coordination between education, scientific research, and production. According to an estimate made in late 1981, Tianjin Municipality has more than 138,000 scientists and technicians working in universities and technical colleges, national defense institutions, technological research agencies affiliated to central and local governments, and factories and enterprises, but these organizations have long been self-contained and have withheld technical information from each other. Many university personnel do not have assignments. In one research institute in the national defense system, there are several hundred engineering and technical personnel of senior or intermediate rank who do not have sufficient assignments. But there is a serious shortage of technicians on the production frontline. To deal with the above-mentioned situations, since 14 April the Tianjin Municipal CPC Committee has summoned the leadership cadres of industry, technology, and universities and technical colleges, as well as more than three hundred scientific and technological specialists and has asked them to examine and approve the recommended technology introduction projects, and to help in

the combat. Chen Weida, First Secretary of the Tianjin Municipal CPC Committee, delivered a report in which he suggested that in order to quadruple its output, Tianjin Municipality must proceed with large-scale technological transformation and resolve the problems created by decentralization of the scientific and technological personnel and by the barriers between different departments. He pointed out the need to adopt new approaches and draft new policies to fully utilize the advantages of the socialist system. He urged the committee to organize the five scientific and technological armies under unified management and to use them reasonably.

Since 21 April, more than 300 scientific and technological specialists have been organized into 41 groups according to their specialties to propose and evaluate projects; these specialists have responded enthusiastically.

According to statements made to reporters by senior members of the Scientific Commission of Tianjin Municipality, organizing various scientific and technological personnel to examine the projects represents only the first battle. To fully utilize the force of scientists and technicians, we must organize them so that they can learn from each other's strong points to offset their own weaknesses and can wage coordinated combat. We must now adopt many bilateral and multilateral cooperation measures. (1) Enterprises, colleges and universities and scientific research organizations can develop extensive scientific and technological cooperation, share patent royalties for their technological products, employ technological specialists to serve as advisers in enterprises, and the like. (2) The military industry may join forces with civilian industry and transfer technology to civilian industry. (3) Focusing on the final product, we should destroy the barriers separating industries and departments, and organize coordination between scientific research and production. (4) We should organize multilateral cooperation, focusing on projects which tackle key problems. (5) Technical personnel whose jobs are not suited to their training should be transferred to other departments with urgent needs, or loaned for contract performance of certain technological transformation assignments. (6) Multidisciplinary groups of specialists should be organized to diagnose the problems of enterprises and to offer them comprehensive treatment. (7) Testing centers, information centers and various types of consulting services should be organized throughout the city.

12397
CSO: 4008/110

TECHNICAL TRAINING OF STAFF, WORKERS STRESSED

Lanzhou GANSU RIBAO in Chinese 16 May 83 p 4

[Article by Wei Guorong [7614 0948 2837]: "Emphasize Technical Training of Staff Workers in Consolidating Labor Organizations"]

[Text] Consolidating labor organizations, organizing production according to fixed number of staff and workers and fixed quotas, rational use of manpower, effective technical training of staff workers, and raising the scientific, educational and technical levels of staff worker contingents are important paths to realizing scientific management of enterprises and increasing labor productivity and economic results, and are urgent demands for developing productive forces.

The "Resolution Concerning the Overall Reorganization of State-Run Industrial Enterprises" of the Party Central Committee and State Council clearly points out that while we consolidate labor organizations we must do our best in training staff and workers, conduct planned, stage-by-stage rotational training among staff and workers, continually raise the ideological, political, technical and professional level of staff and workers, and enable training to become a long-term and unremitting system.

Conducting technical training of staff and workers during the consolidation of labor organizations is a strategic measure to accelerate the four modernizations. Technical training of staff and workers is an important aspect of the party's undertaking in socialist education, an important avenue for training talents for the four modernizations and a reliable guarantee of the development of the national economy. It has an extremely close relationship with the building of material and spiritual civilization. Marx pointed out that it takes a certain education or training in order to change the nature of ordinary people so that they will obtain a definite technical ability or skill in some area of labor and become a developed and specialized labor force. Also, the more developed science and technology are, and the higher the level of social productive forces, the greater the demands on the intelligence of the laborers. The atomic industry, the electronic calculator industry and other scientific and technological developments that appeared in the 1940's imposed new demands regarding the educational and technical levels of laborers. Today, scientific and technological development is even more rapid and has extensive applications in production. The appearance of large numbers of new specialties,

categories of work and industries has posed new demands on the broad masses of staff and workers, who must continually increase their scientific and cultural knowledge, professional and technical level; even a porter who does loading and unloading must also know how to use electrical equipment and machinery as well as maintenance and repair. We have found that it is through investment in intellectual resources that many developed countries raise their labor productivity and increase their surplus value. An important means is to stress the role of intellectual investment more than investment in material forms. After World War II, the economies of West Germany and Japan rapidly recovered and developed mainly because during the war they held back part of their human resources, and after the war they emphasized developing human resources and vigorously developed professional and technical education. But the goals of the capitalists are different from ours, for they primarily strive to acquire surplus value. In carrying out our glorious and magnificent modernization we need to train a large number of specialists and experienced laborers of all types and at all levels. This is an extremely important and fundamental kind of construction. The technical training of staff workers is an important measure for turning potential into actual productive forces which can play an enormous motivating role in developing production. In modern production, science and technology are also turned into direct productive forces through man. Here, "man" refers to a physical and mental laborer who has a specific education and scientific knowledge, production experience and labor skills to enable him to use the instruments of modern production and to master modern techniques. If laborers must master knowledge, experience and skills then we must conduct technical training for staff workers.

The consolidation of labor organization is closely related to technical training for staff and workers. Each of the "three construction" and "six standards" specified by the central authorities for the reorganization of enterprises is closely related to technical training for staff and workers. Building a democratic, centralized leadership system, staff and workers contingents who are both red and expert, and a scientific, civilized management system, as well as correctly handling the relationships between the state, collective and individual, product quality, economic results, labor discipline, civilized production, and ideological and political work are all related to technical training of staff and workers. As a major task in the reorganization of enterprises, consolidation of labor organization should be related to the actual conditions of enterprises and should concretely specify the demands of technical training of staff and workers. In general, the following aspects should be included. 1) After consolidation of labor organizations we must organize a definite proportion of staff workers to conduct training, adopt the method of a fixed number of staff members but not specified persons, and conduct planned, group-by-group rotational training. We must also see to it that there are goals in training, demands in study, standards in evaluation, and rewards and penalties in checking attendance, and truly turn technical training of staff and workers into "a long-term, unflagging system."
2) Training must combine the needs of present production and long-term development, promote the further rationalization of labor organization, enhance the level of fixed staff and fixed quotas, increase labor productivity and speedily make use of the economic results of investment in intellectual resources. 3) Teachers, teaching materials, premises, and teaching facilities

for training must be implemented in substance and not merely in name. 4) The forms of training must be flexible and diverse, and they must emphasize practical results. Apart from rotational training with release from production, other effective forms and measures of training can be adopted. In short, we must foster an attitude of serving production.

The current situation regarding the quality of the staff and worker contingents in our province is that large numbers of them lack the necessary scientific and cultural knowledge and their technical level is not high. There is a serious shortage of intermediate- and high-level technicians. According to statistics on over 610,000 workers of different grades and ranks in our province, 70 percent are workers of grade 3 or under and only 1.02 percent are technical staff and workers at grades 7 and 8. The provincial average technical rank is not even grade 3. As regards educational level, according to statistics on over 417,000 staff and workers of 9 provincial bureaus and offices including industry and communications, finance, trade and construction, those with a college education total merely 4 percent, those with an upper middle school education 19.1 percent, those with a lower middle school education 38.2 percent, and those with a primary school education 32 percent, while 6.7 percent are illiterate or semiliterate. In short, the educational and technical levels of staff and workers, in our province are low and the shortage of professional and technical personnel is more prominent. In particular young staff and workers age 35 and below, who make up about 60 percent of the total number of staff workers in the province, will become an important backbone of our production and construction in the next decade. This objectively requires that in the next several years we make an effort to give them supplementary cultural and technical classes. At the same time, we must conduct various types of scientific and technical training among staff and workers based on the needs of large-scale technological transformation in the future. China's economic development in the next decade will primarily take the path of intensive technological transformation. In economic construction we will rely chiefly on the present staff and workers, meeting the demands of new technologies and processes through various types of technical training. Quite a few units have already realized the importance of training staff workers; they have already done a good deal of work and have achieved initial results.

9586
CSO: 4008/118

ROLE OF SCIENTISTS AND TECHNICIANS IN ENTERPRISES DISCUSSED

Shijiazhuang HEBEI RIBAO in Chinese 9 May 83 p 2

[Article by Jia Ran [0328 3544], first secretary of Shijiazhuang Municipal Committee: "Some Problems in Developing the Role of Scientific and Technical Personnel in Enterprises"]

[Text] Since the 3d Plenary Session of the 11th Party Central Committee, the policy toward intellectuals has been gradually implemented in our municipality, mishandled cases have been redressed and corrected, the problem of employment that is not in accord with training has basically been resolved, most comrades have had their technical job titles changed or upgraded, their living conditions have been improved somewhat, a group of fine, middle-aged and young scientists and technicians have taken leading posts, and an attitude of respect for knowledge and intellectuals has begun to develop in society. How can we deepen our work regarding the intellectuals? Recently we invited some engineers and technicians of medium-sized and small enterprises to give their views at a forum on developing the role of engineers and technicians, as well as conducting some individual interviews and listening to the opinions of concerned municipal departments. We feel that there are several key problems which we should try to solve.

Stress Providing the Necessary Work Conditions for Creativity

"Repaying the state by one's achievements" is the wish of almost all scientists and technicians. To realize this aim, it is very necessary to improve their work conditions and living conditions. But of the two, improvement of work conditions should be given priority.

In the past few years the party and the government have done a great deal of work in implementing the policy toward intellectuals and improving their living conditions. But by comparison, not enough attention has been given to studying and improving their work conditions. Improvement of work conditions here means, first, creating for them a congenial work environment, further eliminating the pernicious influence of the "left," correcting some cadres' prejudice against intellectuals, and developing a new atmosphere of respect for knowledge and intellectuals. In addition, we must provide proper material conditions for creation in scientific research and technical work, such as library resources, scientific and technical information, work assistants, and suitable

conditions and places for experiments. Particularly in medium-sized and small enterprises which have a poor foundation and where work conditions for scientists and technicians are more arduous, the leading cadres should place this task on the agenda, study it earnestly and systematically, and conscientiously apply effective measures.

Living conditions and work conditions supplement each other. Improvement of work conditions will promote improvement of living conditions. It has been shown in many enterprises that after the work conditions of their scientists and technicians have improved they have been able to produce even more scientific and technical achievements. The birth of a new product, the application of a new achievement or the introduction of a new process will create new wealth and fill enterprises with new vitality, and the living conditions of scientists and technicians as well as workers and cadres will consequently improve. This is a "benevolent cycle." Therefore, even before the financial status of the state is basically improved, it is worthwhile spending a little more of the limited funds to improve the work conditions of scientists and technicians.

Do Not Assign Intellectuals to Administrative Posts as a Matter of Course

The central authorities have proposed early promotion of fine middle-aged and young intellectuals to leading posts and making the leadership groups revolutionary, young, knowledgeable and specialized, which is a very wise policy decision. This is an important condition for developing the role of intellectuals. A large number of scientists and technicians have taken up leading posts and have played an enormous role in changing the condition of enterprises. This work must be continued. But there seems to be a view at the grassroots level that assigning administrative posts to engineers and technicians constitutes stressing the role of intellectuals. This is an incomplete understanding of the policy. There is a factory with 15 technicians, of whom 9 core technicians with specialized technical skills were given administrative posts. Consequently they spend considerable time on administrative work, the strength of the engineers and technicians has been divided, development work has slowed down and some comrades have become worried.

Under the present situation, in which the social work shouldered by enterprises is still very toilsome, this problem has become particularly acute in medium-sized and small enterprises. If the very few core professionals in an enterprise take up administrative posts, it is bound to affect scientific research work, and some comrades will have no choice but work overtime on it, resulting in a lack of continuity and an inability to deal with matters comprehensively. Certainly there must be knowledgeable people in charge of enterprises; but it is important that we assign jobs to scientists and technicians according to their capabilities, enable them to apply their capabilities and make suitable arrangements for them so that they can give play to their special skills. The practice of giving administrative and party posts to core specialists and technicians is unnecessary. Even if some technicians must hold administrative posts, we should avoid or reduce routine work for them as much as possible.

Help Solve the Problems of Obsolescence of Knowledge and Poor Information Flow

In my contact with scientists and technicians I have come to understand that some of the core technicians who graduated from universities and colleges in the fifties and sixties have a common problem. Due to prolonged interference by the "left," they dared not study books assiduously and learn professional work, but spent all of their time doing the same routine with obsolete equipment, outdated products and old technology. Many things which they learned in the past cannot be used now and some of them will soon become outdated, and as information is not timely and does not flow, their ability falls short of their wishes in repaying the state with achievements. They say that when they are faced with problems in ideology and in life they can seek the help of leaders to resolve them, but when they have problems in technology they cannot find such support. Medium-sized and small enterprises are particularly poor in engineering and technical resources. When they encounter problems they cannot find explanations in books, no friends can give them answers, and there are no channels to the "enlightened"; they have no choice but to beg knowledge here and there, which is arduous and yields very little results. Besides, we still do not have a decent library for science and technology here, and there are few scientific and technical books at the Xinhua Bookstore.

This poses a very important problem which we must be determined to resolve: we must adopt all effective measures and stress rectifying the outdating of knowledge and poor information flow among scientists and technicians. We believe that we should begin with the work of improving and strengthening scientific associations and institutes, build a close and effective scientific and technological system from the science office to the factory and from the factory to the city, create a municipal information center for science and technology and a consulting service center, and gradually form them into a network. We must have overall planning and make arrangements for the training of scientists and technicians, and prepare to establish advanced municipal training colleges for scientific and technical cadres and bookstores that carry scientific and technical materials in foreign languages. In the course of streamlining the administrative structure we must stress "taking from the well-off to help those who have too little," and apply streamlined organizations to scientific and technical work. At the same time we must increase investment in science and technology.

Advocate the Joining Together of Leading Cadres, Workers, and Technicians

Implementing the "three-in-one combination" of leading cadres, workers and technicians is one of our fine traditions. After a large group of scientists and technicians take up leading posts, real implementation of this "three-in-one combination" is truly guaranteed. We should give new substance to the "three-in-one combination" in the new period.

Many middle-aged scientists and technicians indicate that they have learned much that is useful in their past association with leading cadres and workers for prolonged periods, and that they have personally realized that if they do not join together with them and learn from practice, knowledge from books alone is inadequate. When some scientists and technicians are commended they

repeatedly request that leading cadres who worked on new products and development be commended at the same time. They say: "Without the support and coordination of leaders and workers it would be hard for us to achieve anything." When they discuss the improvement of living conditions they conscientiously consider the difficulties faced by the state and their relationship with leading cadres and workers, fully showing that they have a very high level of consciousness. We should stress effective ideological work with leading cadres and workers so that they will understand the important role of knowledge and intellectuals in the four modernizations, actively support and coordinate with intellectuals in order to further increase their contributions and take the initiative in developing closer ties with technical personnel, getting to understand them, and learning knowledge and skills from them. Learning, closeness and service constitute the new substance and meaning of the combination of leading cadres and intellectuals.

But we should also recognize that the ideological work with the engineers and technicians of enterprises cannot be weakened. Of course, regarding intellectuals in the past as the "stinking youngest child" and the "object of transformation" was highly erroneous. The pernicious influence in this area must continue to be eliminated. But it will not be in accord with reality if we think that we do not need to do ideological work. Under the new situation, just like the workers, peasants and cadres, intellectuals still have the task of ideological transformation. Quite a few scientists and technicians realize this problem. They say: we are trained by the blood and sweat of the party and the people; the more attention is given to us the more we feel our own shortcomings and inadequacies, and the more we should be good at handling ourselves. The responsibility of our leaders is to instill in them a faith in communism, cultivate their "three ardent loves," help them to learn from practice even more consciously and join together with the workers, and strengthen unity and cooperation among engineers and technicians. While they are being led to transform the objective world, they must pay attention to transforming their subjective world, continue to enhance their ideological and theoretical level and their professional and technical level, and make their due contribution to the four modernizations.

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CSO: 4008/118

LABOR MINISTER OUTLINES FORMULA FOR MAXIMUM USE OF S&T TALENT

HK110250 Beijing GUANGMING RIBAO in Chinese 27 Apr 83 p 1

[Article by Zhao Shouyi [6392 1343 0001]: "Promote the Rational Movement of Scientific and Technical Personnel by Focusing on the Tasks of the State"]

[Text] Editor's note: Recently, the minister of labor and personnel, Comrade Zhao Shouyi, talked with out reporter. We have secured his approval to edit the talk for publication. [End editor's note]

China does not have a sufficient number of scientific and technical personnel. Their distribution and employment are not entirely rational. On the one hand, there is a serious shortage of able persons in the rural areas and outlying districts, as well as in medium-sized and small cities, towns and enterprises. On the other hand, there is an overconcentration of able persons in big cities and enterprises, universities and scientific research units, which has resulted in fairly serious accumulation and waste and failure to apply their strong points, with some work having nobody to do it and some persons having nothing to do. The crux of the matter lies in the shortcomings of the management system and methods. It is necessary to conduct reform, promote the rational movement of scientific and technical personnel step by step in a planned manner and improve the management and utilization of scientific and technical personnel.

Promote Movement With Tasks

The movement of scientific and technical personnel is not our aim and we should not promote the movement for its own sake. The purpose of the movement is to bring into full play the role of scientific and technical personnel and to arouse their enthusiasm, initiative and creativity so that they can play a bigger role in the four modernizations. We do not approve of a "blind movement."

The rational movement of able persons, first and foremost, should be centered on the tasks of the state in order to ensure the fulfillment of key state economic construction tasks and key scientific and technological projects through the movement of the scientific and technical contingent; at the same time, it is also aimed at carrying out the party's policy toward intellectuals in a more satisfactory manner so that each scientific or technical personnel can play his role, give scope to his ability, and gradually become a rational mass structure. In carrying out key state projects, we should select superior persons and rationally utilize them to ensure the fulfillment of the tasks on schedule, guaranteeing

both quantity and quality. No units or leaders should obstruct the transfer of scientific and technical personnel taking part in key state projects. It is entirely wrong to practice departmentalism and to resist the rational movement of able persons. Without adhering to this point and stressing its importance, organizing forces to tackle key problems will become empty talk. If we can promote the movement in conjunction with tasks, there will be no need to worry about muddling things up and "squeezing out" the state plan.

We should encourage scientific research units, colleges and universities to collectively undertake the tasks of the state, practice various forms of the responsibility system on the basis of the task and promote the movement of able persons in conjunction with tasks. Some units which have relatively strong scientific and technical forces can undertake several tasks concurrently. A major task can also be undertaken jointly by several units, with one unit assuming primary responsibility. If we do not have enough technical forces and management personnel, we can advertize for them in society. By adopting this method, military industry units can also engage in some civil projects, just as civil units engage in military industry tasks. It is also necessary to proceed from the specific conditions of the different types of scientific research and design units in trying out various forms of the responsibility system based on the task and personnel positions, which conform to the specific features of scientific and technical work. Under the guidance of state planning, we should integrate, scientific research and design units with the responsibilities, rights and interests of individual scientific and technical personnel, and gradually form a management system of the scientific and technical contingent which conforms to our national conditions. In this sense, the rational movement of scientific and technical personnel constitutes a major reform on the scientific and technical front, which should be carried out resolutely and in an orderly way.

Promote Movement with Policy

In promoting the rational movement of scientific and technical personnel, it is necessary to adopt correct, practical and effective policies and change some management systems of cadres and distribution methods of rights and interests which are inappropriate.

When studying and working out a policy on rational movement, it is necessary to take the following principles into consideration:

1. It is necessary to improve the systems of checking on scientific and technical personnel and of conferring titles of technical or professional posts and the systems of salary and reward. It is necessary to work out some appropriate measures for giving preferential treatment in order to encourage them to go to where conditions are hard to undertake key construction tasks of the state. We should attach importance to actual work standards and contributions and not onesidedly seek quantity. With respect to scientific and technical personnel who have made major contributions, we do not necessarily have to follow the rules in promoting them and increasing their salaries.

2. Under the present conditions, planned deployment is still a principal means of achieving the movement of able persons. In the meantime, those departments and units which are trying out the responsibility system on the task basis should correspondingly trial implement the methods of inviting bids for the task and of advertising for contract posts and engage the most suitable persons in order to ensure fulfillment of the most urgent task. With respect to personnel engaged to carry out key construction tasks or to tackle key projects of the states, the original units should support their transfer. When a contradiction arises, the higher authorities should promptly decide by arbitration.

3. It is necessary to adhere to the rational movement of scientific and technical personnel. In accordance with the needs of the state, we should promote the rational movement of scientific and technical personnel from cities to the rural areas, from big cities to medium-sized and small cities, from the hinterland to outlying regions and from departments, areas, trades and units with relatively strong scientific and technical forces to those which have weak scientific and technical forces but which should be urgently strengthened. It is necessary to conscientiously organize scientific and technical personnel to support the rural-areas and outlying regions. With respect to scientific and technical personnel who work in the rural areas, some appropriate stipulations should be made regarding their residences and housing, the schooling and employment of their children and their salaries in order to eliminate, as much as possible their concerns at home. With respect to scientific and technical personnel who work in the outlying areas, it is necessary gradually to carry out a special policy of regular rotation. Scientific and technical personnel from units under the ownership of the whole people working in units under the collective ownership must retain their status as state functionaries.

4. We should encourage intellectual flow. On the condition that they fulfil the tasks stipulated in the state plan, scientific and technical units should be allowed to accept scientific research tasks from other units, provide technical services and receive suitable remuneration. The remuneration received should be divided among the state, unit and participants. The proportions should be determined by various localities and departments in the course of their experiments.

The primary duty of scientific and technical personnel is to wholeheartedly do their own jobs well. Given this condition, scientific and technical personnel should be allowed to do part-time jobs, such as teaching, in addition to their main occupations, serving as advisers, and providing technical, educational and management services in other units in their spare time. The individual persons should obtain the approval of the organization when engaging in the above-mentioned activities. The remuneration received should in principal belong to the individuals. However, they should have the approval of the leaders of the unit when using the equipment of the unit and pay some charges.

The fact that scientific and technical personnel do part-time work or engage in scientific and technical activities in their spare time shows that the tasks of many units are insufficient, that the potential of scientific and technical personnel is great and that the policy toward the intellectuals is far from being carried out in some units. It is, therefore, advisable to guide but not stop this practice. It is not strange that there should be some disputes over whether

or not remuneration should be demanded. Provided that we do a good job in organizing the movement of able persons around the tasks of the state so that the major force of the scientific and technical contingent can be effectively applied to the most urgently need and construction tasks, it is not difficult to solve other problems. Naturally, we should adhere to education in communist ideals, ethics and discipline, vigorously step up the building of spiritual civilization, guide the broad section of scientific and technical personnel in serving the needs of the state and advocate the spirit of dedication to scientific undertakings. At the same time, we should also arouse all positive factors with correct policies, including the principle of socialist distribution based on more pay for more work, and put a stop to the serious waste of intellect caused by the practice of "everybody eating from the same big pot." This is a question strongly related to policy in the current rational movement of able persons. It is necessary to handle it carefully and correctly and avoid onesidedness.

Promote Movement with System Reform

An important aim of the rational movement of scientific and technical personnel is to promote the rationalization of the internal structure of the scientific and technical contingent. In scientific research units, institutions of higher education, factories and other enterprises where scientific and technical personnel are relatively concentrated, it is absolutely necessary to speedily implement various forms of the responsibility system based on personnel positions, and on the basis of institutional reform, determine the authorized size of the staff. It is necessary to readjust the proportions between scientific and technical personnel on the one hand and political workers, support services personnel and auxiliary staff members in professional work on the other, and the proportions among the three categories of scientific and technical personnel--the high, medium and lower grades. Only when the structure of various categories of personnel is relatively rational is it possible to suit the needs of various tasks. In numerous units, there are many people who cannot be utilized and who are not suited to their jobs, while there is an insufficient number of urgently needed personnel. If the comrades who cannot be utilized are transferred to other suitable units or posts, they will have bright prospects. There are many instances in which "a blade of grass" or "a worm" in a big city or unit may become "a treasure" or "a dragon" in a medium-sized or small city or enterprises. With respect to some people who do not have genuine skills and who refuse to study hard, it is necessary to educate and train them in order to raise their standards. A very arduous task which should be done well by the leaders and the personnel departments at various levels is to encourage surplus personnel to effect rational movement and assign them to posts where they are needed and suited to the jobs.

Scientific research institutions, design departments, and scientific and technical management departments, as well as the institutes of higher education, such as science, engineering, agriculture and medicine, should proceed from reality in determining the quotas for various personnel in their own units and the appropriate proportions of scientific and technical personnel at various levels. Those units exceeding the quotas should transfer the excess to other units. This is a precondition for implementing the salary system relating to position. The implementation of this system will help improve the structure of the scientific and technical contingent and promote and movement of able persons.

It is necessary to conduct experiments in scientific research and design units at the central and provincial levels and in key institutions of higher education in instituting the employment system on the contract basis for scientific and technical personnel and other staff members. The employing units have the right to engage or dismiss a person and scientific and technical personnel have the right to apply for a post or to resign. With respect to those who have been dismissed but who have no jobs for the time being, the various units should help them to find work in other units, organize them in various service work or take a refresher course. With respect to those who fail to find suitable jobs in the alloted time and who are unwilling to submit to the assignments of the organization, they can be put under the unified management of the personnel department of their respective units. Later, we can try various methods, such as setting up personnel service companies and social service department, to solve the placement of these people.

In encouraging and promoting the rational movement of able persons and opposing the waste of able persons caused by overstaffing, it is also necessary to enact laws. We should improve the relevant legal system and apply the legal system in the struggle against the phenomena of suppressing and persecuting able persons. Under no circumstances should a person who wilfully persecutes able persons remain in a leading post. With respect to those elements who seriously violate the law and discipline, it is necessary to enforce the law upon them. We need a talent protection law which conforms to our national conditions. In some units, new unjust, false and wrong cases relating to intellectuals have occurred again before the old cases have been sorted out. There are numerous cases in which scientific and technical personnel have been "investigated" and even "put into custody" just because they have received some remuneration in their spare-time scientific and technical activities. Although the causes are fairly complicated, an important factor is that some leaders ignore and even boycott the party's policy toward intellectuals. We should pay attention to these problems and solve them one by one. On such a question of principle as attaching importance to and carrying out the policy toward intellectuals, we must have the spirit of perseverence.

In brief, it is necessary to pay attention to policies, systems and enactment of law by focusing on the key construction tasks of the state. Only by doing a good job of these things is it possible to genuinely effect the rational movement of able persons and to further ensure the four modernizations program.

CSO: 4008/102

NOTED MATHEMATICIAN PRESENTS FORMULA FOR USE OF INTELLECTUAL RESOURCES

HK060416 Guangzhou GUANGZHOU RIBAO in Chinese 28 Apr 83 p 1

[Interview with Hua Luogeng, mathematician, by reporter Ye Lifei [5509 7787 5481]: "An Interview With Noted Mathematician Hua Luogeng on Exploitation of Intellectual Resources"; in Guangzhou "a few days ago"]

[Text] Taking the opportunity upon the arrival in Guangzhou of the noted mathematician, Professor Hua Luogeng, who was to give instructions on applied mathematics, this reporter interviewed him at the Zhudao guest house a few days ago. Comrade Huo Luogeng was having a discussion with a comrade from the provincial economic commission on problems concerning the application of "overall planning method" and "optimum seeking method." For the past few days Comrade Hua Luogeng has received group after group of scholars and personages of economic circles, despite weariness from his journey. Comrade Huo Luogeng looked somewhat fatigued. However, as we conversed, the senior professor, at an advanced age of 73, was glowing with radiating vitality, and spoke with fervor and assurance. During the interview, he laid special emphasis on the following question: to make science better serve the economy, whether it is mathematics or other realms of science, it is necessary to take into consideration how science should become a weapon in the hands of those who are engaged in production work. Comrade Hua Luogeng said: "It is necessary to pay close attention to the exploitation of intellectual resources in carrying out construction. So far as the question is concerned, this process is not only to be carried out among intellectuals but should also be carried out among the whole nation. This is a question which merits our special attention. We intellectuals should help the party in the exploitation of intellectual resources among the masses, send scientific knowledge to the masses and make the producers master scientific methods by themselves. By doing so, science will really be changed into a productive force."

Comrade Hua Luogeng has been doing this himself. As early as 20-odd years ago, he began to devote himself to the cause of the exploitation of intellectual resources. As is universally known, the venerable Hua made outstanding achievements in theoretical mathematics long ago. Since the 1960's, he has been focusing on applied mathematics and has created the "overall planning method," "optimum seeking method," and other economic mathematic methods widely applied in various fields of the economy. For the past 20 years or so, he has been to over 20 provinces, cities and autonomous regions, going deep into over 2,000

factories, mines and enterprises, and personally taught the workers mathematical methods, which have been changed into weapons in their hands. Comrade Hua Luogeng said: "Till now, I have never regretted taking this path, and I feel it getting wider as we go along." With a sense of humor he said: "Those who have mastered knowledge but do not use it in practice are tantamount to a library." In his opinion, "the national construction is in urgent need of mathematical methods. There is vitality once mathematics is applied to productive construction." This reminds me of a poem he has written in the opening of his book "Mathematical Methods and National Economy," which goes as follows:

> Keep on exhausting your mental and physical efforts,
> and pay no attention to the level of your ability;
> Under the premise of the people's interests,
> I will be ashamed to haggle over personal gains or losses.

This has been Comrade Hua Luogeng's breadth of vision.

Comrade Hua Luogeng has shown great concern for Guangzhou's work in the field of applied mathematics. On several occasions, in 1972, 1974 and 1980, he came to Guangdong to give instructions to technicians on the application of the "overall planning method" and "optimum seeking method" to industrial production, which yielded very good economic results. This time he has made Guangzhou the first stop of his tour, in spite of the fact that he has recently been released from the hospital. He went to the Dongfang hotel to inspect how the hotel was applying the two methods in conducting its reconstruction project. He was happy when he saw the Dongfang hotel; the municipal construction engineering bureau and the machinery installment system were effective in organizing their production with the two methods. He praised the scientific research personnel of Guangzhou's mathematics circles for going deep into the forefront of production to popularize the "overall planning method" and the achievements they had won. Recently, he has led his assistants to investigate the electricity consuming system in the Dongfang hotel, guiding them in applying the "overall planning method" to their energy-saving project. The staff members of the Dongfang hotel said with excitement: "The venerable Hua is such a famous scientist, so advanced in age and weak in health; however, he has been so meticulous in guiding our work. We must study hard and apply the scientific method to production."

[HK060418] Comrade Hua Luogeng happily said: "The fact that in spreading the two methods, the Dongfang hotel and the construction and installation departments concerned have won notable achievements in economic results is in itself a very good experience. If their experience is popularized, if all trades and professions follow their example, are we not more sure of quadrupling the total output of our social production? If construction departments gain economic results in the application of the "overall planning method," material construction departments will also be successful in raising quality and lowering costs in their production when the "optimum seeking method" is applied. Comrade Hua Luogeng very much appreciated our way in adopting the two methods in Guangzhou by taking root among the masses, going from top to bottom, and popularizing step-by-step with good leadership. It is his view that Guangzhou

is full of bright prospects for carrying out work in applied mathematics, and a new situation will be created if "information service centers of applied mathematics" are established all over the city, attention is paid to doing a good job in the exploitation of intellectual resources on a mass basis, experiments are done on projects closely related with local economic development and the work is popularized step-by-step when fruitful results are achieved.

As our interview was drawing to a close, Comrade Hua Luogeng said: "Please express my thanks to the people of Guangzhou through your newspaper. I must thank them for the good experience they have created which has supported our work." Beyond doubt, Comrade Hua Luogeng and his assistants have worked diligently to help Guangzhou solve some economic problems. The people of Guangzhou are even more thankful to them!

CSO: 4008/104

IMPROVEMENTS IN PLANNING FOR PERSONNEL TRAINING PROPOSED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 4, 1983 pp 30-32

[Article by Zeng Decong [2582 1795 5115], Xiamen University: "Restructuring Personnel Plans and Personnel Forecasting"]

[Text] 1. Education and science constitute one of the three great strategic focuses of China's economic development and a central concern of the four modernizations. We must have personnel and we must have knowledge. One of the great errors of the Cultural Revolution was that it delayed the training of qualified personnel. Since the 3d Plenary Session of the 11th Central Committee, manpower training matters have become a major strategic concern to which the party and state have accorded full attention, and many reforms have been instituted. But the training of qualified personnel still does not meet the needs of the four modernizations. Recently, we studied the distribution of this year's college graduates in a certain province. Statistics showed that of this province's college graduates in 73 specialties, there were not enough to meet requirements in 38 specialties or 52 percent of the total number, and the graduates in these specialties could meet only slightly more than 20 percent of this year's requirement for people in the fields in question. The number of graduates exceeded requirements in 22 specialties or 30 percent of the total number; they totaled 313 percent of current needs. In only 13 specialties, or slightly over 17 percent of the total number, was the number of graduates in balance with requirements. This circumstance makes it clear that the development of higher education is still not adapting to the needs of economic, scientific-technical and social development, that there is a serious shortage of qualified personnel, and that the personnel being graduated in a considerable number of specialties are not urgently needed by the four modernizations. In other words, higher education is out of balance with other state activities, its internal proportionalities (i.e. the proportionalities between branches and among fields) are also out of balance, and there is a considerable degree of blind action. It is true that a multitude of factors have led to this situation, but one of the most important of them is a lack of adequate planning. Therefore, for effective training of qualified personnel, we must make planning more scientific, improve training plans and programs, do effective personnel forecasting, develop effective personnel development programs, make both of these activities more scientific, and place them on a true scientific basis.

In economic construction we must be more foresighted and develop long-term plans, overall conceptions and large-scale policy decisions, "because many problems, particularly the most important ones, not only cannot be decided within the scope of the annual plan, but are even outside the scope of the 5-year plan."

Therefore, while the state accords great importance to drafting a 10-year program for developing the national economy, in the case of science and technology and particularly the training of qualified personnel, because "it takes 100 years to develop a man," it must take a still longer view. It is obvious that constructing a plant is arduous and complex and requires a great deal of work; but constructing a base for training personnel is even more arduous and complex and requires an even longer time. For example, there is an extreme shortage of financial and economic personnel, as has long been known at all levels from the center to the localities, and every effort has been made to find ways of solving the problem. But the shortage is still severe. In the case of Fujian, during the Sixth 5-Year Plan period an additional 1,000 persons with a higher education in finance and economics are needed every year; but the province has only one economics academy, at Xiamen University, and although it has made extensive efforts, it can only turn out some 300-odd graduates a year, of which only slightly more than half can be assigned to Fujian. In 1982 the number of personnel assigned to Fujian (including those from Xiamen University) was only 240, less than a fifth of the number needed. It is apparent that we must take account not only of the long period required to train qualified personnel, but also of the fact that it takes a long period to establish an academic specialty or a department, thus we must not start to think of the training base only when the need for trained personnel becomes acute. To summarize, we must take a longer view and set up longer-term programs in personnel training, and we should accord full importance to personnel needs forecasting and to work on training programs, making a genuine effort in this area.

2. In making personnel training programs more scientific, we must act in terms of China's specific situation, adapt to the needs of the four modernizations, proceed in accordance with the objective laws of personnel development, use scientific forecasting techniques, carry out systematic, thorough surveys, and conscientiously do effective work. We must make our progress accord better with objective laws and reflect objective reality more correctly. Only in this way will the personnel development plan have better guidance and become more practical. In concrete practice, we must focus on the following principles.

a. Adaptability. Personnel training must adapt to the needs of China's economic, scientific-technical and social development and to the needs of the four modernizations; this is a problem of the orientation of personnel development programs. In order to have an effective program, we must study foreign experience to find out what types of personnel were trained, how, at what economic level, and under what specific conditions, for our own reference. But our own undertaking must be socialist, Chinese-style modernization, for we have our own national circumstances and our own special characteristics. Therefore,

a personnel development program must be based on our own national situation and our four modernizations, and must proceed in terms of the needs of China's socialist four modernizations.

Qualified personnel adapt to the needs of the four modernizations in many forms and many areas. For example, they adapt to these needs in terms of both numbers and quality, in terms not only of a rational overall lineup of fields, specialties and levels, but also of overall development of the individual's morality, knowledge and physical fitness and the breadth, depth and capabilities of his knowledge. This includes a necessary reserve of qualified personnel. At the same time, because of the long period required for training personnel, the factors influencing personnel needs are multifaceted and complex: for example, the extremely rapid development of science and technology, the specific path of economic development, the continual change in the objective situation and the like. What will the specific circumstances be in 10 or 20 years? What kind of changes will they bring about in personnel requirements? Although we can engage in scientific forecasting, we cannot bring our present-day knowledge and forecasting work entirely into agreement with future objective reality. Therefore, in order to make our trained personnel and the personnel who will be trained in the future adapt to the changing situation and to possible unforeseen circumstances, when drafting a personnel development program we must take account of these circumstances, consider policies to deal with them, take account of the problems which they may encounter in changing specialties after graduation, and develop in them the ability to adapt to a changed situation. We must take steps to give them greater adaptability: for example, by giving them a good foundation, by strengthening their practical experience, by laying stress on training their reasoning ability, creativity, ability to use both hands and brain, and ability to master new kinds of knowledge and new techniques, by adjusting the structure of knowledge in a reasonable way, by dealing correctly with the scope of each specialty, and even by conducting various types of short-term job training.

b. Scientific Character. We must act in accordance with the laws of personnel development. Laws are relationships, i.e. relationships between objects and essence and between essences. We must deal correctly with the relationship between personnel training and the four modernizations, the relationship between personnel training and the development trends of science and of technology, the relationship between higher education and secondary and elementary education, the proportionalities and makeup of personnel development at these three levels, the proportionalities between areas and fields in higher education, the proportionality between graduate students, undergraduates and students in specialized training, the relationship between making use of old specialties, restructuring those which are not adapted to objective development, and creating new specialties needed by the four modernizations, the relationship between the various types of higher education, the relationship between quality and quantity, the relationship between popularization and heightened standards, the relationship between the present day and the long term, the relationship between needs and capabilities, and so on. To summarize, we must correctly understand and deal with the various external and internal relationships of personnel training, master and utilize the laws of personnel development, and

proceed in terms of the actual situation. We must master its law and persist in a scientific approach. This is the key to effective personnel development programs.

c. Foresight. As described above, foresight is important in any work, and it is particularly important in personnel training. To have scientific foresight we must have scientific forecasting. Without scientific forecasting there can be no scientific policymaking. Scientific forecasting is the basis of work on personnel development programs. Scientific forecasting of personnel needs should be based on the strategy of the four modernizations and the knowledge subordinate to it; even personnel needs forecasting in one field should take account of this point. Moreover, we must be aware not only of the scale of development of various sectors, but especially of where they are tending, what technical policies and technical facilities they are utilizing, and what type of management system they are implementing; personnel needs forecasting must be based on scientific forecasting of the changes in the factors which will influence personnel requirements, on a knowledge of the characteristics, tendencies and needs of economic, scientific-technical and social development, on a knowledge of the laws of personnel development, and on a knowledge of national circumstances, the nature of our development and our basic paths, if we are to carry on correct, effective forecasting and personnel development program activities. There is a wide variety of scientific forecasting methods; because personnel training and personnel development plans have their own complexities and difficulties, we must emphasize the use of the best methods and combinations of them in forecasting.

d. Systematic Character. The trained personnel contingent of any developed society has a complex structure, a complex hierarchy and complex relationships, and in all cases the community is the form in which they exist and function: for in the society, sector, area or larger unit, it is the body of qualified personnel in a given field which forms the personnel group, and the regular relationships between groups form the personnel community. A very large, multidimensional personnel community is a complex, multilayered system. It is made up of a number of next-level subsystems. These next-level subsystems also have complex internal structure and corresponding external relationships. In personnel development programs, we must accord full importance to the dynamic regulation of personnel systems and the thorough superiority of the socialist system, make personnel plans and personnel development programs embody the principle of overall coordination, utilize their strong points and avoid their weak points, make them interconnected and mutually supportive, and try to use the minimum investment to achieve the optimum personnel training results; we must select the program methods best adapted to the objective form in which the trained personnel as an entity exist or act, and must place full emphasis on the use of systems theory and systems methods in our programs.

3. In order to make personnel development programs more scientific we must improve our work with them.

a. We must centrally incorporate personnel development programs into the state four modernizations program. In discussing the improvement of planning work,

the Central Committee leadership stated that we must "coordinate economic, scientific-technical and social development more effectively."* Personnel training should also be better coordinated with these three activities and adapt to their development needs. An effective state personnel development program is a major concern for the entire party and the entire country and should be drafted under the specific leadership of the Ministry of Education under the centralized guidance of the Central Committee State Council. It is essential that the development plans of the various departments, sectors and localities should include personnel development programs. The practice of "considering things but not people" which exists in some localities and some sectors must be corrected. We must make great efforts to carry on effective personnel development programs at all areas and at all levels and use them as an important basis for drafting a national personnel development program.

b. We must organize the participation of scientific and technical personnel in the program. We need to train a vast scientific and technical, management, and Marxist theoretical contingent, group by group and generation by generation, which has well-rounded moral, intellectual and physical development, which is both red and expert, and which can act independently to solve major problems in China's four modernizations. Therefore, the personnel development program must organize the participation of the following six categories of scientific and technical personnel: (1) personnel in all fields and specialties; (2) specialists and management personnel in all areas in which they will be employed; (3) educators and school management specialists; (4) scientific and technical personnel in educational economics; (5) futurologists, particularly scientific and technical personnel involved in personnel requirements forecasting; (6) scientific and technical personnel in mathematics and computers. We must make full use of them as advisors and see to it that their participation in working out the program gives them an understanding of the actual situation in the four modernizations so that they will become able to think more effectively about the developmental trends, key points and problems of their own fields and do their own work more effectively.

c. We must use advanced scientific methods. Personnel development planning must adhere strictly to Marxist epistemology and methodology; it must be based on surveys and realistic assessments, and it must study and use scientific methods and advanced techniques such as systems theory and systems methods, suitable advanced scientific forecasting methods, economic analysis, computer technology and the like.

To summarize, personnel development planning must be done conscientiously and must at all costs be done well.

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* Zhao Ziyang, op. cit.

8480
CSO: 4008/107

DEVELOPMENT, DISTRIBUTION, MOBILITY OF S&T TALENT NOTED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese, No 3, 10 Mar 83 pp 22-23

[Article by Li Daxiong [2621 1129 7160] and Zhao Beiwang [6392 0554 2598]: "Professor Mao Yisheng Discusses The Fostering, Distribution and Mobility of S & T Talent"]

[Text] In March 1982, the United States National Academy of Engineering elected a well-known Chinese scientist, bridge expert and Vice Chairman of the China Scientific and Technical Association Comrade Mao Yisheng [5403 0110 2573], as a foreign member. This is the first honorary membership to be bestowed on a Chinese scientist by the US National Academy of Engineering.

Mao entered the graduate school of Cornell University in 1916 and later earned his Ph.D. degree from Carnegie Institute of Technology in Pittsburgh in 1921. After returning to China, he assumed the responsibility of building the largest bridge in China at the time, the Qiantangjiang bridge in Hangzhou. This bridge, located south of the Xihu scenic area, has played an important role in promoting China's economy and connecting the north and the south for several decades. Mao has also made outstanding contributions in education and has trained a large number of superior engineering and technical talents for the Chinese people.

In early November 1982, we interviewed Prof. Mao before he went to the United States to attend the US National Academy of Engineering award ceremony. He first remarked, "I did not know that you were coming, and I saw your magazine SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY for the first time today. But I have had some thoughts about scientiology and the management of science and technology for some time now. There is indeed a necessity for somebody to engage in the study of science itself; there have already been many publications on this subject in the west. On can control and speed up the development of science and technology

only by studying overall patterns and trends in science. Scientiology is a field well worth the effort of study. I hope you people will continue your effort and will do a good job. An important issue today is the development, placement and mobility of trained scientific and technical personnel.

Special Attention and Support Should be Given to the Major Universities

Since the beginning of the New China, we have systematically trained a body of specialists, with good results. This has been our main source of scientific and technical talent. Colleges are the plants that produce trained personnel; since first-rate products are produced by first-rate plants, we must first make our colleges first rate. Special care and support should be given to the colleges with a long history and international reputation, because, after all, these famous universities have a good academic atmosphere, a group of established professors and a certain amount of facilities. They are the results of long historical practice and cannot be created overnight. These universities have produced a group of outstanding S & T talents. Some of them have gained international reputations, some have made distinguished contributions to the three decades of socialist construction, and others have made important inventions and innovations. It is therefore vitally important in developing today's talent to make use of the favorable conditions at these famous universities and let them continue to develop their unique features. Naturally we should not ignore new schools; the development of education has to go on. The number of schools, and especially the number of institutions of higher learning, is still far below what is required to improve the scientific and cultural standards of the whole nation.

In the distribution of colleges and universities, regional balance should of course be considered. In the past, some schools were moved from the east coast to the inland, and some positive effects came from the move. But the disadvantages of such measures should also be studied; for example, moving well-established, famous universities to remote mountainous areas creates many problems. The idea of having a university devoted to the training of communications personnel in a remote small county may have some merit, but placing a historic and internationally famous university in a secluded and hard-to-reach location will prevent many outstanding high school graduates from going there and the quality of the students will suffer. It was said that very few of the students went there as their first choice and that even though they showed up at the school, they did not feel at ease. The location was also quite inconvenient for the students and the instructors in terms of their practical work. Such relocation has therefore produced exactly the opposite effect to that intended and cannot produce the desired high quality. My opinion is that famous universities should generally remain where they are; a more efficient approach probably would be to split one school into two, which would not affect the training program but would result in a new school. Of course the development of the new school might be somewhat slower, but all things take time to develop, and nothing can be achieved without going through the development phase. After some years the new school would have developed its own unique features.

Communications and transportation were stressed at the 12th Party Congress. I think that we should not only work on improving the current situation but should also look at the future situation. According to the research of a mathematical economist, transportation and energy will be of pivotal importance to quadrupling the national economy by the year 2000.

Job Placement of College Graduates Should not be Oversimplified

Regarding job placement for graduates, Mao stressed that a rational and scientific placement of our laboriously-trained talent is crucial to the four modernizations. But, disturbingly, this problem has never been properly recognized by the personnel management departments. China is a large country with numerous departments and a large number of graduates are assigned each year. We should carefully study the unique circumstances of each profession and reconcile departmental needs with personal preferences and specialties so that each graduate may be assigned to a post that is a good place to start. The assignments should not be made in a perfunctory manner. Some of our cadres in charge of job assignment are totally irresponsible and make assignments at random. But the future career of the graduate being assigned depends on this one-time decision. Because our current cadre management system has no flexibility, it is extremely difficult to correct an improper assignment. How can we treat the scientific and technical personnel urgently needed in the four modernizations in such an irresponsible manner? Waste of talent is the greatest crime.

The Soviet Union has a system for assigning its college graduates. I recall that according to a description in one magazine, Soviet graduates may submit dozens of employment conditions, and the enterprise, plant or mine doing the hiring can also submit dozens of conditions. These conditions are quite detailed, including work aptitude, working conditions, living conditions and pay, and benefits. They then match these conditions on a computer, and the two parties get along once they are matched. Those who did not match in the first run will modify their conditions and the match will be tried again. What should be done in China naturally depends on the situation here, but it is still possible to be reasonable and satisfy both sides. Thus the job of the personnel department must be done very carefully, and those responsible should make the assignments by putting themselves in the position of the graduates. The current oversimplification assigning jobs without offering a choice (e.g. mechnical engineering majors arbitrarily assigned to any machinery plant) is very inappropriate.

Personnel Should be Allowed to Move

Naturally it is very difficult to distribute all the graduates according to specialty and intellectual orientation on the first try, and one cannot expect instant success. But this should never become an excuse for the cadre management department and irresponsibility should never be considered to be the normal state of affairs.

What remedy do we have if the first assignment is inappropriate? Even though the assignment is basically proper, later changes in the situation could still bring new incompatibilities. So we must allow mobility. To draw an analogy

with marketing, in the past when we abolished the country fair trade, it caused problems in the supply of goods, but now we have free markets which play an important role in market regulation and in making up for the inadequacies of the planned economy. To allow personnel mobility, we need something similar to agricultural and sideline product free market. Why can't we have a "free market" in personnel mobility? It is worth a try. Naturally it would take a different form, perhaps through advertisement and recruitment in newspapers and magazines. Only with mobility can we improve the productivity in science and technology.

Dr. Sun Yat-sen put it very well in his "National Construction Program": "All enterprises will prosper when talents are fully utilized." I saw a recent article in GUANGMING RIBAO on the personnel problem, and I distinctly remember one sentence in it: "Improper use of talent is the utmost waste." We ought to think carefully about this. Everybody is talking about management today, but what is the goal of management? There are probably several ways to say it, but I summarize it in one sentence: "Management is the reduction of waste"--including the waste of talent, the waste of material, and the waste of time. When these wastes are reduced or eliminated, the economic efficiency will be improved and we will have done a good job in management.

The mobility problem also involves sensible utilization and assignment of self-taught talents, and the housing problems. I think that once the overall system is sensibly modified, these problems will be resolved.

In short, to achieve the great goals of the 12th Party Congress, our talent problems must be resolved immediately; we must make a great effort in this connection.

9698
CSO: 4008/99

NEED FOR WELL-ROUNDED SCIENTISTS POINTED OUT

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 1, 10 Jan 83 pp 17-19

[Article by Wu Youwei [0124 1635 1218]: "China Needs Well-Rounded Scientists"--An Interview with Comrade Xiong Yi [3574 3015]"]

[Text] In the early years Xiong Yi studied at the University of Missouri and University of Wisconsin in the United States, earning his Ph.D. degree in soil science. Since he returned to China in 1951, he has served as team leader of a Chinese Academy of Sciences [CAS] soil survey team, director of the Institute of Soil and Water Conservation, director of the Nanjing branch of the CAS, and director of the Nanjing Institute of Soil Research. As a senior scientist with many achievements in soil research, Xiong Yi is also very experienced in leading and organizing scientific research.

Natural Scientists Should Pay Attention to Dialectic Integration

"Our scientific research today is too diffused and lacks unity; as a result, science and technology have failed to promote the development of the national economy to the fullest extent possible," is Professor Xiong Yi's candidly expressed view. "The high degree of specialization in scientific research is the result of a twentieth-century trend of branching out in science. The continual branching out of disciplines in natural sciences marks the rapid increase of man's ability to understand nature and it is no doubt a sign of progress in history. But natural scientists devoted to a certain area of research are liable to suffer from a limited view, narrow thinking and a declining ability to solve interdisplinary, fundamental and general problems. Haven't we learned enough lessons in this regard?"

In 1954 Xiong Yi led a team of several hundred specialists on a soil survey of the north China plain in order to select irrigation zones based on soil data and to develop agricultural irrigation in the Huang He valley. After studying changes in soil characteristics, he discovered that there was a direct correlation between ground water and the salinization of soil. The salt came with water and the water washed the salt away. Water played a crucial role in this. Once convinced, he decisively proposed that the primary solution to the flood, drought, and soil salinization problems in the north China plain was drainage.

Unfortunately, there was heated debate at the time as to whether the treatment of salinized soil should be done by water conservancy measures or by agricultural means and the drainage proposal did not receive wide attention. Worse yet, a large number of flatland reservoirs were built on the north China plain in 1958, pits and ponds were used to store water, and ridges were built in the fields to retain rainwater. The result was a further deterioration of the drainage situation. When large-scale development of irrigation using the water of the Huang He was added to this situation, the north China plain suffered widespread and severe secondary salinization and aggravated drought. Crop production plummeted and the people's life and property were in jeopardy. Later, the situation gradually improved after the Ministry of Water Conservancy decided to halt irrigation with river water from the Huang He and promoted well irrigation, drainage, and treatment of soil salinization.

Looking back upon this period, Professor Xiong Yi said: "Anyone who ignores the universality, multiplicity and complexity of nature will be punished by nature. Entities and phenomena do not exist in nature independently, but are interconnected. Take the various hazards in the north China plains for example--flood, drought, salinity, wind, and sand: they are all different and yet interrelated and mutually constrained. Hence scientists may start with the characteristics of each phenomenon and study the various facets of nature, but they must also look at the general relationship among them and weigh the pros and cons of treating each hazard. From the overall viewpoint of agricultural scientific-technical management, the modernization of agriculture must treat agriculture as a whole, analyze all the factors and take a series of general measures. For a long time China's agricultural policymaking has not paid sufficient attention to systematic research and scientific research did not play its proper role in agricultural production. The various branches of agricultural science were absorbed in their own concerns and there was a lack of balanced coordination among the research units. Our management departments were used to dealing with single issues and not good at generalized management. This has affected the overall development of agricultural production."

"These years people have called you 'the ever-changing scientist'," I interjected. Xiong smiled, "I am not ever-changing. I have moved into new research areas as my understanding deepened. Natural sciences are going through the dialectical process of combination, division, and recombination, and natural scientists cannot avoid this dialectical synthesis."

Science Research Has No Vitality Unless It Considers Social and Economic Problems

Raindrops hit the green leaves outside the window and Xiong's voice sounded very clear in the quiet room. He continued: "In the contemporary course of events, with science becoming increasingly socialized and society becoming more and more scientifically oriented, a large number of interdisciplinary research topics have emerged. These problems cannot be solved by relying merely on natural sciences. A good example is the study of regional planning and development."

Xiong then changed the topic to vast Lake Taihu. He said: "In a broad sense there are many problems with the Taihu area. The major problems include overpopulation and conflicts over the use of land by the various branches, shortages of energy resources and power, mismanagement, lack of unified planning, and an irrational administrative system and the economic policy. Consequently, production, consumption and exchange have been sluggish. Today the ecological system has become incompatible with the state's needs in the Taihu area. The ecologists' task is not only to find the problems but, more importantly, to propose concrete and practical solutions for the construction of the national economy. To solve regional planning problems in which natural science and social science are intertwined, cooperation between the two will be needed. Without studying social and economic problems, a natural scientist cannot propose the best result of frequent human interference and is closely related to the economic activities of the society. The construction at Taihu should therefore follow not only the laws of nature but also the laws of economics; in other words, it should take account not only of the long-term interests of the state but also of current economic policies in China. Agricultural and industrial development as well as ecological and environmental improvements should be taken into account. In the past, many articles have stressed the need for human activities to follow the laws of natural development but have failed to mention the laws of society and the economy, which is rather one-sided. The fact is that proper human activities not only conform to the laws of nature but are also keeping with the laws of society and the economy.

At this point Xiong Yi emphasized that "In the realm of national economic construction the interaction between natural sciences and social sciences is becoming increasingly close; without taking into account social and economic considerations, research in natural sciences has no vitality.

Training More Well-Rounded Scientists Is an Urgent Task

Professor Xiong Yi, now in his seventies, has a sharp mind and is very articulate. He said: "Today the development of ecology has entered the stage of studying man and the biosphere. Man plays a dominant role in the biosphere and his responsibility for its evolution is an issue that urgently requires our attention. The human race is not only an important constituent of the ecological system, but also the center of the ecological system. The ecological system centered around man's production activity may be called the artificial ecological system. In addition to natural factors, the artificial ecological system also contains social and economic factors and the activities of man. Each of these three components has its own structure, function and rules of development, and each should be studied from an overall, systematic viewpoint. In addition, they also interact closely with each other and form a mutually dependent and mutually constrained network. It seems to me that ecology is not only a natural science but also a scientific way of thinking and a methodology."

"Natural scientists often pay attention only to the material world, ignore the human factor and very seldom consider the social and economic aspects. Research on the artificial ecological system, on the other hand, stresses the overall integrated and social nature of the objective world. Armed with the concept

and research method of the artificial ecological system, a natural scientist can then observe the objective world more realistically and more comprehensively from the viewpoint of a social economist. This would also help in the rational use of the natural resources, the development of energy and conservation, and the study of coordinated development in agriculture, industry, commerce and land management."

After a brief pause, Xiong continued: "To approach these highly significant scientific research projects in the development of the national economy, we can of course get the natural scientists and the social scientists together to make a breakthrough effort. But scientists in these two fields have very different methods of operation and there may be some problems in their cooperation. We may let them interact and exchange opinion in consultation sessions and conferences. In addition, we definitely need to cultivate well-rounded scientists, such as natural scientists who know something about social science and social scientists who know something about natural science. Institutions of higher learning in China should strengthen the horizontal connection between disciplines and train a large number of scientists with solid foundation and broad knowledge who are capable of moving ahead in frontier science and in multidisciplinary topics. This is an urgent task before us."

"What are the qualifications of a scientist engated in interdisciplinary research?" I asked.

"They must be specialists in their own fields, they must have solid background knowledge, extensive experience, and familiarity with neighboring and related fields," Xiong replied. "Our problem now is a lack of understanding of the role of interdisciplinary research and a lack of respect for researchers engaged in interdisciplinary research. When we evaluate researchers, we often look only at their records in their major field and consider the depth of their research, forgetting to consider its breadth of the extent of its applicability. This situation, if not corrected, will be very detrimental to the cultivation and growth of interdisciplinary researchers."

Knowing that Professor Xiong was still recovering from an illness, I concluded my interview at this point. As the professor was seeing me out, he told me enthusiastically: "The 12th Party Congress has laid out a comprehensive program which creates a new situation in socialist modernization. It has proposed the strategic goals of economic construction for the remainder of this century and the strategies and steps to achieve this goal. I believe that in promoting the further flourishing of socialist science, well-rounded scientists will have ample opportunities to use their talents." From these words, I came to appreciate the fervent enthusiasm of this senior scientist.

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CSO: 4008/87

SURVEY, FORECASTING OF SCIENTIFIC, TECHNICAL PERSONNEL SITUATION

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 1, 10 Jan 83 pp 43-45

[Article by Zhang Jiguang [8022 4949 0342]: "A Study and Forecast of the Scientific and Technical Personnel Situation"]

[Text] The pressing needs of the new situation of full-fledged socialist modernization call for a new phase in the development of science and technology personnel. The basic work of investigating and forecasting the scientific and technical personnel situation is therefore very important. In this article we summarize the experience gained by participating in a survey and forecast of the scientific and technical personnel situation organized by the Ministry of the Aviation Industry.

I. Why is the study and forecast of S & T personnel necessary?

Since the state was founded, China has achieved a great deal in the area of developing scientific and technical personnel; more than 80 percent of the main scientific and technical force in various fields received their training after Liberation. But the 10 years of turmoil dealt the cause of education a serious blow and cut off the source of scientific and technical personnel. During the 10 years of the closed-door policy, not only did science and technology come to a standstill and lag farther and farther behind the developed nations, but education and personnel development also fell behind and even moved backward. This has caused many problems in the utilization, management and training of personnel. Many new technologies and fields of research could not be developed because of the lack of qualified people. What kind of people do we need today and how do we solve the existing problems? To answer these questions, we need to study and investigate the personnel situation.

Secondly, in the development of qualified people one cannot start a project today and expect results in 3-5 years. If professional training begins at the freshman year in college, it generally takes 7-10 years before we can have a trained specialist capable of independent work as an effective member of the scientific and technical force. College training takes 4-5 years and on-the-job training takes another 3-5 years. It would be at least 15 years if we count high school, and even longer in the case of graduate students. In a word, personnel development is a long-term endeavor and must be planned ahead

of time. The recent task of forecasting scientific and technical personnel needs in the aviation industry for the next 10-15 years was tied in with the programs for the next 5 years and the subsequent 10 years in aviation.

Third, the main source of scientific and technical personnel is the colleges and universities, but they were built in the 1950's after the Soviet model, and teaching method and instructional material remained at the old level for many years and have long since become outdated. Although there have been some improvements in recent years, the changes have been minimal. Also, the number of specialists the colleges need to produce must also be based on research and production needs and scientific and technical development in the various fields. It is therefore necessary to study the personnel situation in order to propose specific improvements in teaching and curriculum with reference to existing problems in training and education.

II. How to Conduct Surveys and Forecasting

This activity can be divided into three steps.

1. Organizational and Preparatory Stage

Allow 3-5 days to organize the participants and give them time to study the documents and material. The department in charge will describe the current personnel situation, trends in professional development, survey and forecasting activities, and methods and plans. The participants are divided into several groups according to specialty.

2. Survey and Forecasting Stage

Allow about 3 weeks for each group to investigate 3 to 4 units (institutes and plants) and study the following four items: (i) age distribution, organizational structure, level and specialties of the scientific and technical personnel, current situation and existing problems; (ii) considering the development and adjustment in the aviation industry, make qualitative and quantitative predictions about the specialties, organization and level of training of aviation personnel needed in the next 10 to 15 years; (iii) recommendations and suggestions to further improve the technical level and management of current scientific and technical personnel; and (iv) ways to improve teaching and quality of education (curriculum, course content and teaching methods) in aviation colleges.

Method of study: The usual mode of investigation is to first listen to the plant or institute leader's description of the current status and future needs of scientific and technical personnel; next, discussion meetings are held to enable people in various groups to understand the training situation in the functional departments (personnel, education, etc.) and the implementation of policies regarding intellectuals. In order to gain an overall picture of the plant or institute, the participants read the work project and near-term measures of the plant or institute and documents on domestic and foreign technological development and, in the meantime, visit the major installations, laboratories and shops in the plant or institute.

In the investigation, attention should be given to the opinions of older scientific and technical personnel, because they have worked a long time and have acquired ample experience. Special meetings should also be held for scientific and technical management personnel to assess the current state of affairs and problems in scientific and technical management.

Sound predictions of personnel needs can only be made after in-depth, detailed investigation, with understanding of the overall situation, and with the participation of the experts. In our study of the aviation industry, the personnel forecast and project statistics were made after going through three steps. The steps are (i) individual units reporting the number of people needed in their units; (ii) investigation groups verifying the requests based on their findings and consultation with the respective units and then proposing modification plans; (iii) by combining the requests from various units and considering such factors as need, feasibility and sources of graduates within the Ministry and outside the Ministry, the personnel forecast of the Ministry is then formulated.

After the investigation of a unit, written material should be prepared immediately; the following information should be recorded: total number of workers in the plant or institute, number of technical staff and its percentage of the total number of workers, year of graduation and age distribution, average age, and number of secondary vocational school graduates, number of engineers, number of people fluent in foreign languages, number of people who know how to use computers, the number of people needed in the next 10 to 15 years at the graduate, college and secondary vocational school level in various specialties.

3. Material Organization and Concluding Stage

One week's time should be allowed for the final summarization after each group have discussed, analyzed, and organized the material and the final conclusion and statistics can be written.

III. Analysis of investigation and forecast results

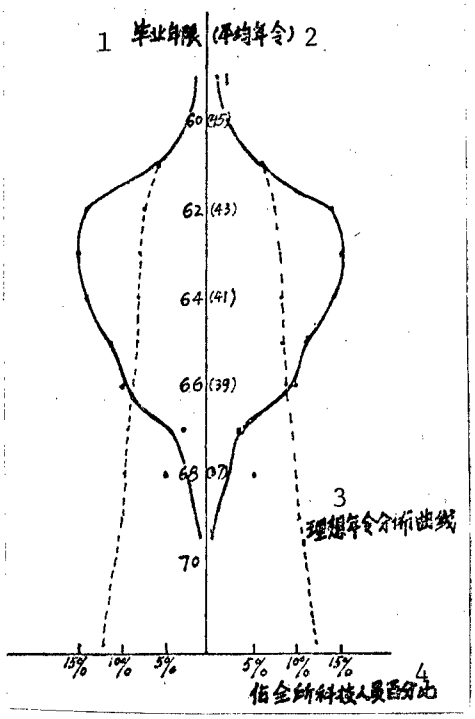
After our investigation and forecast, we identified the following problems that need to be resolved.

1. The problem of a drastically decreased ratio of scientific and technical personnel to the total number of workers as compared to 1966 and earlier. The number of technical staff in one plant has dropped to 8.8 percent of the total workers. The cause is unplanned hiring and lack of replenishment of college graduates during the 10-year upheaval; the consequence is a direct effect on the quality of new technology and product development. For this problem we proposed suggestions to strengthen the ranks of scientific and technical personnel.

2. The problem of age, outdated knowledge, decreased technical level and interrupted continuity. At one institute established in 1962, 86 technical staff and 36 college graduates had been assigned there in 1962, more graduates were added later and by 1981 the total number of S & T personnel was 608. The breakdown is shown in the table below.

Year of graduation	50-60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
average age	50-45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
Number of workers	86	36	85	91	87	69	63	17	31	0	1	0	7	13	0	13	10
Percentage of current S & T personnel	average age 2	6	14	15	14	11	10	3	5	0	0	0	1	2	0	2	1.6

As can be seen from the table above, this institute was assigned too many college graduates in the years 1962-1964, while during the 10-year, upheaval college graduates were not adequately supplemented; hence the unreasonable distribution of technical personnel. The original core technical personnel continued to age and there was no new blood to replace them. To depict this problem more clearly, we refer the readers to the following diagram.



Key:

1. Year of graduation
2. (Average age)
3. Ideal age distribution
4. Percentage of total number of S & T personnel in the institute

As the figure shows, the continuity problem in this institute began in 1967. If this problem is not resolved, it will have an increasingly serious effect on the ability of the institute to accomplish its assignments. The diagram above also shows that if the number of graduates assigned in 1962-1964 had

been 20 percent lower and if 70 graduates had been assigned each year after 1967, then the institute would have had 800 technical people by 1972, and in the meantime 5 percent of the workers could have been reassigned to other units, so that there would be a more desirable age distribution curve (dashed line). Such an age distribution would not only insure the future of the scientific and technical contingent, but would also permit optimization of their age, knowledge, and level structure of the S & T personnel. This serves as an example of the problem of advancing age, outdated knowledge, falling technical level and lack of continuity.

3. The problem of continuing education of middle-aged scientific and technical personnel. Most of the middle-aged scientific and technical personnel have become the backbone of the scientific and technical contingent. Their work assignments are heavy and they bear the main responsibility of supporting a family; as a result, they generally are not in a position to study and advance their knowledge. According to regulations, they are supposed to study for 3-6 months every 3 years. This problem is urgently in need of solution.

4. The problem of job placement for college graduates. A common problem has been that many graduates were given assignments unrelated to their specialty and could not use what they have learned, while plants and institutes have not obtained the technical people they needed. We need to resolve the problem of educational programs divorced from the needs of the units that use the graduates and the problem of ineffective curricula and overly narrow specialization. In the investigation it was pointed out by many people that graduates of liberal arts universities can adapt to new technical work better than graduates of vocational colleges.

This investigation and forecast has provided data on numbers and specialties of scientific and technical personnel needed by the Ministry of the Aviation Industry and has provided preliminary suggestions for solving some of the existing problems and for improvements in teaching.

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CSO: 4008/87

SCIENTISTS' CONTRIBUTION TO MODERNIZATION EXAMINED

Beijing ZIRAN BIANLUNFA TONGXUN [JOURNAL OF DIALECTICS OF NATURE] in Chinese Vol 4 No 6, Dec 82 pp 1-2

[Article by Qian Sanqiang [6929 0005 1730]: "Scientists Must Make a New Contribution to Modernization"; excerpts of speech presented at conference for study of documents of the 12th Party Congress, 23 September 1982]

[Text] Participating in the 12th Party Congress, with its great historical significance, I learned profound lessons and received great encouragement.

As a scientific worker I had a strong impression that the congress has placed science in an unprecedented important position.

In his political report, Comrade Hu Yaobang stressed that scientific and technical modernization is the key to the four modernizations and that making science and education one of the key strategic focuses for achieving our strategic objectives in economic construction during this century is an important aspect of spiritual and cultural construction. This assigns China's scientific and technical workers a great historical mission.

At the congress, representatives of the Chinese Academy of Sciences and the Chinese Academy of Social Sciences studied and held discussions together. We made the point that we were originally a single academy of sciences and now have been divided into two, but the trend of scientific development is for interpenetration and unification of mathematics and natural science with philosophy and social science. It was stated in the political report that "we must strengthen research and applications in economics and management science." Today's science has unprecedented great scope, cost and effects. To manage modern science effectively, we not only need a knowledge of natural science, but also of economics and management science. On the other hand, our current economic construction must strive to equip itself with modern science and technology, and in constructing socialist spiritual culture we must base ourselves on modern scientific and cultural knowledge. Therefore, in developing modern economics, management science and other social sciences, we must be thoroughly familiar with modern natural science and technology. Moreover, economics and management science are also being continuously modernized and are continually acquiring modern equipment and mathematical methods, such as computers, operations research and systems analysis. Psychology, economic

geography and the like are basically borderline sciences between natural science and social science. As science and its social effects develop, such fields as the history of science and technology, technical economics and the like which study science and technology are also rapidly developing and are receiving serious attention from scholars in all countries. Today's major social problems, such as population, environment, energy, food and the like, must be studied in comprehensive form through a combination of natural and social sciences in order to find the most suitable ways of solving them. These circumstances make it clear that in the future we must strengthen the union and combination of mathematics and natural science with philosophy and social science (including economics) so that all of science and technology will serve production even more effectively.

The political report called for "planned pursuit of large-scale technical modernization tasks." Technical modernization and technical reform are not only the tasks of manufacturing enterprises and production activities, but also tasks on the scientific and technical front. In western Europe, the United States and Japan, mamy factory enterprises have industrial research laboratories of various sizes engaged in studying technical modernization, and some are also engaged in some applied scientific research and small-scale basic research. In our scientific research system, because of historical factors in the development of industrial research laboratories, they are still a relatively weak link. Many factory enterprises still have few or no research laboratories engaged in developmental or applied scientific research, while some plants' laboratories have quite inadequate research staffs, funding and facilities. In the future, we must expand technical modernization and technical renovation, and all plants, enterprises and localities must establish various types of industrial research laboratories of various sizes, in accordance with the actual situation, and in planned and systematic fashion. In order to achieve economic benefits and production and social results rather rapidly, we of the Chinese Academy of Sciences, the production departments' research institutes and the advanced schools must also energetically help factory enterprises to establish industrial research laboratories, providing support in the form of knowledge, technology and personnel, and even organizing contingents to help solve difficult scientific and technical problems in production and construction.

Moreover, while the Academy of Sciences and the production departments' research academies strengthen applied research and accord due importance to basic scientific research, they must also consider China's actual situation; and even if some of the difficult key problems of technical modernization are in the domain of development research, they should provide energetic aid and cooperation...and help the plant enterprises establish their own industrial research laboratories, so that we will gradually develop an organic scientific researh production system in whcih basic scientific research, applied scientific research, developmental research and industrial production are closely combined and interrelated.

I remember when the Chinese Academy of Sciences cooperated with the Ministry of the Defense Industry in developing nuclear power. We ran into a difficult technical problem regarding metals, where the necessary information was kept

secret from us by other countries. Through energetic cooperation between the Chinese Academy of Sciences' Metallurgical Research Institute, Metals Research Institute and Nuclear Power Research Institute and relevant research academies of the Ministry of Metallurgy, we attacked this key problem and accomplished the research tasks. Moreover, in basic research on synthetic insulin, we achieved results taht were at advanced worldwide standards through cooperation between the Research Institute of Biochemistry, the Beijing University and the Research Institute of Organic Chemistry. We still are extremely grateful for the concern and guidance which Premier Zhou Enlai, Vice Premier Chen Yi and Vice Premier Nie Rongzhen gave to science and the concern and support which they gave to cooperative effort.

In the 10 years of turmoil, science was greatly disrupted. We still are facing many problems and difficulties, but many of our recent conditions are still much better than in the 1950's in terms of research funding, manpower, and facilities. I recall that in 1949 we trained scientific personnel in nuclear science almost from nothing and established the needed research organizations. But by 1964, only 15 years later, we successfully exploded the first atomic bomb, and only 2 years and 8 months after that we also successfully developed a hydrogen bomb, in addition to developing personnel in nuclear reactor, engineering, high-energy physics, nuclear physics and applied nuclear technology. In astronautics, we started training personnel and establishing organizations in 1955, and by 1970, also after a labor lapse of only 15 years, we launched China's first satellite. With the guidance of the party and government, we resolved to be self-reliant, and starting from those manpower and material resources conditions we successfully achieved our objectives and made a contribution to developing our national defense forces. Of course insufficient attention was paid to changing over from purely military technology to technology useful in both military and civilian applications, and military scientific research results did not yield the benefits they could have; these circumstances must be corrected.

Today, we have a much more solid industrial base than we did in the past, we have greater research funding, we have trained a large, youthful scientific research contingent that is both red and expert, our party has correctly generalized the lessons of experience since Liberation, and the 12th Party Congress has placed science and technology in an unprecedentedly important position; as a result, we are entirely confident that given the party Central Committee's vigorous strengthening of its guidance of science and technology, the next 20 years will make even more numberous greater and more extensive contributions, so that we will accomplish the great and glorious historical tasks which we of the Chinese Academy of Sciences have been assigned.

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CSO: 4008/71

SCIENCE, TECHNICAL WORKERS' ROLE IN WORKER, PEASANT ALLIANCE

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 6, 20 Nov 82 pp 10-12

[Article by Tian Fu [3944 1133], China Scientific and Technical Association, and Zheng Tianshou [6774 1131 1108], Beijing Scientific and Technical Association: "The Role and Position of Scientific and Technological Workers in the Worker-Peasant Alliance"]

[Text] Scientific and Technological Workers Are an Important Component Part of the Worker-Peasant Alliance

The question of how to treat scientific and technological workers is also a question of how to treat intellectuals. Are scientific and technological workers part of the working class? Are they reliable partners? After the Party Central Committee affirmed that they are, does everyone understand this question in this way? In reality we fear that this is not completely so. The reasons for this situation are many sided, but a prejudice in understanding, especially the "leftist" influence, is the principal reason.

In the past we said that intellectuals were influenced by the bourgeoisie; there was a lot of talk about their standpoint and viewpoint being bourgeois, and not enough concrete class analysis was made with regard to them. Marx said: "In a school, to the school boss a teacher can be a pure wage laborer. There are many educational factories of this kind in England. Although to the students these teachers are not production workers, to the boss who employs them they are production workers. The boss exchanges his capital for the teacher's labor capacity, and through this process makes himself rich." Based on Marx' profound class analysis of intellectuals, in China, excluding intellectuals who early took part in the revolution and intellectuals who trained themselves after liberation, among the old intellectuals only a very few belonged to the bourgeois and the vast majority were oppressed by imperialist and reactionary rule, and were hired "production workers" and professionals. After Liberation, because of the party's policy of "uniting with, educating, and remolding," for the great majority of intellectuals, including a very few bourgeois intellectuals, after socialist remolding, there was a big change in their class position; they served socialism and drew their pay from the state. Just as Stalin expounded: if the intellectuals' class status changes, the nature of their activities will also change. No matter if we look at

their economic position and class relationships or at their political state, they have already become mental laborers among the proletariat. With regard to the workers and peasants who mainly engage in physical labor, they are only differentiated by a division of work and not by the existence of classes; in our nation's socialist production system, they and the workers and peasants who engage in physical labor are in the same class position and economic position, and have common political interests and economic interests.

After correctly understanding the class position of scientific and technology workers, it will not be hard to comprehend their position and role in the alliance. During the period of the war of resistance against Japan, Comrade Mao Zedong pointed out: "The Chinese proletariat, peasants, intellectuals and other petty bourgeoisie are the basic forces determining the country's destiny." For this reason, the CPC Central Committee made the "decision to recruit a large number of intellectuals." This idea of Mao Zedong's was further developed. Taking the Soviet Union as an example, he explained: "In Russia's organs of state power, even under the conditions in which there is no other political party but the Bolsheviks, what exercises power is still the alliance of the workers, peasants, and intellectuals." In January 1956, Comrade Zhou Enlai, at a conference of intellectuals convened by the Party Central Committee put forward the proposition: "The socialist era, more than any other previous era, requires the full improvement of production technology, requires the full development of science and the full utilization of scientific knowledge. Therefore, if we want a greater, faster, better, and more economical development of building socialism, we must rely on close cooperation between physical labor and mental labor, and on the fraternal alliance of workers, peasants, and intellectuals." This clearly points out the historical position and role of scientific and technological workers in our country.

The Characteristics of the Worker-Peasant Alliance and The Special Mission of Scientific and Technological Workers in the New Period

In the construction of socialist modernizations, the worker-peasant alliance is a political alliance and also an economic alliance, and making the economic alliance the primary form is the primary characteristic of the worker-peasant alliance at the present time. The core of the building of socialism is the economy, so the tasks of building a powerful material foundation for socialism is put in first place. And the task of economic construction is a combination of industry, agriculture, science and technology; this requires a combination of workers, peasants, and intellectuals. In the development of modern science and technology, its characteristics of socializing science and making society scientific is extremely striking. The period of industrializing the achievements of scientific research is becoming shorter and shorter, and the position of science and technology as a productive force in the national economy is daily becoming more prominent. Someone has estimated that at the beginning of this century the raising of production efficiency by science and technology was only 5-10 percent, and now it is 60-80 percent. In 1980, there were over 2,600 major achievements of scientific research in the country, and 50 percent of them were applied in production. From this it can be seen that if we want high speed, high efficacy in constructing the four modernizations, we must depend upon science and technology, and must depend upon laborers who

possess a certain amount of scientific and technical knowledge, production experience, and labor skills. In the alliance, which has the economy as its main goal, the scientific and technological workers have a special mission. On the question of further eliminating the "essential difference" between mental labor and physical labor, history has entrusted the scientific and technological workers with a more arduous mission. In accord with Stalin's teachings, "it is not on the basis of bringing the educational and technical level of the mental laborers, engineers, and technicians down to the level of a medium-grade skilled worker, and by this method that a slight evening up of the educational level of the mental laborer and the physical laborer will be attained," but it will be attained "only on the basis of raising the educational and technical level of the worker class to the level of the engineers and technicians." In the course of socialist revolution and construction, the scientific and technological workers of our country must make use of their own practice and make unremitting efforts in their mission of combining with the workers and peasants, and undertake the glorious task of raising the scientific education level of the entire nation.

Implementing the Policy on Intellectuals Is the Important Link in Displaying the Role of Scientific and Technical Workers in the Alliance

One of the current important questions in strengthening the industrial-agricultural alliance is the concrete implementation of the policy on intellectuals.

In theory and practice, the central authorities have already resolved the question of intellectuals. The intellectuals have stood up politically; the phenomenon of giving no heed to learning has already been or is now being corrected; many intellectuals have been promoted to leadership posts at all levels and bear important leadership responsibilities; in the majority of areas and units, technical and academic titles have been restored; the provisional methods for exchanging scientists and technicians and inviting scientists and technicians to hold two or more posts concurrently have been promulgated, etc. However, in actual work there are still some problems that have not been solved, and the pernicious influence of the "left" is still a major obstacle to the implementation of the party's policy on intellectuals. This is still mainly manifested in what Comrade Zhou Enlai criticized at the time: the tendency to bureaucratism, sectarianism, and selfish departmentalism in treating human talent. The reason behind the emergence of this mistaken tendency is: "The great progress of intellectual circles in politics and their professions has been underrated, and their important role in the country's socialist cause has been underrated. Not recognizing that they are part of the worker class, it is held that in any case production depends on workers,...thus the party's policy on intellectuals is not conscientiously carried out, and the problems relating to intellectuals are not conscientiously studied and solved." In another aspect, the creation of this mistaken tendency and the state of the composition of our cadres ranks at all levels is not unrelated. People with this kind of mistaken tendency, proceeding from the orthodox concept of industry and agriculture, consciously or unconsciously, regard intellectuals as different from themselves, only acknowledging that workers and peasants create the wealth of society, while

not acknowledging that it is created by intellectuals. This contention that intellectuals only create spiritual wealth but not material wealth, which depends on the support of the workers and peasants, is a muddled idea. In fact, any modern production is almost always a combination of mental labor and physical labor. Once physical labor and mental labor are combined, material wealth can be created. Of course, in society there are some intellectuals who do not directly take part in material production, but that is because of the requirements of society and the state, and there is only a different division of work between them and the industrial and agricultural laborers. So it is said that in the cause of building socialism, no matter whether it is a high degree of development of productive forces or rational readjustment of production relations, the constant perfecting of the superstructure, the improvement of the laborers' knowledge and skills, and the molding of moral character, cannot be separated from the hard work of intellectuals on the scientific, technological, legal, educational, literature, and artistic fronts. Therefore, the correct and thorough carrying out of the Marxist policy on treating intellectuals is an important task in strengthening and consolidating the worker-peasant alliance.

The current problem is that party organizations and administrative departments at all levels should truly place the question of intellectuals on their important agenda and frequently acquaint themselves with and study the policy on intellectuals. Overcome and correct the bureaucratic work style and sectarian bias on the question of treating intellectuals, truly achieve equal treatment for them politically, give free play to and utilize them in work, and be concerned and show consideration for them in life.

China is in a new transitional period, and history has bestowed upon this alliance a new meaning. The party's political and ideological education is especially important. The worker class must carry out self-education, and the education of peasants and intellectuals must be strengthened. The scientific and technological ranks still need to resist the influence of bourgeois ideology, promoting in intellectual circles a stress on scientific morality and an establishment of a good style of society, and promoting the collective spirit. The Party Central Committee's "Resolution on Certain Questions in the History of Our Party Since the Founding of the PRC" reiterated the necessity for intellectuals to combine with the workers and peasants and, through study of Marxism-Leninsim and study of social and work practice, to establish the ideology of the proletariat world outlook. Naturally, in strengthening their education, the past methods of restricting and discriminating against them cannot be adopted. The policy toward intellectuals must be one of relative stability, and we definitely cannot hurt the feelings of intellectuals and do things harmful to their interests.

Reference Works:

1. "Completed Works of Marx and Engels," Vol 26, book 1 p 443
2. "Selected Works of Mao Zedong," one-volume edition, People's Publishing House, 1966
3-4. Zhou Enlai's "Report on the Question of Intellectuals," Peoples Publishing House, 1956

(Edited by Xu Qianwei [6079 0467 0251])
9727
CSO: 4008/69

PERSONNEL STRUCTURE IN GANSU NEEDS IMPROVEMENT

Lanzhou GANSU RIBAO in Chinese 20 Jul 83 p 4

[Article by Li Jun [2621 6511]: "Revise the Structure of Science and Technology Personnel to Develop Talent"]

[Text] The science and technology [S & T] personnel is only 0.000048 percent of the population of our province, far from meeting the demand of building the four modernizations. Take the agricultural S & T personnel for example, the 8,284 men and women represent about 0.000005 percent of the agricultural population of the province. This apparently is inadequate to meet the demand of agricultural development in our province.

The structure of our existing S & T personnel is also inadequate to meet the demand of the four modernizations. First, the age of S & T personnel tends to be too old, 57.53 percent are between 36 to 55 years old; 2.29 percent between 56 to 61 years old. Furthermore, among the 13 senior agronomists, 5 are between 56 to 60 and 7 over 61 years old. Among 882 agronomists, 44 percent are between 46 to 55 years old, 10.3 percent are between 56 to 61 years old. Most of the agricultural S & T personnel are not only advanced in age but also frail in health. The strong-bodied have to work in the field, having no time for studying and improving the overall result.

Second, the structure of personnel is not rational. Senior technical personnel represent only 0.7 percent of the total number of S & T personnel and middle-level personnel about 18.4 percent. Consequently, in some units, middle-level technical personnel at the engineer rank had to spend much of their time working on simple technical tasks, thus wasting their talent. At the same time, there are many units lacking technical personnel at the engineer level. The more rational distribution should be 1:4:8:40. With the improvement of national economy, if the situation is not changed shortly, some units would use three or four middle-level personnel to work on 4 tasks which should only take one or two of them. Middle-level personnel also often take up the quota and block the route to advancement for junior-level personnel.

Third, the overall level of personnel structure is not high. Among S & T personnel, only 0.14 percent have a graduate degree and 39.6 percent have

undergone postsecondary education. With a relatively low educational level, they cannot undertake important tasks, thus affecting the development of the S & T enterprises in our province.

In view of the practical situation of the S & T team in our province, I propose emphasis be put on the following tasks:

1. Strive to change the distribution of S & T personnel, actively reform the structure of the S & T team. Internal adjustment should be made based on the district and the bureau under the direct jurisdiction of the province, so that each S & T personnel finds the right position which makes full use of his talent. The reform should be made according to the development of production and the structure of production in our province.

2. Fully utilize the potential or our S & T team and promote S & T consulting and technical cooperation. For example, on the one hand, colleges and research institutes can provide funds, location, equipment and support, or training; on the other hand, factories and mining enterprises should join colleges to work out research topics according to the demand of production development.

3. Hire part-time consultants from higher education and scientific research units to help with technical matters, guide experiments and train personnel in the technical field.

Of course, another important aspect is to improve the management of S & T personnel, to work out a rational and directional mobility for S & T personnel. Last year our province has engaged in an overall review and strengthening of the work of intellectuals which achieved good results. However, our province is a remote and backward area; unless some practical special policies are adopted, it would be very difficult to stabilize the S & T team, and guide its rational mobility. For example, last year, among the 50 college graduates assigned to a certain factory, only 5 actually reported to work. Therefore, not only should more amenities be given to S & T personnel, but political ideological education should also be engaged. It is thus hoped that more S & T personnel will take up work in backward districts and units which involve greater hardship.

9507
CSO: 4008 /161

RENMIN RIBAO CITES PROMOTION OF YOUNG SCIENTISTS

National Defense S&T Commission Report

Beijing RENMIN RIBAO in Chinese 13 May 83 p 3

[Article: "Group of Middle-Aged and Young Scientific Technical Personnel Promoted to Senior Technical Posts"]

[Text] Since last year the National Defense Scientific and Technological Commission has approved the promotion of over 200 middle-aged and young scientific and technical cadres to senior technical posts; 14 percent of them (over 140) graduated from college in about 1960.

The contingent of technical cadres in the system of the National Defense Scientific and Technological Commission is of comparatively young age, but the commission was criticized a few years ago because there had been few promotions of such cadres to senior posts. The National Defense Scientific and Technological Commission has now clearly stipulated that evaluations and promotion to higher technical ranks may not be based on seniority, formal schooling, administrative posts must not be confused with technical positions, and no fixed ratios must be adopted, but promotions must fit the actual circumstances.

Among the technical cadres who were proposed for evaluation and promotion to senior technical posts, some who had graduated from universities shortly before Liberation and had seniority and good service records were still refused promotion because a comprehensive evaluation found that they did not meet the conditions for promotion. On the other hand in the case of a technical cadre who had graduated in 1967 and had made outstanding contributions in completing an assignment in defense research and testing, the examination committee agreed to a promotion to the post of senior engineer, because his case met the conditions for such a promotion. The National Defense Technical University has an expert on electronic computers who is now 46 years old. He has shown considerable attainments in his specialty and was promoted from assistant professor to associate professor in 1979 and to full professor last year, in a break with the usual procedure.

Editorial Comment

[Article by Yen Ban [0673 0133]: "'Drawing the Line' and Breaking With Customary Procedure"]

[Text] There is a story that toward the end of the Ming Dynasty, Zhang Xianzhong, the leader of a peasant revolt, "instituted examinations to recruit scholars," not by handing out the usual topics for examination essays, but by stringing up a rope and making the candidates pass under it. Those who were taller or shorter than the height of the rope were rejected, and only those that were as tall as the height of the rope were chosen. Lu Xun did not at all agree with this method. Today, when some units evaluate men and assign them to certain professional ranks, they cast aside the standards that the state has established and "draw the line" in their own way interims of formal schooling and seniority. When the evaluation is made by "drawing a line," one can disregard the candidate's real proficiency and his past contributions, and need only ask when he graduated, and, regardless of his moral worth, intellectual capabilities and the like, promote him if he has put in the requisite number of years. This actually means stifling diligent and promising men and rewarding lazy ones who have only drifted along without doing real work. The absurdity of this method is actually no less than that of Zhang Xianzhong's selection of scholars by stringing up a rope.

Zhang Xianzhong's method of selecting scholars is only a story which we may dismiss, but the "line-drawing" that occurs now in real life as a method of evaluation is something that we have to break down. Only by breaking down the arbitrary old conventions can we make talented personnel emerge. The approval of the promotion of over 200 middle-aged and young technical staff to senior technical ranks by the National Defense Scientific and Technological Commission courageously breaks down the old pattern of doing things. As a result, a group of really capable and knowledgeable talents have successfully passed their evaluation, while those temporarily lagging behind are spurred on to greater effort. Breaking down the old patterns is a kind of revolution against the "line-drawing" method, and other units too might well engage in such breaking down of old patterns.

9808
CSO: 4008/112

SCIENTIFIC WORK IN MINORITY AREAS ENCOURAGED

OW252204 Beijing XINHUA in English 1105 GMT 25 Jul 83

[Text] Beijing, 25 Jul (XINHUA)--The China Association for Science and Technology today called on scientists and technicians to help speed up the development of remote and minority areas. [Sentence as received]

Pei Lisheng, vice-chairman of the million-member association, told the opening of a national science and technology forum here that more young and middle-aged scientists and technicians, particularly university graduates, should go to work in border and minority regions.

Pei also urged scientists and technicians already in these areas to decide to work there all their lives.

The State Nationalities Affairs Commission, the Ministry of Labor and Personnel, and the China Association for Science and Technology, will give honorary certificates to all scientists and technicians who have worked in remote and minority areas for 20 years or more, Pei said.

Pei also demanded that scientists and technicians in coastal and developed areas cooperate to introduce modern technology to China's remote regions as quickly as possible.

Ren Ying, vice-minister in charge of the State Nationalities Affairs Commission, said the state is planning to send a large number of scientists and technicians to such areas.

China has 55 minority nationalities with a total population of 67 million. The minorities live in 17 provinces and autonomous regions, covering over 60 percent of the country's territory. With rich industrial resources and abundant minerals, the areas occupy a strategic position in the country's economic modernization and defense.

According to current statistics, there are about 560,000 scientists and technicians working in minority areas, 300,000 of whom have worked there for more than 20 years. Most came from the country's coastal and developed areas in the 1950's or early 1960's.

The 180 representatives attending the current forum were selected from among the 2,000 outstanding scientists and technicians in the remote areas to be cited by the forum, which will run through 30 July.

[Beijing XINHUA Domestic Service in Chinese at 1224 GMT on 25 July carries a similar report on the national forum of scientists and technicians for the development of remote and minority areas which adds that the forum will last 5 days and that the forum's opening ceremony was presided over by Vice Minister of Labor and Personnel Jiao Shanmin.]

CSO: 4010/85

SCIENTISTS AND TECHNICIANS ENCOURAGED TO WORK IN POOR AREAS

Beijing RENMIN RIBAO in Chinese 5 May 83 p 2

[Commentary: "Encourage Scientists and Technicians To Go To Work in Places Where Conditions Are Difficult"]

[Text] The Huairen County CPC Committee and the country's various scientific and technological departments encourage agricultural scientific and technological personnel to go to communes and brigades which offer poorer working conditions and a more difficult life to work on technological contracts. This is an endeavor which deserves recommendation.

At present, all rural areas, including prosperous regions with attractive conditions and poor regions with unattractive conditions, are eager to study science and technology. But which areas are more in need of scientific and technological personnel "to give away charcoal on a snowy day?" Obviously, they belong to the latter category. Peasants in poor regions are more eager to have science and technology come to their doorsteps so that they may quickly cast off poverty.

Poor regions have long been unable to change their circumstances. Generally speaking, these regions have relatively inferior natural conditions. For example, some places suffer from long-term drought and poor soil. Some places are low-lying, with easy waterlogging and have serious problems of salinization. Other places have high mountains and deep ravines so that communications are inconvenient. Undoubtedly, it will be difficult to go to these places to work on technological contracts; there will be many problems. But this is only one side of the problem. We must realize that areas suffering from long-term poverty often have great latent capacities hidden within them. These are better areas in which to demonstrate the effects of science and technology. Many comrades have already produced outstanding results in these areas. All agricultural scientific and technological personnel who want to accomplish something must conquer their fear of difficulties, develop an attitude of daring to do pioneering work, and go to these regions where conditions are difficult in order to show their talent.

To help large quantities of scientific and technological personnel go to poor regions to work on technological contracts, relevant leading departments must create favorable conditions for them and help them solve various problems.

For example, in such areas as political treatment, material supply, living arrangements, salaries and promotions, children's education and careers, the departments can give the personnel priority consideration, as well as all necessary care. They can also give the personnel freedom to come and go and implement the rotation method after fixed periods. After working for a few years, when scientists and technicians have produced results, they should be encouraged to stay, if they are willing to do so. If they would like to leave at the end of their tenures, they should be allowed to be transferred back. In short, we must show them more concern in such areas as ideology and livelihood, so that they will be able to work steadily under difficult conditions. Huairen County has already adopted some measures of this type. They are still in need of improvements, but it is always valuable to take the first step, and the results can be shown to other places for reference. If we do our job well, large numbers of agricultural technological personnel will willingly come to poor regions and unite with the local masses. After struggling for a few years, the appearance of these regions will be changed.

12397
CSO: 4008/110

MEASURES TO INCREASE S&T PERSONNEL IN BORDER REGIONS APPROVED

Beijing RENMIN RIBAO in Chinese 30 Apr 83 p 1

[Report by Chen Zujia [7115 4371 3946]: "State Council Approves Policy on Scientific and Technological Personnel in Remote Border Regions"]

[Text] Recently, the State Council approved a report by the Ministry of Labor and the State Nationalities Affairs Commission on policies and regulations to strengthen scientific and technological ranks in remote border regions, and on encouraging scientific and technological personnel from the coastal and interior areas to assist the border regions.

In their report, the Ministry of Labor and the State Nationalities Affairs Commission discussed policies and measures dealing mainly with the following areas:

(1) Allow remote border regions to attract scientific and technological forces from coastal areas and the interior through such methods as inviting applications, invitations, temporary transfers, lecture invitations, consulting services, and technological cooperation. Relevant departments in the provinces and municipalities, and the central government should give them enthusiastic support and should develop assistance according to their needs. The assisting personnel do not have to change their registered permanent residences and their food grain arrangements. Pay and conditions and length of stay can be determined through mutual negotiations.

(2) Encourage university graduates and graduates from technical secondary schools to assist in the development of remote border regions. When the state is devising plans for assigning graduates, it should consider the needs of remote border regions. The cases of children of staff and workers who originally came from the interior to assist the remote border regions should be considered according to their actual conditions; otherwise, graduates from remote border regions who are recruited should, in principle, return to work in their original places. Graduates of universities, colleges and technical schools who are assigned to work in remote border regions should be given the salaries and benefits of regular rather than probationary workers of the specified grade from the first day when they report for duty. The salaries of graduates who are assigned to such plateau regions as Tibet and Qinghai may float upwards by one grade. If they should work there for eight full years, the higher salary grade may not be terminated thereafter.

(3) Suitably elevate the living allowances of scientific and technological personnel in remote border regions. Remote border provinces and regions should be allowed to give their scientific and technological personnel different kinds of subsidies, floating salaries, and bonuses according to local economic and cultural development needs. Relevant departments in the central government should not interfere with the financial payments of local governments.

The implementation of various kinds of labor contract and technical contract systems should be encouraged in remote border regions. If they can guarantee the completion of their primary jobs, scientific and technical personnel should be permitted to hold two or more jobs concurrently. They should, during their free time, be allowed to involve themselves in technological, managerial, cultural and educational services. They should be permitted to accept appropriate rewards.

(4) Specify the maximum length of service for scientific and technological personnel and arrange for them to have a place to return to when they become old. Graduates of universities, colleges, and technical schools and scientific and technical personnel (excluding those who have assisted according to agreements) who have been assigned or transferred from provinces and cities in coastal or interior areas or from control departments to such plateau regions as Tibet and Qinghai, may be allowed to be transferred back to the coast or interior after working for eight full years, unless they willingly choose to stay. Those who are in other remote border regions can have rotations arranged for them within those provinces.

Those scientific and technological personnel who have assisted remote border regions since the 1950s and have now reached the age of fifty-five can be the first to return to the interior and settle down. Scientific and technical personnel who have assisted remote border regions in the past should be allowed to return to their ancestral homes or the residences of their spouses and children when they reach the age of retirement. With the exceptions of Beijing, Tianjin, and Shanghai, which are under strict control, they should be allowed to settle in any other regions according to their convenience.

(5) Vigorously publicize and commend exemplary and progressive scientific and technical workers who have assisted remote border regions. Those with remarkable results must be given honorary titles, certificates, and the necessary material rewards.

12397
CSO: 4008/109

SHORTAGE OF QUALIFIED PERSONNEL IN BORDER AREAS CITED

Beijing RENMIN RIBAO in Chinese 30 Apr 83 p 3

[Letter to Editor from Lanzhou Branch, Chinese Academy of Sciences: "Question of Shortage of Qualified Personnel in Border Areas Needs To Be Solved"]

[Text] At present, there is a shortage of qualified personnel in remote border regions which is difficult to replenish. There are not enough people to carry on the work in those professions which require field work under difficult conditions. This situation is very serious.

Our Lanzhou Branch of the Chinese Academy of Sciences is located in the Northwest. Most of its institutes concentrate on the study of glaciers, frozen earth, deserts, petroleum geology, plateau atmosphere, plateau organisms, and salt lakes. The work is difficult and dangerous. But the aging of the present scientific and technological contingent is an increasingly serious problem. Their ranks are unstable, and there is not enough new manpower to supplement them. In addition, some scientists and technicians have moved to coastal cities. This year, in the Lanzhou area, the average age of more than one thousand scientists and technicians of intermediate rank and above is 46.2, already past the best age range when a person is full of creativity. According to incomplete estimates, during 1978-1982, the state assigned 127 university students to our branch. Only sixty of them, or 47.1 percent, actually reported for duty. During the same period, 146 of our scientists and technicians were assigned to other places. During 1979 and 1980, various institutes in the Lanzhou area planned to recruit sixty graduate students. Only forty-seven registered, and the institutes could admit only ten. According to some reports, the nucleus of the scientific research personnel of the 1980s consists of middle-age people who are now around forty years old. The backbone of the contingent for the 1990s should now be about thirty, yet the proportion of this group is very low in our branch. As we enter the twenty-first century, our principal work should be undertaken by those people who are now around twenty, but they are almost nonexistent in our branch. Therefore we are very concerned about the long-range development of scientific research in the Lanzhou Branch. We have reached the time when we must take drastic measures.

The attractiveness of the coastal areas in the East is due chiefly to their superior natural conditions, as well as to their relatively developed material

and spiritual culture. The remote border regions in the West, however, do not have these advantages. In order to attract scientists and technicians, we must create some favorable conditions. This requires the formulation of some reasonable policies for remote border regions, as well as for field work. We must adopt effective measures and provide appropriate solutions so that our opportunity will not slip away.

12397
CSO: 4008/109

QINGHAI INVITES SPECIALISTS TO LECTURE, TEACH

Beijing RENMIN RIBAO in Chinese 27 Jan 83 p 3

[Article: "Qinghai Invites Outside Specialists To Lecture"]

[Text] Since 1980 the Qinghai Provincial Science and Technology Association has systematically invited outside experts and scholars to lecture in Qinghai and has effectively promoted the development of science and technology in Qinghai Province.

Statistics show that 170 specialists and scholars (including a dozen foreign scholars) have given 4,800 hours of lectures in Qinghai in the last 3 years and that close to 100,000 people have attended the lectures. Specialists and scholars visiting Qinghai have lectured on theoretical topics, made on-site visits and taught techniques specifically aimed at the needs of the science and technology personnel in Qinghai and the problems in their production, research and teaching based on the development situation of natural sciences in Qinghai. This has provided the science and technical workers in Qinghai--especially the basic-level workers who seldom have the opportunity to go outside--a brand new perspective and allowed them to acquire new knowledge and techniques and receive intellectual stimulation. In recent years, under the stimulus of lecture activities, the Qinghai scientific and technical workers have not only increased their number of publications but have also improved the quality of their papers. In addition, articles jointly written by Qinghai scientists and outside specialists have also increased.

Such academic activities have also helped to solve some difficult problems in local production. The Qinghai Leather Society invited senior engineer Zhao Shunsheng [6392 7311 3932] of the Tianjin Institute of Leather Technology, a well-known leather specialist in China, to lecture in Xining for 15 days. Zhao lectured on leather-making theory based on the skin structure characteristics of the Qinghai yak, visited the Xining municipal leather goods plant to teach leather technology and improved the layer stripping technique so that three instead of two layers can be obtained. This improvement alone led to a 130,000 yuan increase in the year's output value at the leather goods plant.

The introduction and learning of new technologies are also important contributions of these lecture activities. Qinghai is a high-risk region for heart disease. The provincial medical association has obtained good results by

systematically bringing in outside experts to help develop cardiac surgery in Qinghai. In 1981, research associate Xue Ganxing [5641 3227 5281] of Beijing Fuwai Hospital and others have come to Qinghai to direct the development of heart surgery and have operated on 20 cases, including 9 cases of open-heart operations with external circulation, and all treatments were successful. Such activities have greatly improved the level of heart surgery in Qinghai, and the provincial hospital and the Qinghai Medical Academy hospital have both successfully treated many patients. From June 1981 to August 1982, the Qinghai medical school hospital, in cooperation with the Gaoyuan Institute of Heart Disease, has performed several dozen open-heart operations with external circulation and lowered body temperature. Many patients have recovered very well after the operations and some have already returned to normal activity.

The lecture activities have also helped to train personnel and promote teaching. In 1982, Beijing Institute of Chemical Engineering associate professor Shen Songyuan [3088 2646 3293] lectured to 218 middle and college chemistry teachers in Qinghai on trends in the development of middle school chemistry instruction and pedagogical methods. He broadened the knowledge of the chemistry teachers and improved the quality of teaching in Qinghai.

9698
CSO: 4008/55

LIAONING TO TRAIN 1.34 MILLION SCIENTIFIC, TECHNICAL PERSONNEL

Shenyang LIAONING RIBAO in Chinese 4 Mar 83 p 1

[Article: "Liaoning Should Train 1.34 Million Scientific and Technical Personnel by the End of This Century"]

[Text] A special conference convened by the Liaoning Higher Education Association said that within this century Liaoning's colleges and technical schools should train 1.34 million scientific and technical personnel.

The conference said that on the basis of forecasts of qualified personnel, by the year 2000 Liaoning will need over 1.5 million personnel with higher and middle grade qualifications equivalent to 15 percent of the province's total workforce. Units under province control currently have 460,000 scientific and technical personnel; with a reduction of 300,000 due to natural attrition, a net increase of 1.34 million will be required, necessitating the training an average of 75,000 to 80,000 scientific and technical personnel each year.

Higher education in Liaoning is currently capable of producing 50,000 graduates per year, including 10,000 trained in full-time ordinary universities, 22,000 trained in television universities, employee universities, correspondence universities and night universities, and 18,000 trained in secondary technical schools. There is a discrepancy of 25,000 to 30,000 between current capacity and actual needs. Education must restructure to resolve this contradiction.

8226
CSO: 4008/76

SEPARATION OF DECISION-MAKING POWER, SCIENTIFIC KNOWLEDGE DEPLORED

Chengdu SICHUAN RIBAO in Chinese 19 Feb 83 p 1

[Article: "Power and Science"]

[Text] It has recently been learned that three scientific and technical personnel in a certain unit laboriously carried out a technical innovation. When evaluated by the relevant departments, its energy conservation results were good, and it was awarded a Class 1 award and a prize of 3,000 yuan. But this innovation has not been disseminated, it has been kept under wraps because one of the unit's top leaders will not approve it.

The appearance of every scientific and technical advance adds some strength to socialist modernization. This good principle which benefits the country and the people should be protected, expanded and made to contribute fully to industrial and agriculture production. But many scientific and technical achievements actually meet a tragic fate as soon as they emerge, generally because of opposition by leaders. The problem is that those with power do not understand science and those who understand science have no power. This separation of power and science is a hindrance to scientific and technical development. Many scientific and technical personnel do arduous work to promote China's development, immersing themselves in scientific research. But some research results which represent the heart's blood of the scientific and technical personnel are chocked off by people who do not understand science; how tragic this is!

Innovation is now being energetically pursued. The writer believes that the separation of power and science is particularly in need of correction. Those in power should understand science, and those who understand science should have power. When science and power are closely united, the four modernizations will have great prospects.

8480
CSO: 4008/66

RESTRUCTURING ACADEMY OF SCIENCES TO SUPPORT QUALIFIED PERSONNEL, PRODUCTIVE PROJECTS

Beijing ZIRAN BIANZHENGFA TONGXUN [JOURNAL OF DIALECTICS OF NATURE] in Chinese Vol 5, No 3, 10 Jun 83 pp 1-2

[Article by Zhou Chenglu [6760 2110 7627], Institute of Biology and Physics, Chinese Academy of Sciences]

[Text] Our most urgent task today is to restructure every trade, every enterprise, every department, and every unit for socialist modernization. To keep pace with the current situation without failing to live up to the glorious responsibility given us by the party and the state, the Academy of Sciences should strive to restructure its leadership and management of science and technology.

The restructuring of the Academy should be piloted by ideological reorientation in order to weed out the pernicious influence of radical leftism, to eliminate "egalitarianism," and to administer it by the rule of science, especially the implementation of the policy toward the intellectuals. In spite of the resolute effort and proclamations of the CPC Central Committee and the State Council to implement the policy toward the intellectuals, there is a tendency at the grassroots level to treat the intellectuals as ornaments to be displayed as needed and put away if no longer needed. If the Academy wants to restructure its organization, it must trust and use the intellectuals to do its work. To trust and use them means to have faith in them and use their talent. It must have faith in them before it can use them. It must know how to make best use of a person's talent, and see to it that his responsibility and authority are commensurate with his position. It would not work of one of the three components were missing. A position would be nominal if it did not carry the necessary responsibility and authority. I agree with the view of Comrade Wen Yuankai of the Chinese University of Science and technology that a position of functional leadership would be powerless to direct actual operations if it were not assured of the requisite conditions and personnel. A position of functional leadership must include the authority to decide the direction of research, to select research projects, to formulate research programs, to organize the required human and material resources, to guarantee the completion of the research programs, to evaluate the achievements, and, in the case of applied sciences research, to promote the application of the achievements. I suggest that the leadership of the academy look into these problems and see if every unit has been able to play the role of its functional leadership.

Furthermore, the leading comrades of the CPC Central Committee have pointed out time and again that the necessary means of livelihood of scientific and technical personnel, especially the middle-aged and young intellectuals, must be guaranteed. The leadership of every department should adopt effective measures to implement this as soon as possible in order to make the intellectuals feel secure, the only way to ensure unobstructed progress of scientific research. Today, such measures are highly visible but unattainable to the scientific and technical personnel at the grassroots level because they are not being vigorously and expeditiously implemented. Unkept promises, no matter how many, cannot but dampen the enthusiasm of the intellectuals.

The crucial issue affecting the restructure of the Academy of Sciences is "to pick the best for support," the specifics of which are simply to pinpoint the key projects for full support and cut back the scope of operation by eliminating all non-essential branches, units, projects, laboratories and groups. But there is no consensus on what constitutes "the best" and "the key projects." What is "the best" in the Academy of Sciences? Personally, I believe an applied research project should be rated against the economic returns its actual application generates, while the rating of a basic theoretical research project depends on how it is rated in China and abroad. If it were rated by the researcher's own criteria, it is bound to run into errors. Even though there are few swindlers in the Academy of Sciences, some are still around. The most prevalent practice is for one to exaggerate his own achievement and blow it out of proportion. If a leading comrade indiscriminately believed such one-sided claims and supported it, it would surely result in wanton waste of human and financial resources. In the current pursuit to restructure the organization, I hope the leadership will guard against deception and never rely on the claims of interested researchers in selecting the best projects. It must listen to the views of different circles, weigh the actual returns, and study the comments of people in the same field.

I also want to suggest that both the Academy and its institutes keep complete functional files. This means not only that the Academy itself should have files on all Academy-sponsored high-level research and k36 projects, but that the institutes should also keep functional files to cover annual entries of their achievements. Once both the Academy and its institutes have complete functional files, it would be much easier for the Academy to support the select institutes, and for the institutes to support the select individual researchers. There are four areas to consider while working on the major steps to implement the selection of and support for the best.

First, provide them with funds and facilities. Those institues and projects which register marked achievements in research should receive adequate funding and specific assurance of scientific instruments and facilities. I suggest that each institute receives only operating funds while specific support must be awarded to any key project the moment it is approved. Those projects which have failed year after year to win specific recognition and funding and other unproductive units should be terminated without further delay.

Second, the selection of the best should include preferred promotions of those scientific research personnel who have scored solid achievements. Those with

outstanding achievements should receive multigrade promotion. In early 1950's, some comrades were appointed research associates 5 years after graduating from college, and they did very well in actual research. What was done then can be done now. Only by abandoning "egalitarianism" and "waiting for seniority" can the selection of the best be realized through promotions.

Third, encourage more frequent personnel turnover. As a rule, personnel turnover and the selection of the best projects tend to complement each other. I am in favor of a system of advertising for job applicants as recommended by Comrade Deng Xiaoping. Once personnel turnover is in full swing, the idea that scientific research is "an iron rice bowl" will vanish, and that will surely arouse the enthusiasm of all research personnel. The post graduate students studying at the Academy should be assigned jobs upon their graduation by a central authority. Most of them will not stay to work in the units which graduated them. A college graduate who works for the Academy shall be given only a 3-year contract which must be negotiated anew at its expiration. All good scientific researchers should be assigned to new places. That is good for them because the turnover relaxes academic ideological rigidity and offers opportunities to expose oneself to new environment which complements and enhances academic endeavors. Experienced scientific and technical personnel should be encouraged to serve in distant backward regions to initiate scientific and technological developments all over the country. But they should enjoy job security and adequate means of livelihood.

Fourth, the restructure of government agencies is organizational measure to beef up the selection of the best to receive support. Any unit which has been found unfruitful over a long period of time, be it a research institute or a project group, should be closed, suspended, merged or transferred. There are certain things one must not do before he can achieve what he sets out to do. For many years the Academy has been clamoring to cut back its scope of operation and focus on key projects. However, due to fears of misjudgments and fears of offending people, it still hesitates to act resolutely to get rid of those institutes, laboratories, and groups which have been unfruitful year after year.

In spite of perennial call for centralization, fragmentation gets worse every year, and funding and facilities are still shared equally by all. If the current drive for organization restructure is still overshadowed by timidity and indecision, the program "to select the best to receive support" and "to safeguard the key projects" will inevitably turn into empty talk.

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CSO: 4008/142

MODEL FOR IMPROVED ECONOMIC MANAGEMENT OF RESEARCH PROPOSED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 4, 23 May 83 pp 19-23

[Article by Wu Lantian [2976 5695 3944] and Zhang Guangren [1728 1639 0088], Scientific and Technical Department, Institute No 2, Ministry of the Space Industry: "A Model for Reforming the Economic Management of Scientific Research Units"]

[Text] In recent years, the departments of the national economy have experimented with various types of economic responsibility systems, achieving excellent results and accumulating rich experience. Scientific research has also been deeply affected. Scientific research is a combination of modern science and technology which is an expression of advanced productive capabilities and has extremely broad coordination relationships. If it is not managed according to economic methods, there will be limitless expenditures, high prices will be paid, production costs will be huge, and blind purchasing will occur.

Operating expenditures and materials consumption in scientific research are extremely "soft." Research expenditures and materials consumption in a research project are connected to such factors as the quality of the equipment and supplies chosen, the nature of the research programs for individual topics and of the research and development programs, the length of the research and development period and the number of cycles in it. There is great disparity in the extent to which an economic approach is taken to these matters.

In designating a large piece of equipment, there is a great amount of leeway even while adhering to specifications, and among the multiplicity of programs and technologies one may either go in for grandiose schemes or make do with what is available; thus materials consumption and expenses may vary severalfold or even several dozenfold. If the development period is long and the number of cycles in it is large, expenditures will increase accordingly. This softness of research expenditures is controllable; by relying on the art of research management, it is possible to get even more work done with limited funding. Some institutes' experience in using the project contracting approach has fully proven this point. For example, in the development of a certain computer, the development expenditures for comparable domestic products had been 800,000 yuan; the authorized sum in the project contract was 350,000 yuan, and after the task was completed the actual expenditure was only 249,000 yuan.

Obviously, a great deal can be accomplished through management. Some say that scientific research expenditures must not be given free rein, but must be rigidly controlled, and that if a lax approach is taken they will double and redouble.

In the system of management of scientific research, administrative intervention is primary and economic management is secondary; plan guidance is primary and regulation by the market is secondary. With these preconditions, if economic management is applied and the economic management model of "a vertical performance contracting system, a horizontal contracting system, and a system of bonuses for individual scientific research results" is applied, excellent results can be achieved.

Structure of the Elementary Model of Economic Management

The structure of the elementary model of economic management is "a system of vertical performance contracts, a system of horizontal contracts, and a system of bonuses for individual scientific research achievements." Distinguishing independent economic accounting units from administrative command systems, this approach institutes a job responsibility system and a technical and economic responsibility system, gradually including all personnel and all assignments within the scope of economic management.

1. The Vertical Performance Contracting System

The vertical performance contracting system is a form in which expenditure and assignment completion contracts are concluded between the higher and lower levels. Using economic methods to manage research and development tasks and making clear the personnel's technical and economic responsibilities will improve work effectiveness and economic results and assure the completion of plan assignments. The higher levels (ministry, academy, bureau, corporation and the like) may use system contracts, assignment contracts or profit contracts in dealing with research institutes, and the institutes may use research project contracts and other forms of job economic responsibility systems in dealing with their laboratories and shops. The key aspect of the elementary model is an economic package consisting of contracted assignments and unification by the plan; in other words, assignments are handed down in the annual plan, funding is allocated for each assignment, and performance of the assignments is contracted for. The research topic is the basic unit for plan assignments and economic accounting, and vertical performance contracting should start with research topic contracting. Independent economic accounting organizations should use research contracting as the basis and contract all assignments handed down in the plan; this is called "all-assignment contracting."

Large-scale contracting in terms of a project, system or aggregate economic indicators requires the creation of certain conditions. In particular, plan management, topic management, financial management, and goods and materials management must be guaranteed to some degree, and the scientific research institutes must establish a system of economic indicators. The circumstances of organizations differ, but the key is to take the first step. They may

start with research project contracts and proceed from the contracting of specific assignments to the contracting of all assignments; and they may expand from spot experiments to blanket implementation. The scale of the activities involved will expand from small to large, from individual topics to systems and then to programs, ultimately developing to the level of multiple aggregate indicators.

The vertical performance contracting system may use different forms in different cases. In general terms, it has two main aspects: first, different categories of personnel, and second, different categories of assignments. Using the example of a research institute, the job responsibility system can be used with management and service personnel, with each person having a specified job involving specified responsibilities in terms of which evaluation is made for work points and bonuses; in the case of front-line scientific research personnel, the technical and economic responsibility system can be used, in which technical indicators, quality indicators, progress indicators and expense indicators are contracted for in each individual project; in the case of workers in experimental shops, quota management can be used. Research topic assignments fall into two main categories. The first is software research, such as program evaluation, theoretical studies, methods research, computer programs and the like. The results of such projects are documents and data, and expenditures are small. But some topics are extremely difficult, and the theoretical level and utility value are very high. There is no way of relating the mental labor expended on these projects to the operating expenditures. The other category is hardware development, i.e. topics involving the development of equipment, instruments and key components and assemblies, whose results are objects, and which include research, planning, trial production, production, and testing processes. Such projects involve rather greater expenditures and are more suitable for economic accounting. Different contracting forms can be used for the different types of topics: in software research, quota contracting can be used. Once the project is decided upon, the technical requirements, expenditure and investment limits, and progress indicators are specified, and if the assignment can be completed in accordance with these requirements a specified bonus is paid; it is increased for ahead-of-schedule fulfillment. If the project cannot be completed in accordance with the requirements, an economic penalty is imposed in accordance with the specific circumstances. In hardware development projects, the method of budgeted contracts and sharing of savings may be used. Once the topic is decided upon, the technical quality indicators, plan progress indicators and expense limit indicators are fixed, all three are contracted for and are evaluated in combination. Provided that the quality and progress indicators are satisfied, a percentage of any saving on the authorized expenditures is used as a bonus, based on the contribution made. The share of savings is used to set up a scientific and technical development fund, a collective welfare fund or a bonus fund.

2. Horizontal Contracting System

The horizontal contracting system is a system of economic contracts between various brother departments within an institute. The signing of economic contracts must be carried out under plan guidance. The higher-level organs hand down or contract out assignments and allocate authorized expenditures to the

responsible units that have taken on the tasks, and during the development work, the responsible unit can sign economic contracts with various brother departments to perform work which it cannot complete itself such as research, design, production, testing, measurements, computations, analysis and evaluation, provision of information, large-scale duplication, fixed-quantity transport, loan of instruments and equipment, and the like.

If the shops and laboratories within the institute are not independent accounting units, when they sign scientific research contracts with each other they use "project book" accounting, and the institute conducts centralized accounting covering expenditures for all types of assignments. Contract fulfillment by shops, departments and laboratories is treated as an evaluation indicator which is used in determining bonuses.

3. Awards for Specific Scientific and Technical Achievements

Scientific research is complex creative labor. The labor results generally are expressed as academic values, social values, utility values and economic values. The commodity category of some scientific research results is unclear. In some projects, the economic value is not immediately evident or is hard to estimate. In addition, the form in which scientific results are directly expressed is sometimes not material, but rather is "intermediary" between material and spiritual form, as in the case of articles, reports, charts, data and the like. The mental labor of scientific research workers requires that they read through large amounts of documents and data, carry out large amounts of scientific experimentation, and subject it to painstaking, meticulous mental processing of their own. The ultimate "intermediary" has a latent value with immense, far-reaching effects in developing production. Therefore, the value of scientific and technical personnel's labor must be correctly evaluated and they must be given their proper compensation or reward.

Awards for individual project results are subject to a level-by-level management system. The state has issued the "Regulations on Awards for Inventions," the "Regulations on Awards for Natural Sciences," and the "Regulations on Awards for Technical Progress," and the departments, academies, bureaus, corporations, institutes and the like must have their own award systems for scientific and technical results. They should withdraw a certain sum from the awards fund which they have received from scientific research to be used as award payments.

They should develop a classification based on the level of scientific and technical achievements. They should establish an examination and evaluation system for scientific and technical results so that the labor of scientific and technical personnel is rated at its proper value. This approach not only places appropriate value on the labor of scientific research personnel, but in addition is effective in stimulating their enthusiasm. The system of inspection, evaluation and awards for scientific research results will call forth the latent mental abilities of the scientific and technical personnel, concentrate them, enter them in technical files, and convert them to collective and national wealth.

4. The Relationship Between the Vertical Performance Contracting and Horizontal Economic Contracting Systems and the System of Awards for Individual Scientific and Technical Achievements

The system of vertical performance contracts, the system of horizontal economic contracts, and the system of awards for individual scientific and technical achievements form the economic management system of the scientific research unit and embody all types of economic relationships; they are a specific form of the job economic responsibility system and the technical and economic responsibility systems. The three are interdependent and self-supporting and permeate every area of scientific research work.

The performance contract system embodies the subordination relationship of higher and lower levels, and the economic contracting system reflects the cooperative relationship between brother units.

There is a subordination relationship between the upper and lower levels in both administrative and economic terms; it is a relationship of leader and led, rather than a relationship of equality. The vertical performance contract form is suited to these relationships, in which the higher levels offer tasks and the lower levels contract for them. The higher levels have the right to review and authorize the tasks which the lower levels have contracted for, and those who have contracted for work can realize a greater gain than those who have not contracted for work. If certain units are unwilling to take on contracts, the higher levels have the right to hand down directive plans, allocate research and development expenditures, and reimburse them for what they have spent after the assignments are completed. Excess development funds are paid back, and any shortfall is reimbursed, and the development organization does not get to keep a percentage, so that it does not realize a gain. Individuals who do not contract for tasks generally can draw only their unit's general bonus, and their gain is smaller than those who have contracted for assignments. In the process of contracting for assignments and of carrying out performance contracts and economic contracts, the higher-level organizations and service departments must take on some responsibilities with regard to those who have accepted the assignments and must embody them in the job economic responsibility system.

Operating expenses are distributed in accordance with plan, and a price must be paid for the cooperation of brother organizations: the economic contract embodies this relationship. Because economic contracts involve a purchaser and supplier who are on an equal basis in administrative and economic terms, agreements based on mutual benefit and equality are suited only to brother organizations and not to the relationship between higher and lower levels. Provided that performance of the higher levels' plan assignments is assured, any organization has the right to accept a cooperative assignment offered by a brother organization. Contract assignments are additional outside-of-plan assignments for which the higher level has not distributed operating expenses, and an economic benefit from them. The horizontal contracting system is a supplement to the vertical performance contract system and the command plan and is a measure which assures performance.

Comprehensive implementation of the vertical performance contract system, the horizontal economic contract system and the system of bonuses for individual scientific and technical achievement can put an end to the "big rice pot" and the "iron rice bowl," help improve economic results, and enlist the enthusiasm of all types of personnel. When this model is implemented, all organizations' general bonuses can be minimized or eliminated.

Some Problems Which Must Be Solved in Introducing the Elementary Economic Management Model

Since 1980, some scientific research departments have carried out spot experiments using research-topic contracting, scientific research contracting and awards for scientific and technical achievements to various degrees and have achieved excellent results and accumulated valuable experience. To disseminate the experience of the units participating in the experiments and to test the preliminary economic management model, it is necessary to solve a number of problems. The primary ones are as follows.

1. The Functions of the Three Management Department, Namely Planning and Dispatching, Financial Management, and Support, Must Be Fully Performed

Trial implementation of economic management is a major reform of the economic management system which affects all of its aspects and permeates all of its areas, making considerable changes in every area across the board from management thinking to the management system, and which places the focus of management on improving investment results. The content of management work is extremely broad, but the most important thing is to strengthen the functions of the three management departments, namely planning and dispatching, financial management, and support.

a. The basic functions of planning and dispatching departments are planning, organization and control. Planning and organization serve to carry out optimal control of the unified movement of systems, personnel and values to achieve the objectives of producing results and trained personnel and improving investment results.

The research plan is the center of all management activity. It must deal effectively with the relationships between needs and capabilities, the overall situation and its parts, the key aspect and ordinary aspects, progress rates and quality, and long-term and short-term, and must make full use of the plan's ability to guide assignment contracting, economic contracting, and awards for results. Plan tasks which are handed down must include the higher level's command plan assignments, the contract tasks offered by the brother units, and assignments selected by the unit itself, with the focus on assuring performance of the assignments handed down by the higher level. The planning departments must keep a record of the tasks which have been taken on by each unit each year, they must designate multiyear revolving plans, and they must organize conscientious technical and economic evaluation of new projects. Plan evaluation indicators must be conscientiously analyzed and studied and must be set in accordance with the characteristics of the subordinate organizations. The capacities of all parties must be organized and work carried out in coordinated fashion via the plan.

Performance of the plan must be controlled by means of dispatching. The leadership organs must create favorable conditions for research personnel and resolve all difficulties. They must effectively allocate personnel and financial and material resources and effectively implement cooperative projects and processing assignments.

b. The basic functions of the financial management organs are regulation, oversight and service. By means of economic accounting and rational distribution of expense funds, they decrease investments, improve labor efficiency, assure the accomplishment of all assignments, and furnish the greatest amount of intellectual and material wealth, of the best quality, to society. They must strengthen financial oversight and assure that state financial and economic discipline and the individual units' financial budgets are observed. They must use investment of funds and distribution of financial gains to regulate the proportionalities between all types of assignments, and must make thorough use of all types of personnel.

Economic accounting is the basis of economic management; the two sustain each other. Only if the economic accounting system is operated effectively is it possible to exercise economic management, and only if economic management is exercised will economic accounting have objectives and a real significance. Economic accounting must be systematized to assure that accounts are kept for each research topic and that there are complete records for each assignment. Consumption quota figures must be accumulated for various types of assignments, and all types of assignments must be subjected to financial analysis.

c. The main task of the support departments is management of goods and equipment. Their main functions are procurement, supply and management. They must establish effective goods and equipment procurement, supply and management systems, assure the completion of scientific research assignments, guarantee that state assets will be used effectively. They must stringently control material expenditures on research assignments, supply every assignment and every research topic, and make timely reimbursement to the financial departments. After assignments are completed, any excess materials and equipment must be recovered in timely fashion and dealt with centrally, and every effort must be made to decrease overstocks. General-purpose, precision, and valuable or low-use-rate instruments and equipment must be centrally managed for general use or specially managed for special use, applying the methods of compensation, rental or leasing. Materials consumption and cooperative expenditures for research projects and assignments must all be calculated.

In goods and equipment procurement and supply the emphasis must be laid on the four implementations. If assignments, plans, programs and measures are not carried out, it will be impossible to organize orders and supply. Because research organizations are involved in research, they make considerable use of new types of goods and equipment and have made considerable demands on measuring instruments; since the design period is long and the trial production period is short, their goods order period is particularly short. When the economic responsibility system is implemented, material supply must do everything possible to rectify this passive situation. Therefore, the material

and equipment supply personnel must understand the specialized fields and the nature of the assignments. The materials departments must establish various types of statistical data on materials used for assignments, generalize patterns and improve their forecasting abilities. Equipment handbooks must be drawn up for commonly used equipment, and production locations must be specified. The range of equipment and parts and components to be used must be specified for new projects. Information on goods in stock must constantly be reported to the user departments. The research and development personnel should make selections in accordance with the information presented by the materials departments. Excessive amounts of new types of goods and equipment should not be used for new products; if new types of instruments are used, information should be filed with the materials departments in timely fashion. The materials departments and scientific research personnel must establish close economic and cooperative relationships.

2. Leadership Cadres and Organization Personnel Must Implement the Job Economic Responsibility System

Leadership cadres and organization personnel must establish jobs and their responsibilities, carry out strict evaluation, and mete out rewards and penalties. If the higher level's plan cannot be completed, not only must the bonus level of the organization unit in question be decreased, but there must be a deduction from the leadership cadres' bonuses. Currently, the leadership cadres and personnel of the administrative organs have not had their job responsibilities made clear, and their economic interests are not embodied in concrete form. There are no specific indices or specific methods, and no complete system for cadre evaluation, so we must gradually establish macroscopic and microscopic standards for quantity and quality of work, institute an evaluation and criticism system, and link economic benefits to job responsibilities.

3. Quota Management Should Be Instituted in the Research Organizations' Experimental Shops

Trial production in the development shops is an important link in the research and development process. When the shops take on trial production tasks for the laboratories, they may sign economic contracts, or the cognizant organizations may hand down command plans. Provided that the shops complete their research tasks, they may take on product assignments and other assignments as their capabilities permit. Establishing evaluation standards for the shops and establishing categories of workers at the same level requires standards. The shops should be evaluated singly, assignments and economic and other indicators should be handed down every month and every quarter, and a bonus should be assigned to the ones which surpass their quotas. In order to assure completion of performance contract and economic contract assignments, they must be embodied in some way in the evaluation indices.

4. Trial Production Plants and Research and Design Organizations Should Have Equal Economic Rights and Interests

Project-type development generally involves the two processes of mental and materialized labor. Product design and trial production are interrelated

stages. Trial production plants and research and design units have the same objectives and basic interests. On the other hand, trial production plants and research and design units are separate economic entities, and their relationship is a cooperative relationship of brother units; once economic management is instituted, these two parties will carry on economic interchange and should have equal economic rights and interests.

The two parties can be distinguished in two ways: in terms of their nature and tasks, and in terms of the product development process. First, once the two parties' responsibilities and place in division of labor are clearly defined, the additional tasks outside their job responsibilities are handled under the cooperative form by signing economic contracts. Second, all activities through design finalization and handing over for production or small-lot production constitute the research and trial production stage, and the task is that of the research and design unit; in such activities as trial production of models, prototypes and test models, the research and design unit may propose cooperation with the trial production plant. After small-lot production has begun, the responsibility is that of the trial production plant. The design unit may take part in production consulting, product debugging and testing, furnishing of data and the like, but it is the trial production plant which requests cooperation from the research and design unit. Economic contracts are signed for all cooperation. When products with finalized design are moved into lot production, the research and design organization collects a proportion of the earnings from the trial production plant in terms of the product's viability, the lot size and the nature of the cooperation between the two parties during the research and development process. For highly viable, large-lot products in which the trial production plant's labor contribution in the research and development period was small, the research and design unit's proportion can be somewhat larger, while in the opposite situation its proportion may be smaller. A suitable number of years during which the proportion may be collected should be specified. The proportion generally should be somewhat lower than when technology is transferred to noncounterpart plants.

5. Handle Distribution Relationships Effectively, and Take Account of the Interests of the State, the Collective and the Individual

The key problem in distribution is how to issue awards. In scientific research units the division of labor is extremely fine, including individual labor, so that formulating the award clauses is extremely complex. The general principles are: first, if different types of labor are distinguished for evaluation purposes, they are treated as separate for award purposes; second, individual bonuses should accentuate differences, should be fair and rational, and should correctly embody the principle of more pay for more work.

The awards for individual scientific achievements should not be subject to a ceiling. The awards should be paid out to a rather narrow range of recipients, and those for individual achievements should be high rather than low.

6. Inspection and Evaluation of Scientific and Technical Achievements Must Be Effectively Conducted

In inspecting and evaluating scientific and technical achievements, the three factors of organization, standards and methods should be implemented. Organizational work should be performed under the cognizance of the scientific and technical committees at the various levels. Relevant high-level experts should be involved, in keeping with the nature of the results. The participants may differ somewhat for consideration of different types of results. The evaluation standards should be as specific as possible. But because the value of scientific and technical results is not as easy to compute as that of product production costs, it is only possible to specify the point range of each indicator. The number of points for each indicator must be decided in terms of the nature and orientation of each research unit's assignment. For example, units engaged in applied research or developmental research should be assigned a high number of points for the application value of their results. The inspection and evaluation methods should be different from level to level, and explanation, publicity and reply procedures should be organized before voting and computation of points. Those with the highest number of points are awarded bonuses. All scientific and technical results should be given a class rating.

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CSO: 4008/107

RESEARCH ON IMPROVING SCIENTIFIC, TECHNICAL MANAGEMENT URGED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF SCIENCE AND TECHNOLOGY] in Chinese No 4, 23 May 83 pp 2-3

[Article by Yang Guobing [2799 0948 1456], Chongqing City Scientific and Technical Commission: "We Must Attach Full Importance to Research on Restructuring the Scientific and Technical Management System"]

[Text] Restructuring the scientific and technical management system is as important as restructuring the economic system. This fact stems from the requirement that "China's economic development must be based on scientific and technical progress." But restructuring the scientific and technical management system cannot now proceed in parallel with economic restructuring; people have not accorded it sufficient importance, and theoreticians have made very little study of this type of restructuring. I believe that this stems from a long-standing failure to accord sufficient importance to science and technology.

The restructuring of the economic management system in accordance with our country's specific conditions has already begun and guided, planned spot experiments have been conducted. In addition, there has been a long period of discussion and research, and many research results regarding the restructuring of our economic system have already provided rather good guidance. Currently, on a national scale, the economic restructuring has already proceeded from such particular reforms as expanded enterprise autonomy to the comprehensive stage of constructing an integrated economic system with open economic districts, based on relatively well-developed central cities. Because we have not only studied the economic restructuring as a real practical problem, but in addition have approached it as a major scientific problem of the construction of Chinese-style socialism, we have been able to maintain clarity in the undertaking and adhere to the practical orientation of Marxism in guiding the restructuring, making gradual if arduous progress.

The restructuring of our scientific and technical management system should be done in the same way, proceeding on the basis of the actual situation, starting with an initial restructuring involving expanded autonomy for scientific research organizations, and not only conducting guided, planned spot experiments, but also studying it as a scientific problem. Marxism-Leninism

holds that theoretical research must be accorded full importance. If theory is not clarified, ideological understanding will not be improved and practical activity will inevitably be blind. Restructuring of the scientific and technical management system must follow the principle that practice is the only criterion of truth; we must investigate boldly and conscientiously and achieve a clear theoretical understanding of the directions, objectives, paths and procedures of restructuring.

We must accord full importance to research on the scientific-technical management system, because it is an extremely onerous and complex undertaking. In macroscopic terms, it involves such areas as the political and leadership system, the economic system, the production structure, commodity price and labor systems, the cadre system and the wage system. In microscopic terms it involves all links within the scientific and technical management system, including the setting up of organizations, drafting of plans, personnel training, cooperative efforts on key problems, the dissemination and utilization of results, sources and channels of funding, and consulting services to society. Modern science and technology are ever-changing, and as a result the scientific and technical management system must have flexibility and adaptability. Comparing it with the relatively stable administrative and economic systems shows up more clearly the complexity of restructuring the scientific and technical management system. If such an arduous and complex undertaking is not systematically and thoroughly studied, it will be difficult to seize the initiative.

For example, there is a great deal of blind action in the current restructuring of the scientific and technological system. Some research and education units request that they be able to be scientifically self-sufficient as the countryside is and that they be allowed to support themselves by contracting. They hope that the compensation received by scientific and technical personnel and teachers will, like that of the peasants, "have no ceiling," and that they will become prosperous. I believe that this rather vague formulation does not take account of the nature and characteristics of scientific and technical work, shows an absence of investigation of the laws of scientific and technical development, and lacks both practical experience from spot experiments and a basis in scientific theory. If such a restructuring was instituted, would it truly be able to promote the development of socialist science and technology? Can scientific and technical research be managed in the same way as agricultural production? Is there only one path to restructuring? We have not studied these questions enough to clarify them theoretically, and we have not arrived at a satisfactory answer based on practice. The superficial assertion that because agricultural production received a great boost from contracting, by extension everything else can be done by contract in the same way, and that scientific research should be no exception, is an unconvincing argument. Again, if we consider the restructuring programs of a few provinces and cities, the reform of the scientific and technical structure is all comprehended within the three terms "eliminating," "combining," and "setting up." But what structures should be done away with and why? What structures should be combined and why? What structures should be set up and why? There has not yet been any conscientious research. Usually there are just superficial comments with no theoretical underpinnings. As a result, there is generally a lack of

awareness and a great deal of blind action. Furthermore, how can the five main scientific research forces in our scientific and technical system, namely, the Chinese Academy of Sciences system, the advanced schools, the national defense system, the industry systems and the regional systems, readjust their structure and chains of command in response to the establishment of the various economic regions throughout the country, and coordinate them so that they thoroughly serve social and economic development? In this area there is an even greater lack of scientific research, and there is no theoretical or ideological preparation.

In his report, "The Four Modernizations and Restructuring," Comrade Hu Yaobang stated that the general guidelines for restructuring are: proceeding on the basis of the actual situation, carrying out comprehensive, systematic restructuring, and always conducting it in an orderly fashion. This requires that we systematically study China's special circumstances, concentrating on the new situations and new problems which will arise in all aspects of restructuring and on their interactions and mutual constraints, so that our reform work will be in accord with the actual situation and with objective laws, will not violate the basic principle of adhering to the socialist system, and will avoid headlong, metaphysical approaches and blind, rash alterations which spoil a good undertaking. We have taken many tortuous paths in the past and have done a good many things which it is now painful to recall. The reason was not only that we lacked a profound understanding of socialism, but also a result of our failure to conscientiously study our actual circumstances in the course of practical activity and to find an optimal means of relating them to our socialist system.

I believe that in the current restructuring of the scientific and technical management system, we must restructure it, not only boldly but also skillfully; we must not only obtain experience through spot experiments in basic-level scientific research units, but also must gradually derive a set of Chinese-style theories of the socialist scientific and technical management system from our practice, using theory to find the key to the restructuring of our scientific and technical management system so that, like the reform of the economic system, it will proceed even more smoothly.

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CSO: 4008/107

CAS DRAWS UP PLAN FOR REFORM OF RESEARCH MANAGEMENT

Beijing GUANGMING RIBAO in Chinese 17 Apr 83 p 1

[Article: "Chinese Academy of Sciences Draws Up Plans for Reform of Scientific Research Management"]

[Text] The Chinese Academy of Sciences' Management Science Work Conference, which ended on 16 April, stated: "Scientific research must be restructured, and restructuring requires scientific research." Scientific and technological research and research on the management of development (more briefly, "scientific research management") should be closely integrated with the practical work of restructuring and should begin with basic work. Research on modernizing the theories, methods, and techniques of management science should be emphasized and strengthened so as to provide a scientific basis for a restructuring of the scientific and technological front and to contribute to the modernization of our country's management.

With the authorization of the CPC Central Committee and the State Council, the Chinese Academy of Science set up a management science study group, equivalent to an academic department, in May 1981; at present the group has 24 part-time committee members from academic departments. The work conference in which about 50 persons, including leaders from some branch academies and relevant specialists from some universities and colleges, participated, was convened by the study group. The purpose of the conference was to discuss organizational matters related to the formulation of a plan for the restructuring of scientific research management and to the full academy's study of scientific research management.

Participants in the conference pointed out that our country's scientific research management has achieved comparatively great progress in recent years and that scientific research management, as an "interface science" involving social science, natural science, and engineering and technology, has begun to be emphasized in various areas. But both management theory and management engineering are just the first step; the calculation and analysis of scientific and technical labor, capabilities and economic results still lack scientific method and accurate fundamental data. The assessment of scientific and technological personnel and the evaluation of achievements also still lack strict quantitative methods, and the conditions for computerization and automation of management are yet to be created. The system of scientific research

management and some of the policies involved still have drawbacks and are in great need of reform. The restructuring of scientific research management will be difficult and will not yield results if the above-mentioned fundamental work is not well-carried out. Therefore, the representatives unanimously agreed that the restructuring of scientific research management must be resolute, but its pace must be steady, and research in management science must be begun first and must be emphasized. Some participants concluded that scientific research labour and industrial or agricultural productive labour have different characteristics and that the restructuring of scientific research management and distribution methods should not simply copy the production contract responsibility system in the villages. During the use of various forms of scientific research task responsibility systems and job responsibility systems, close attention should be paid to different types of scientific and technological work, such as theoretical research, applications research, development of technologies, trial production of new products, and mass-style technological innovation. They should be administered individually and in differentiated fashion, not in one set manner.

More than ten aspects of planning for the restructuring of scientific research management were raised at the conference. Among those in which results are needed this year are: differentiated management of scientific and technological activities, delineation and interconnection of scientific research organizations' responsibilities, authority and benefits, and questions concerning the dissemination of scientific research achievements.

Chinese Academy of Sciences Management Study Group Vice-Chairman Wang Minxi [3076 2404 3556] chaired the conference. During his talk at the conference, Management Study Group leader and Vice-President of the Chinese Academy of Science Qian Sanqiang [6929 0005 1730] stressed the fact that scientific research management also needs to emphasize an innovative spirit, and to establish a Chinese-style administrative science.

12365
CSO: 4008/93

MANAGEMENT SCIENCE AND ITS APPLICATION MUST BE REINFORCED

Taiyuan JISHU JINGJI YU GUANLI YANJIU [RESEARCH ON THE ECONOMICS AND MANAGEMENT OF TECHNOLOGY] in Chinese, No 4, 31 Dec 82, pp 26-29

[Article by Wu Fengxiang [6762 7685 4382]: "We Must Strengthen Research in Management Science and Its Application"]

[Text] Comrade Hu Yaobang pointed out in his report to the 12th Party Congress: "We must strengthen research in economics and management science and their applications, ceaselessly improve the standards of planning and management of the national economy and the standards of operations management of enterprises and services." What is the meaning of "management science" here? Why must we strengthen research in management science and its applications? How can we strengthen it? Some insights from my studies on these questions are discussed below.

I. What is "management science"? Ordinarily people understand it in two ways. One view is that management science is an "academic discipline." The other view is that management science is a "school of thought" of this academic discipline. The management science mentioned in the report by Comrade Hu Yaobang, as we understand it, refers to the general "academic discipline" of management, not a concert "school of thought" in management.

Management as an area of social division of labor existed a long time ago as a profession. Around the turn of the century, management became a scientific theory, an academic discipline which was knows as "scientific management" at the time. The academic discipline of management developed into many management theories and schools of thought around the 1940s of this century. Management science was one of the important academic schools of thought of this academic discipline.

The theories of management science as an academic school of thought can be generally discribed as "emphasizing materials and neglecting people", i.e. the so-called "X theory". Its subject matter mainly concerns the question of how to organize productive forces and emphasizes the management of material factors.

The central research subjects of management science as an academic discipline are management questions in industrial and commercial enterprises. But its

theory is not only applied to various types of production enterprises and sectors, but is also suitable for application in various types of administrative and service units and sectors. To manage an enterprise or a business unit well involves not only questions of the organization of productive forces, but also questions of the improvement of production relations. Management science is a science that studies the objective laws of rational organization of productive forces and of safeguarding and improving production relations in order to suit them to the development requirements of the productive forces and in order to stimulate the continued development of productive forces. We believe that this is the management science that was referred to in the report to the 12th Party Congress.

The science of management in China is relatively backward in terms of theoretical research, and its practical application is even more backward. To adapt to the requirements of the glorious strategic goals, while our industry, agriculture, commerce, transportation and construction enterprises, units and sectors need to greatly improve their standards of management, our hospitals, schools, offices, services and similar service units and sectors need even greater improvement in their standards of management. Therefore, strengthening research in management science and its applications is needed to realizing the strategic goal of quadrupling national output value and is one of the "four necessities" of the third strategic focus.

Management science does not have a long history. It is not old; as an academic discipline, it is a "newcomer". Some people say that its emergence is a major event of the 20th century. In today's world, whether in advanced and developed nations or in developing nations, this science is greatly emphasized. Its rapid development and the emphasis placed on it by every nation, making it the "pets of scientific research, all originated from the needs of practice and development. The progress of modern science and technology and the detailed division of labor in society require more coordination among the various sciences and technologies before complex, multidisciplinary practical problems can be solved smoothly. Therefore "frontier sciences" are more popular. Management science is a comprehensive frontier science that spans the social sciences, natural sciences and technical sciences. Enterprises need it and service units need it. Academic courses majoring in management offered by finance and economics schools can be said to have a long history, but management majors offered by engineering schools have already caught up. In the past, the management major was long regarded in China as an unpopular course of study that nobody wanted to pursue because there was no future in it. Now, it has become the popular course that everyone is taking because everyone believes that there is a great future in it.

II. Management science is being emphasized more and more and has become a popular science. This shows its importance and also shows that the people's level of understanding of it has improved; therefore we must strengthen our study and application of it. Where is the necessity of management science manifested?

First, the importance of management in the development of enterprises is represented by the theory of "30 percent and 70 percent". This theory

states that the success or failure of an enterprise depends on 30 percent technology and 70 percent management. Management is the decisive factor in whether production activity and operations of an enterprise are good or bad and whether an enterprise will be successful or will fail. The theory of "30 percent and 70 percent" originated in the United States. Later it was proven by Japan's experience. Many of our enterprises, when compared to similar foreign enterprises, are visibly behind in efficiency, result, and benefits. Although backward technology is also a factor, the main reason is backward management. In technical equipment, we have imported full sets of foreign products but the results have been only a fraction of those obtained by others; this further proves the theory of "70 percent reliance on management". Since the Cultural Revolution, most of our enterprises could be said to have progressed technically to varying degrees, but many technical and economic indices are still stagnant and have even regressed. Thus, we must frequently campaign for "restoring the best level of the past" mainly because during the Cultural Revolution the mandate life of management was overthrown, greatly weakening it, causing it to regress and forcing us to advocate a restoration. To restore the best levels reached by such indices in the past, we must first restore the best management level of the past. If management is not restored and improved, the best technologies will not be able to have their original effect. For the enterprises, the reason for the theory of "30 percent and 70 percent" is that most technical problems are problems of execution, while most management problems are decision problems.

Second, the importance of management for the four modernizations is manifested by the theory of the "two wheels". One is advanced technology, and the other is advanced management. These are the two wheels that are indispensable in the four modernizations. The theory of "two wheels" is the experience of the method used to achieve rapid multiple growth in the Japanese economy; it is also a method that many of our comrades strongly urge that we should emulate. Our four modernizations are socialist and also Chinese in style, and therefore we must adhere to the four basic principles. This is the direction and the prerequisite for the four modernizations. Taking this direction and with this prerequisite, how can we hasten the realization of the strategic goal of quadrupling national output value? One requirement is to have capital, the second is to have technology, the third is to have management. Management is the key factor among these three major factors. If management does not progress, funds and technology cannot be used at the right places and cannot produce the effect they should, and this will create serious accumulation and shocking wastefulness. Comrade Deng Xiaoping pointed out a long time ago that there are two things that might retard the four modernizations: one is management and the other is lack of capital. A shortage of capital can be made up by borrowing, and a lack of technology can be made up by purchasing it; but if we do not understand management, it will be difficult to borrow funds and even more difficult to purchase technology. In management we can only rely on our own efforts. Studying the experience of every nation, we see that no economically modernized nation is established on a foundation of backward management. Therefore, management is the key to hastening the realization of the four modernizations.

Third, the importance of management in the light of social progress is illustrated by the theory of the "three major pillars". One is management, one is science, and one is technology. These are the three major pillars of modern social progress and civilization. Management is the foremost among them. Social progress includes the development of a material civilization and a spiritual culture. The key to building up these two civilizations is an economic buildup. We have already mentioned that the key factor in hastening the economic buildup is management. Professor Engels of West Germany has said that to determine if a nation is rich or not, the main factor to observe is not the abundance of its natural resources but its ability to organize its economy. Resources are important factors in development, and management itself is an important resource. When the management level is low, it is possible to waste resources. When the management level is high, we can conserve resources and even create resources. This is the reason why we advocated that management be asked to produce output, quality, results and benefits. Therefore, in developing resources, we must first develop the important resource of management. We should strengthen research in management science and its applications and improve the management level of each profession. To quote Professor Peter Drucker, the American master of modern management: "Management is the most fundamental key factor in stimulating social and economic development."

Fourth, the importance of management to human existence is expressed by the theory of "social responsibility". Preventing pollution by the "three wastes", protecting the environment for human existence and development, and maintaining ecological balance are social responsibilities of management that cannot be shirked. They are also an important component and task of management. Building many factories and modernization of the economy can create fortunes and culture for mankind, but on the other hand, if we do not pay attention to environmental pollution caused by the "three wastes", disaster and pain will be brought upon people. "Creating fortunes at the front gate" should be done but "releasing poison from the back door" must not be allowed. It is not true that the socialist system has no problems caused by the "three wastes". Its superiority is mainly manifested in the ability to self-consciously prevent and treat the problem of the "three wastes". Our persistent adherence to the important principle of "three simultaneous efforts" in capital construction is a concrete manifestation of this superiority. To protect the environment of human existence well and to benefit future generations, management must include "management of the skys, management of the earth, and management of the atmosphere in between." This is the glorious responsibility of management in society and it is also the major contribution of management to mankind.

Above, we have briefly described the importance of management in the development of enterprises, in the four modernizations, in social progress and in human existence. It is not difficult to see that the report to the 12th Party Congress clearly specified strengthening research in management science and its application. This not only has an important practical meaning, it also has a profound historical significance.

III. It is clearly stated in the party documents that we must strengthen research in management science and its applications. This by itself shows the importance of management science, and it is also a great encouragement for comrades engaged in research in management science and its applications. To guarantee the realization of the strategic goal of quadrupling national output value while ceaselessly improving economic benefits, we should first solve effectively the problems in the following three areas well as we implement this "imperative" among the strategic focuses proposed by the 12th Party Congress.

First, we must change our thinking. For a long time, whether in public opinion or in carrying out economic work, we always held the ideology of emphasizing technology and neglecting management. We neglected research in management science, we neglected training and use of managerial talent, and as a result we suffered serious loss. Now, it is time for us to change from the attitude of emphasizing technology and neglecting management to the attitude of emphasizing technology but emphasizing management even more. In addition, we must quickly change from verbally advocating emphasis on management to actually implementing measures and according full importance to management from top to bottom. We must have the concept of "70 percent reliance on management", we must also understand the process from "input" to "output" in management problems. The "production cycle" in management is much longer than the period from input to output in technical problems, and therefore it is not easy to get instant results, and it is not easy to see the direct relationship between cause and effect. Because of this, management problems are frequently neglected by people, and often tend to be pushed off the daily agenda. Thus, we must not only emphasize management in general terms, but must also emphasize management in strategic terms and in long-range terms.

Second, we must emphasize training and use of managerial talent. We have a very large population but very few trained people. The waste is very great. These three factors, "very large, very few and very great," constitute a major problem that we must conscientiously solve in carrying out the four modernizations. In the case of managerial personnel these three factors are more pronounced than in other fields. On the one hand, some localities intentionally or unintentionally refuse to recognize that the managerial field is a "specialty." Their approach to their work is either to matching personnel with organizations at random or "meeting emergencies" and "doing odd jobs". On the other hand, in some places managerial personnel are regarded as "laborers"; their social status is low, their salaries are low, there is no "future", and many voluntarily change professions. The experience of the four modernizations and the requirements of our strategic goal have made us deeply aware that managerial personnel are insufficient in both quantity and quality. To quickly make managerial personnel "return to the ranks" and train them on a large scale are urgent needs in the present overall reorganization of enterprises; and they are also needs of the strategic preparation for the period of vigorous economic growth. The return of existing personnel and the training of new personnel require that we solve the problem of their future in the management profession. In

emphasizing research in management science and its application, we must first emphasize the personnel engaged in research in management science and its applications and correspondingly elevate their social status and material wages. In this way, we can change the situation of "voluntarily changing profession" to "wanting to rejoin the team", and the situation of "they want me to learn" to "I want to learn". In large-scale on-the-job training for managerial cadres and large-scale training of new manpower in management, we must appropriately solve the problem of training locations and quickly solve the problem of building up a large team of teachers in management. To adapt to the requirements of large-scale learning and large scale teaching, management education must also undergo corresponding reforms; it must be covered by an overall plan, there must be appropriate division of labor, and it must be gradually included in the regular management education system.

Third, we must strive to establish a Chinese-style management science system. Research and application management as a science do not have a long history in our nation. We are rather backward in this respect, and we should admit it. But the views that we have nothing in management science, that "it will not do to learn from the Soviet Union", and that "we have just begun to learn from the West" do not coincide with the actual situation in our country, and therefore they are mistaken. We not only have the management experience inherited from the revolutionary bases, but we also have the management experience learned from others and created by ourselves after Liberation. Management science is a science of a dual nature involving rational organization of productive forces and maintenance perfect productive relationships. Are we inferior to capitalism in productive relations? Are we more backward than capitalism? In management, we must admit to our backwardness and humbly learn from others, but we must also see that we also have our strong points and that there is still the question of conscientiously summarizing our own experience. Management is general and also special. There is not only the "theory of the system", there is also the "theory national boundaries." The management science system in each nation has its own characteristics and marks. As Comrade Deng Xiaoping pointed out in his opening address to the 12th Party Congress, "Copying and transplanting other nation's experience, other nation's models, will never achieve success." We must both learn to create. We must strive to establish a Chinese-style management science system. The management science system, we believe, must have "threefold adaptability." First, it must be able to adapt to the requirements of large-scale socialized production. Second, it must be able to adapt to the requirements of the socialist system. Third, it must be able to adapt to the requirements of our national situation and national customs. In brief, it must have "threefold adaptability" in order to gradually establish a modern, Chinese socialist management science system. This is the demand imposed upon us by the 12th Party congress; it is necessary for the four modernizations, and it is the glorious task of both theoretical workers and practitioners of management science.

9296
CSO: 4008/42

ACADEMY OF SCIENCES ESTABLISHES CONSULTANCY, DEVELOPMENT DEPARTMENT

Beijing RENMIN RIBAO in Chinese 8 May 83 p 3

[Article: "Chinese Academy of Sciences Establishes Scientific-Technical Consulting and Development Service Department"]

[Text] To implement the policy of focusing on economic construction and to effectively serve society, the economy and production, the Chinese Academy of Sciences has recently established a scientific and technical consulting and development services department. The branches and research institutes of the Chinese Academy of Sciences will establish corresponding scientific and technical consulting and development service departments.

The scientific and technical consulting and development services departments of the Chinese Academy of Sciences at all levels can provide scientific and technological consulting and development services to all departments of the national economy in over 20 fields of science and technology, such as agriculture, energy resources, study and development of natural resources, computers, semiconductors, optics, and the like. Such services include compensated or uncompensated transfer of achievements in scientific and technological research, accepting research assignments from industrial and mining enterprises to find solutions for technological difficulties in production, joint development of new technologies, consultation on equipment and technologies in the exploitation of potential, innovation and reform, services in connection with the importation, assimilation and improvement of foreign technologies, services in connection with lectures, consultations, employment of advisors, training and the like at outside units, and serve society by using various kinds of available instruments, equipment, and testing procedures and techniques. According to state foreign policy and relevant regulations, the consulting and service departments may also accept assignments from abroad to provide scientific and technical consulting and services.

9808
CSO: 4008/112

CAS SETS UP SCIENTIFIC, TECHNICAL CONSULTATIVE SERVICES

OW100911 Beijing XINHUA Domestic Service in Chinese 1438 GMT 7 May 83

[Text] Beijing, 7 May (XINHUA)--The Chinese Academy of Sciences (CAS) recently set up a department of scientific and technical consultative and development service with the purpose of providing an effective service for the society, economy and production within the framework of the policy concerning economic construction. All of the branches and institutes under the academy will also set up corresponding scientific and technical consultative and development service departments.

The CAS departments of scientific and technical consultative and development service at various levels will provide various departments associated with the national economy with scientific and technical consultative and development services in such fields as agriculture, energy resources, the exploration and development of resources, computers, semiconductors, optical science, lasers, remote sensing, automation, electronics, electronic engineering, nuclear technology, the study of new types of materials, environmental protection, medicine and hygiene, scientific instruments, mathematics, physics, biology, chemistry, astronomy, geology, and mechanics.

The services to be rendered include transferring the results of scientific and technical research projects with or without compensations; undertaking commissions from mining and industrial enterprises to study and solve technical production problems and to jointly develop new technology in order to provide a consultative service in solving problems concerning equipment and technology for tapping potentials, carrying out renovations and reforms; providing services in introducing, applying or reforming new technology from abroad; and undertaking professional services in providing other units with lectures, advice, advisers and training, as well as in making use of existing facilities for experiments including various instruments, equipment, and technology in order to provide society with such services as analysis, testing, calculations, experiments or special technological processing work. In accordance with the state's foreign policy and other relevant regulations, the CAS department of scientific and technical consultative and development service may also undertake commissions from foreign enterprises and provide them with scientific and technical consultative services.

CSO: 4008/104

IMPORTANCE OF RESEARCH UNITS FOR DECISIONMAKING STRESSED

Beijing RENMIN RIBAO in Chinese 6 May 83 p 2

[Interview with Du Runsheng [2629 3387 3932]: "It Is Essential to Strengthen Research and Set Up Consulting Service"]

[Text] "In today's work on organizational restructuring, we must establish and strengthen our specialized research organizations and consulting services. The number of organizations and cadres issuing orders should be reduced somewhat; the number of people involved in research should be increased." Comrade Du Runsheng, Director of the Chinese Research Center for Rural Development, recently stated these views in an interview with a reporter from this newspaper.

Comrade Du Runsheng said: "The reform of leadership methods should be implemented simultaneously with other reforms. To carry out complex socialist modernization, leaders should go down to grassroots units and keep in touch with reality. Their task cannot be accomplished without this approach, but it is insufficient for them to depend solely on it. A person's perceptual knowledge is always very limited. In order to make a correct policy decision, our leaders must rely on many facts and on their understanding of the various aspects of matters. Our work cannot be done by one person or even by a small group of leaders. No leader can concentrate on one matter for a long time. Very often, he touches on a matter and then leaves it behind. It is dangerous to solve a problem on the basis of a few contacts he has had with it in a year. Thus, to solve our problems, we must have a group of specialized personnel engaged regularly and continuously in research."

"The masses are concerned about the stability of our policies and strategies. It is proper for policies to change according to changing conditions, but it is improper for them to change as personnel changes. We cannot allow a newly arrived Secretary Zhang to change the policies of Secretary Li, and then later a newly arrived Secretary Wang to change the policies of Secretary Zhang. To prevent a leader's personal prejudices from causing deviations in policy, we must pay attention to the results of research organizations and consulting services. We must have these competent specialized organizations. Under the guidance of Marxism-Leninism, we must use instruments and methods suitable for modernization. We must undertake much careful and thorough investigation and study, in order to offer our leaders reliable information for policy making and different plans to choose from. This would help to assure the correctness of the decisions made and would also prevent people from changing policies blindly."

The reporter suggested that our nation still had a weak link in this area and that this problem had not yet aroused the attention it deserved. Comrade Du Runsheng said: "We must conquer the influence of the old belief that officials are automatically noble and authority is automatically respectable. We must implement the specialization of research. We must learn some of the methods of natural sciences and use them for our study of social sciences. In this way, we will have a scientific policymaking process. This is a component of our realization of modernization, and we must feel a sense of urgency. We must have healthy research organizations and create brain trusts. All systems, all areas, and all departments must work together, cooperate with each other, and link up with each other."

Comrade Du Runsheng also said: "The Party Central Committee emphasizes this area of work. In recent years, the state has established six specialized research organizations in economics, technology, system research, international relations, and rural areas."

At present, the Chinese Research Center for Rural Development has more than 80 full time personnel as well as nearly 100 researchers and special researchers. In the nation's 17 regions, 57 counties have established information centers for long-term research.

12397
CSO: 4008/110

DEVELOPMENT OF SCIENTIFIC, TECHNICAL CONSULTING IN CHINA URGED

Beijing ZIRAN BIANZHENGFA TONGZUN [JOURNAL OF THE DIALECTIC'S OF NATURE] in Chinese Vol 4, No 6 Dec 82 pp 28-33

[Article by Li Gongde [7812 0501 1795]: "Develop Scientific and Technical Consulting Services in China"]

[Text] Scientific and technical consulting is a new activity which has developed rapidly throughout the world since World War II and which has gradually come to be accorded in China in recent years. Although this activity has not been developing for very long, it has already manifested its importance in our economic construction, and it deserves to be energetically promoted.

I. Scientific and Technical Consulting Abroad

What is scientific and technical consulting? The United Nations Industrial Development Organization's "Handbook for Hiring of Consultants by Developing Countries" states that a consultant is a person or organization hired by a customer organization because of his or its possession of specialized knowledge and experience, to give industrial advice or take the responsibility for drafting industrial plans. The US Association of Consulting Engineers defines the consulting engineer as an experienced engineer who impartially and independently uses his technical capabilities and judgment to the maximum benefit of the customer.

In short, scientific and technical consulting uses the scientific and technical knowledge of experts in the society to solve social and economic problems and scientific technical and management problems within the enterprise or other organization; it uses available scientific and technical personnel flexibly and effectively to serve society and production.

Scientific and technical consulting first appeared as a separate field in England. In the late 19th and early 20th centuries consulting began to separate from the construction contracting trade. It developed rapidly and became an important activity after World War II. According to statistics, the number of consulting companies in the United States was 907 in 1940, while 1,287 were established between 1941 and 1950, 2,749 were established between 1950 and 1960, and 3,113 were established between 1961 and 1971. A

certain number of them went bankrupt or merged, and by 1976 the total number was over 13,000.

The scope of consulting services is quite great, with three major areas: strategic consulting (or policy consulting), technical consulting, and management consulting.

In this century, the main method of solving scientific and technical problems of society and production has been to set up specialized research organizations. After World War II, as science became increasingly socialized, science and technology gradually penetrated into every aspect of society; at the same time, science and technology became increasingly finely subdivided, and when solving problems it was necessary to make combined use of many branches of science and technology, including both natural science and social science. Many of these problems could be solved by using the existing knowledge and experience of experts. Many departments and enterprises felt that it was cheaper and more effective to use consulting services to solve them than to establish special research organizations. Accordingly, a variety of consulting organizations and companies arose to meet the need. For example, the well-known RAND Corporation was originally a US Air Force technical development and research organization, but in order to meet the government's policymaking needs it turned to strategic research. Some 99 percent of West Germany's companies are medium and small sized, and they rely primarily on more than 40 consulting organizations to solve problems of production technology. The large companies also use consulting services. About two-thirds of the large companies in the United States regularly use outside consultants. In this way, in addition to making up for gaps in their staffing, the consultants are "outsiders" who do not bring preconceptions, are not constrained by traditional company ideas, and can solve problems rather objectively and offer new suggestions. Consultants have been recognized as an essential external condition for the survival and development of companies.

We may say that the rapid development of consulting services is a product of social needs and of the development of science, technology, society and the economy to a certain stage. We should view the importance of scientific and technical consulting in this light.

Scientific and technical consulting has already become an important way in which science and technology serve society and production abroad. This method is economical, objective and flexible; these are its characteristics and advantages. Obviously, specialized research organizations still remain important.

II. The Rise of Scientific and Technical Consulting in China

In China, consulting has become a distinct activity in the last 2 or 3 years. We did, of course, have a variety of consulting organizations that had been established by various departments and systems, but their work was just in its infancy. These organizations and their working conditions are as follows. (1) Organizations set up by government departments primarily for

policy consulting, such as the State Council's Economic Research Center, Techology and Economics Research Center and the like; their tasks are to study and provide documentation on the main problems of national economic construction and make suggestions to the State Council. Certain provinces and municipalities have establsihed similar oganizations. (2) Consulting organizations set up by research and planning organizations or advanced schools and academies, primarily for various types of engineering and technical consulting. Some are in the form of companies, while others are organized by department or locality. (3) Consulting organizations of a popular character, such as the scientific and technical consulting provided by the China Scientific Society system, and the economic consulting provided by the Democratic National Construction Association and the Industrial and Commercial Alliance. (4) Companies providing foreign consulting, such as the China International Economic Consultants Corporation, subordinate to the China International Trust and Investment Corporation, and the China International Engineering Consulting Company recently established jointly by 17 departments. These consulting organizations all have done a large amount of work.

The scientific consulting provided by the China Scientific Society is done under the direct concern of the central Committee leadership. In March 1980, Comrade Hu Yaobang stated in his speech at the second congress of the China Scientific Society that it should develop intellectual resources and thoroughly support the scientific and technical workers in planning and research of broad scope. In August 1980, Comrade Zhao Ziyang commented on the report of the comprehensive investigation of coal resources in the Huai River region of Anhui and the natural resources of Wanxi Prefecture presented by the Scientific Society, stating that scientific and technical consulting work is very important and is a form in by which the scientific and technical departments can come to society. Since then, the consulting activities which the Scientific Society arranges for its scientific and technical personnel have become one of its main activities. With energetic support from the relevant departments and units, the China Scientific Society and its province, municipality and autonomous region branches and subordinate associations, societies and research societies all have carried on consulting work. According to incomplete statistics, they have already established more than 220 consulting organizations at different levels and of different types. In Shanghai alone, the society carried out more than 3,500 consulting projects in 1980 and 1981 alone.

The consulting work done by the society includes the following areas: (1) consultation and submission of opinions regarding orientations and policies for economic development and readjustment and reform; (2) investigations and documentation for the departments' and localities' development programs and plans, and for comprehensive resource development and utilization, urban construction and environmental protection; (3) technical and technical-economic documentation for construction projects and import projects; (4) organizing technology transfer, release and exchange, and popularization of new achievements and new technologies; (5) organizing technical efforts and technical consultation for manufacturing and mining enterprises and providing technical services; (6) provision of technical services for the de-

sign of engineering projects and special equipment; (7) providing suggestions and guidance for enterprise management; (8) technical guidance and technical contracting for commune and brigade agricultural production; (9) training of scientific and technical personnel. This work falls into two main categories: first, providing scientific documentation for policymaking by leadership departments at various levels, and second, direct provision of technical and management services for industrial and agricultural production.

The Scientific Society System's

Consulting services in the last 2 years have already shown their importance in national economic construction. (1) They are helpful in uniting the needs of the scientific and technical personnel's consultation and advice in economic construction. (2) They are helpful in rapidly applying science and technology to production, promoting the four transfers, and enlivening the relationship between science, technology and production. (3) They are helpful in developing human resources in science and technology, utilizing the capabilities of scientific and technical personnel and providing them a wider range for making a contribution to the four modernizations. (4) They help in promoting the integration of scientific research, planning and production units and the amalgamation of enterprises. (5) They help in bringing scientific and technical personnel into broader, more profound contact with the real world, helping them learn from society, raising their political consciousness and improving their level of professional qualifications.

The role of science and technology in social and economic policymaking is gradually becoming to be recognized. One of the main expressions of the "leftist" errors which persisted for a long period in our social and economic policy making was a neglect of documentation for economic plans, policies and measures, which resulted in great waste and loss. Consulting is a good method of placing our planning and policy-making on a scientific basis. Consulting can markedly increase the economic benefits produced by many large-scale construction projects. The China Scientific Society responded to an assignment from the Minister of the Coal Industry Gao Yangwen [7559 2254 2429] by organizing an expert team consiting of more than 20 experts from the societies of planning methods, coal, electrical machinery, railroads, navigation routes, communications and energy, headed by Professor Hua Luogeng [5478 5012 1649], which cooperated with Anhui Province and the scientific and technical personnel of the Anhui Coal Industry Company in carrying out a 3-month documentation effort for a program defining the optimal practical layout, scale, equipment, sequence and pace of development of the western Huai coalfield. By means of overall, comprehensive organization, more than 20 mine construction schedules were shortened by 2 to 2 1/2 years from the original plans, and this alone allowed the state to produce several tens of millions of tons of coal earlier than expected, bringing about an immense train of economic benefits for the east China region, whose supply shortage had been steadily deepening. The Baogang Qihe committees of the Shanghai City Scientific Society proposed driving fewer sandpilings and decreasing their diameter in the Baogang materials stockpiling base, and this suggestion alone was capable of saving more than 30 million yuan in

investment; the program for building a water supply reservoir on the Chang Jiang instead of bring water from Dianshan Lake offered a saving of more than 10 million yuan on capital construction costs alone, in addition to being of great importance for rational utilization of water resources.

Consulting also provides us with a new, economical, effective method of assuring that science and technology are fully and directly utilized in production. In economic construction, many questions of production technology can be resolved only by scientific research and rather long scientific and technical efforts, but many more problems can be solved by shifting science and technology from the laboratory to the plant, from advanced localities to backward localities, and from the military to the civilian sphere, thus utilizing the knowledge and experience which scientific and technical personnel already have; in other words, they can be solved through consulting. This is especially true of technical modernization and equipment renovation by existing enterprises in order to make full use of them and increase the economic benefits they yield. Datong City's scientific society surveyed 22 medium and small-size enterprises and found that 93 percent of the scientific and technical problems which these enterprises suggested for solution could be resolved through technical guidance, technical services, technical consultation, technical key-task efforts and technical transfer, and that only 7 percent were relatively difficult and required technical research.

In the past, manufacturing and mining enterprises solved technical problems primarily through in-house scientific research, cooperation with institutes, or technical exchange. These methods will continue to play a role, and are continuously developing in terms of form. The difference between consulting services and these methods is that the former uses the potential in society and, unlike in-house research, it does not require additional manpower or facilities, so that it is more economical it is more specifically oriented than technical interchange; and it is more flexible than plant-institute cooperation, has a greater variety of forms, and is well suited to solving the difficult problems of one or two units. Consulting services can also organize a rational structure of intellectual assets by organizing personnel from different organizations and different disciplines for work to meet different needs and by carrying out technical key-task efforts, technical transfer, technical consultation and technical guidance. For example, in order to help the Tong County Miniature Electrical Machinery Plant decrease the noise level of miniature motor vehicle windshield wiper motors and put them on international markets, the Beijing scientific society organized 75 scientific and technical personnel from 10 departments in 29 units to participate in the work.

Consulting groups, such as the advisors groups and service groups which the scientific society constantly utilizes, do not have a fixed complement of personnel, but are organized according to need and are a kind of "flexible structure." These groups can adapt rather effectively to the varied, complex requirements of the problems that arise in real-world production. In addition they are organized when there is a task and disbanded when there is no task, so that the personnel are constantly mobile and being replaced, and the problem of people with no work to do or work with no people to do it does

not arise, work effectiveness is high, results are obtained quickly, and technical and economic achievements are good.

There are many scientific and technical problems whose solution is not beyond the capabilities of the scientific research and design organizations, but because there are many written and unwritten regulations which control the relationships between science-technology and production too rigidly, many units are unable or unwilling to take on these tasks and full use cannot be made of the scientific and technical personnel. When the Jiamusi Textile plant was expanding, it discovered partway through the work that the plans and working blueprints for the heat supply shop had serious deficiencies, and it asked almost all qualified units to take on the task of correcting them, but all refused; finally, with the cooperation of the Harbin City United Consulting Services Company, they carried out a several-month effort and revised the plans, so that the construction work was able to proceed according to schedule and a loss of a million yuan was avoided. This instance makes it clear that effective consulting services can invigorate certain aspects of China's scientific and technical work.

Many examples make it clear that the use of consulting to solve production and technical problems is both economic and flexible and yields rather high-quality economic benefits. It has an even more pronounced effect for medium and small enterprises with weak technical manpower. Originally the quality of the Dali brand padlocks produced by the Zhangjiakou City Lock Factory was low and sales were poor, so that in 1979 they had an overstock of 800,000; in 1980, with the cooperation of the city's mechanical engineering society, they took on the task of producing Yingxiong brand locks for export, turning out 200,000 a month, and product quality met the requirements of foreign markets, so that the plant earned more than 300,000 yuan in foreign exchange. The Shandong Province textile engineering society organized several retired engineers to visit cotton textile mills in Heze, Liangshan, Dezhou and Tai'an, provide technical guidance and improve management techniques. These plants' production situation rapidly showed a great improvement. Class 1 cloth increased from 20 to 95 percent of the Liangshan Cotton Textile Mill's output. The broken ends acceptance rate for the Tai'an Cotton Textile Mill increased from 40 percent to more than 85 percent, and its monthly profit rose from 34,000 yuan to 136,000 yuan.

To make full use of scientific and technical personnel, we used to stress effective work on in one's "main job" and required only that scientific research personnel produce results. Naturally, scientific and technical personnel must do well in their main jobs, but the question of what their main jobs are should be understood in a broader sense. At a congress of the academic department personnel of the Chinese Academy of Sciences held last year, leading central committee comrades put forth the following requirements for scientists: (1) they must provide more results for the nation's economic construction; (2) they must use their rich knowledge and experience to provide valuable views and suggestions regarding major problems of the four modernizations; (3) they must serve society and propagandize science and technology to the cadres and masses, and bring science and technology to the plants and the countryside. Consulting is an excellent method of

carrying out the second and third of these requirements. Scientific and technical personnel also have the problem of their "secondary role." Because of the integration of present-day scientific and technical development and the overlapping and interpenetration of sciences, the specialized knowledge of a scientist or engineer is not only important in his own field or trade, but sometimes may have a major effect on the solution of problems in areas or trades which on the surface would seem unrelated.

With the highly uneven distribution of China's scientific and technical manpower, the far from complete use of capabilities and potential, and the unsuitability of advocating "free mobility of trained personnel," consulting services and "mobility of knowledge" are of even greater current relevance.

3. Some Tentative Ideas on Developing Scientific and Technical Consulting in China

Scientific and technical consulting is a new activity of great usefulness and importance to the four modernizations, and in dealing with the question of how China can develop it most rapidly, we should both borrow mature experience accumulated abroad and take our own path in accordance with the system characteristics and specific conditions of our own socialist country.

First, we must embody socialist characteristics in it, and make its objective that of serving socialism. The objective of consulting incapitalist countries is to make a profit, while the objectives of consulting in China cannot be profit, but must be based on the interests of society, the state and the people. This principle must be embodied in the choice of direction and tasks and in its methods of operation.

Many problems with regard to embodying socialist principles require investigation. For example, in our work we must adhere to the general objective of serving socialism and manifest a communist, cooperative spirit; we must not think solely in terms of money or proceed only to the extent to that the work is profitable. But should consulting services provided under the socialist system be uncompensated? They should not, because in the current stage we can only use the principle of exchange of equal value to produce economic ties, and cannot adhere to the principle of distribution according to work. Therefore, some technologies should be turned over for a price, and a certain fee should also be collected for consulting services. The outlays needed for consulting services should be provided not only by necessary state support, but also should be partly met by the units which hire the consultants or assign the task. It is entirely necessary, reasonable and in accord with socialist principles to pay the scientific and technical personnel who take part in the consultation a suitable subsidy (and compensation should be given to the units to which these personnel belong for the work time taken up) and to give bonuses to the experts who make major contributions to the consulting work. This promotes the development of consulting and helps enlist the enthusiasm of the scientific and technical personnel. We must realize that the economic value which they create in their work far exceeds the small compensation given, and this fact primarily benefits the state. In this spirit, the China Scientific Society and the Ministry of Finance

have drafted a "Temporary Regulation on Scientific and Technical Consulting Services by the Scientific Society System and Subordinate Academic Groups," which has already been issued and put into force. We must not regard the payment of set subsidies to scientific and technical personnel for their consulting services as illegal income from improper economic activity.

Second, we must utilize our country's existing basis and all favorable conditions and enlist the enthusiasm of all parties.

Abroad, consulting initially was carried out by independent consulting experts, but later they decided that for many tasks they needed the cooperation of other experts, and accordingly they joined together and formed companies. Still later, outside-assistance consulting companies and larger-scale combinations developed. Because with increasing company size it is difficult to include experts in all fields, some companies use a method in which the number of permanent personnel is small, and when necessary they hire additional experts of specific types to cooperate with them in contracting for difficult multidisciplinary tasks and overseas work. Currently most US consulting companies have 10 people or fewer. According to statistics for 1981, there were 4,903 companies with 1 to 10 persons, 1,662 companies with 11 to 25 persons, 751 companies with 25 to 50 percent persons, 376 companies with 50 to 100 persons, and 364 companies with more than 100 persons. The strategic consulting organizations include companies such as the Rand Corporation with large numbers of personnel, and organizations such as the British International Institute of Strategic Studies, which establishes relations with experts in all countries to do its work. This research institute has only about 10 of its own research personnel, and with administrative secretaries and research assistants the total is only 30-odd people. But it has ties with more than 3,000 members, who do most of the work. Japan has the "mobile research organization" method. This type of organization does not have a permanent building and research personnel; responsible persons are appointed as the tasks require, and the personnel taking part in the work do not leave their original units, but come together voluntarily; when the work is completed, the group disbands.

Although consulting has just begun in our country, its situation is already good. Many departments, research and design organizations, and advanced schools and academies have relatively good scientific and technical contingents and facilities and can take on consulting work. Although the Scientific Society system itself has no scientific and technical personnel and no facilities, many of its activities have some similarity with foreign "outside-assistance" consulting companies and "mobile research organizations." The Scientific Society has more than 100 societies, assocations and research societies, as well as province, city and local scientific societies, so that it already constitutes a system. The Scientific Society is intersectorial, interdepartmental, and of mass nature; by utilizing it in coordination with the consulting organizations of sister departments it will be possible to develop consulting activities in China rapidly.

The Scientific Society system's policy consulting activities such as the major suggestions for the Baogang engineering project which the Shanghai City

Scientific and Technical Society's Baogang advisory committee made, the selection of the Shijuisuo Harbor in Shandong by the Marine and Wetlands Society, the drafting of the Zhuhai City development plan by the Guangdong Province Scientific Society, the consultation provided for the Honghe farmland construction plan by the Heilongjiang Province scientific society, and the criticism of the provincewide energy conservation program and the inspection of the fossil-fired power station construction program by the Liaoning Province Scientific Society, have all given rather good results. All of these projects were highly multidisciplinary and quite difficult, and experts from many fields from different departments were organized to do the consulting work on them. As a mass academic organization, the Scientific Society has a rather unique position and is able to practice democracy; the specialists who take part in consulting activities are subject to little or no influence from particularist concerns, but objectively carry out repeated documentation work drawing on collective wisdom, and make suggestions which are in accord with the actual situation. Both Chinese and foreign experience requires that advice and decision making be separated in this consulting, work, i.e. separation between the staff and decisionmaking departments in order to create the conditions for the experts engaged in consulting to present independent, scientific suggestions and programs for decision by the leadership. Separation of advice and decision making has been recognized as the key to success in this type of consulting.

The technical and management consulting pursued by the Scientific Society system includes many cases in which specialized units have problems which most units are unwilling to take on, so that they ask the Scientific Society for assistance, and cases when the Scientific Society corrects omissions and deficiencies. The Scientific Society and its associations are scientific and technical workers' organizations, and thus have extensive contact with scientific and technical personnel in all fields, which helps to create horizontal ties, enabling it to use methods of operation different from those of the administrative departments involving socialized, mass-type methods; thus it has greater flexibility and is more able to adapt to the complexity of real-world production. The annular ceramic vacuum chamber cementing problem (cementing sectional ceramic rings into a vacuum chamber capable of achieving 10^{-8} Torr) of the Institute of Physics, Chinese Academy of Sciences, had cost the institute more than a year's effort, and it had asked for help from relevant units in all major cities, including the Shanghai Research Institutes of Resins, which had studied adhesives, but none of them could solve the problem. The main reason was that this problem involved not only adhesives and bonding techniques, but machining, surface treatment and other technical problems, so that it was difficult for any single unit to handle. Finally, they found the Shanghai City Bonding Technology Society, which organized a key-task team and carried out the task. This group had experts in chemical engineering, mechanical engineering, electrical machinery, vacuum technology and the like, experienced technicians with rich experience with these technologies, and even master workers from the clothing and footwear fields.

When the scientific and technical personnel go elsewhere to take part in consulting services, the problem of how to handle the relationship between the

home organization and the consulting work arises. Practice has made it clear that if this relationship is handled properly, the scientific and technical consulting work not only will not harm the work of the home unit, but actually will promote it. Shanghai Research Institute of Adhesives summed up the advantages resulting from the participation of its personnel in the society's consulting work as follows: (1) it could solve difficult technical problems which would have been hard for a single unit to solve; (2) it helped disseminate research achievements; (3) it provided a great amount of information for the research institute, giving it a basis on which to select topics and determine its orientation; (4) the scientific and technical personnel's participation in consulting activities can strengthen their economic outlook, expand their range of knowledge and increase their ability to solve real problems.

8480
CSO: 4008/71

CAMPAIGN TO SOLVE SCIENTIFIC PROBLEMS LAUNCHED

OW110907 Beijing XINHUA in English 0741 GMT 11 Aug 83

[Text] Beijing, August 10 (XINHUA)--China has launched a nationwide campaign to solve problems involved in achieving its scientific and technical priorities for 1981-85.

Thirty-eight broad areas have been listed for intensive research, including the exploitation of new technology and energy resources, and the comprehensive utilization of existing petroleum reserves. One hundred and fourteen major questions and a thousand minor topics have now been set as the focus for the new campaign, which will involve scientists and research institutes throughout China.

According to the State Science and Technology Commission, the questions and topics were chosen following studies carried out by 8,000 scientists over the past year, on the basis of the following principles:

-- Giving priority to topics that can help promote economic efficiency, while not neglecting major social problems such as family planning and prevention and treatment of hepatitis and cancers.

-- Combining major scientific research with national plans for capital construction and technical transformation. For instance, the selection of the research in lysine, an additive to feed, is made for the construction of a large scale lysine plant.

-- Utilizing domestic and foreign equipment and technology as much as possible, including adopting military industrial technology for civilian use and cooperating with foreign firms to speed up research.

-- Giving priority to the urgent application of scientific projects, while also paying attention to research in basic theory.

-- Arranging topics on technological processes, construction of projects, equipment, materials and popularization of products in a systematic way so that the research results can be quickly used to boost productivity.

-- Concentrating scientific resources on major topics to channel research into the most promising areas of application and eliminate unfeasible projects. For example, in the research of new energy resources, emphasis is placed on solar energy, methane gas and wind, which are more apt for China.

CSO: 4010/88

CONTRACTS SIGNED ON KEY RESEARCH PROJECTS

OW050415 Beijing XINHUA Domestic Service in Chinese 0027 GMT 4 Aug 83

[Excerpts] Beijing, 4 Aug (XINHUA)--Research work on 38 key scientific and technical problems to be tackled during China's Sixth 5-Year Plan period will be carried out under contracts signed between state-designated responsible units and units actually doing the research work. Now, contracts have been signed on most of the projects.

These key scientific and technical research projects, selected jointly by the State Planning Commission, the State Science and Technology Commission and the State Economic Commission, and a major measure adopted for speeding up national economic development.

The 38 key scientific and technical research projects of the state cover 114 subjects; each subject is further divided into many specific problems. It is estimated that two-thirds of the subjects will be completed around 1985.

The contents of the contracts cover: Domestic and foreign standards and development trends; specific problems to be tackled and major technical and economic targets; economic and social benefits; research and testing methods and technical lines be used; progress schedule; appraisal and opinions by other units of the same trade.

Because these key research projects are closely related to actual production, and because many of them are also key problems in production and construction currently faced by various areas and departments which urgently require solutions, the projects, when completed, will quickly translate into productive forces, and not just turn out some showpieces, gifts and samples which have no practical use. Therefore, the departments concerned are very enthusiastic in organizing efforts to tackle problems. In addition to funds received from the state, many areas and departments have tried to raise funds on their own to support the tackling of key scientific and technical problems in each area and department. As a result, many problems were solved even while contracts were being signed.

CSO: 4008/169

CAS DESIGNATES 41 NEW MATERIALS AS RESEARCH TOPICS

Beijing RENMIN RIBAO in Chinese 7 Jun 83 p 5

[Article by reporter Zhu Yaxin [2612 7161 2450]: "CAS Organizes 41 Topics To Tackle"]

[Text] The Chinese Academy of Science has designated 41 new materials which are closely related to the four modernizations program and to the lives of the general public as priority topics for research.

Recently, the Chinese Academy of Science sponsored a working conference to discuss the research and development of new materials. The conference reviewed 27 research topics which are already underway, and discussed the feasibility of 14 new topics.

According to informed sources, among the topics of new materials under study, there are 12 in the metals category, 11 in the non-metal category, 14 in the category of high-molecular, organic materials, and 4 other topics.

If successful, the results of these research topics will have a significant impact on the development of China's energy sources, communications, biomedicine, high technologies, and in industrial production. For example, the research of corrosion and protection of metals used for off-shore petroleum exploration, the research of organic silicon emulsion, the research of new infrared optical glass all have important economic values.

According to informed sources, the Chinese Academy of Science has 28 research offices and 2500 scientists and technicians connected with the work of materials research and development. In order to accelerate the research efforts and to increase the distribution and application of research products, the Chinese Academy of Science has decided to build an intermediate test facility for new materials.

3012
CSO: 4008/124

SCIENTISTS, TECHNICIANS TO STUDY 'CHINA IN 2000'

OW261225 Beijing XINHUA in English 1415 GMT 25 May 83

[Text] Beijing, 25 May (XINHUA correspondent Yu Yuanjiang)--All Chinese scientists and technical workers will be organized to participate in a nationwide research entitled "China in 2000." This was announced here today at a meeting of scientists called jointly by the technical-economic research center under the State Council and the China Association for Science and Technology.

Ma Hong, director general of the center, explained that the idea is to draw a relatively clear and detailed blueprint of China in 2000 for consideration by government policy making bodies. He expected the scientists to come up with projections based on an overall and comprehensive research of the development of economy, culture, sciences, technology, people's life and building of spiritual civilization in the next 18 years. They will also propose options for achieving the goals.

He said that the object of the research is a big and complex socio-economic system. The research will cover the exploration of the general law governing the development of the society, economy, culture, sciences and technology in China, study of the current and future international environment and domestic conditions for China's socialist construction, and forecasting of the social environment in year 2000 as well as production system, regional and city system, socio-economic information system.

The scientists will also have to explore the interdependence of these systems and their complementarity and interaction with each other, he added.

The scientists will also propose optimum structures for industries, sciences, education, employment and population. They will advance and prove functions for the goals of 1985, 1990 and 2000.

The research will be carried out jointly by the Chinese Academy of Sciences, the Chinese Academy of Social Sciences, units attached to the ministries and commissions under the State Council, the China Association for Science and Technology, schools of higher learning and local research institutes.

Five hundred people attended the meeting, including Zhou Peiyuan and Pei Lisheng and Qian Sanqiang, chairman and vice-chairmen of the China Association for Science and Technology, Zhang Pan, deputy director general of the Technical-Economic Research Center, and leaders of the 108 societies affiliated to the China association. These societies have a total membership of 1.1 million.

CSO: 4010/68

SCIENCE ACADEMY CONCENTRATES ON MAJOR PROJECTS

OW230558 Beijing XINHUA Domestic Service in Chinese 0910 GMT 20 May 83

[By reporter Zhu Weixin]

[Excerpts] Beijing, 20 May (XINHUA)--The Chinese Academy of Sciences is concentrating its efforts on 28 major research projects. It has been learned that these projects are essential for the four modernizations and the country's economic revitalization.

Over 90 institutes of the Chinese Academy of Sciences, or over three-quarters of the total number of the academy's institutes, and over 5,000 scientists and technicians have been committed to the projects. Most of the research projects will yield social and economic results within 3 to 5 years.

In agriculture, the Huang, and Hai Rivers' plain--which has been plagued by drought, flood and alkalinity--and the Sanjiang Plain--marsh land that has potential for development--have been chosen as areas of research. A comprehensive plan to harness and develop the resources of these two plains will be presented to the state following the research. Since water resources and transportation are two key problems in building Shanxi into an energy and heavy chemical industrial base, the development and rational use of water resources are among the academy's major research projects; plans have been made to study the comprehensive development of Shanxi's coal-related resources and to study mining safety.

New materials under study include welding and coating materials for hydroelectric turbines and pyrolytic cracking equipment used in the petrochemical industry, high sensitivity color films, X-ray film and high-heat ceramics. A plan has also been worked out to study the application of computers and the development of software and key computer accessories. With regard to new technologies, principal efforts will be directed toward research into biological engineering, lasers, superconductors, remote sensing, radiology and others. Development of a vaccine through genetic engineering to prevent B-type hepatitis, which will be of great significance toward improving the people's health, is also included.

The Chinese Academy of Sciences pays great attention to major research projects. A special leading group to supervise major research projects has been set up.

To ensure the feasibility of the projects, academy President Lu Jiaxi has visited Taiyuan to hear reports on developing Shanxi into an energy and heavy chemical industrial base, Vice President Yan Dongsheng has been personally directing the study into new materials and new technologies; and Vice President Ye Duzheng has visited Shandong and Henan on many occasions to study the Huang, Huai and Hai Rivers' plain before deciding on the relevant research projects.

CSO: 4008/115

CAS INVOLVEMENT IN RESEARCH ON KEY PROBLEMS OUTLINED

Beijing ZIRAN BIANZHENGFA TONGXUN [JOURNAL OF DIALECTICS OF NATURE] in Chinese Vol 5, No 1, 10 Feb 83 pp 1-3

[Article by Yan Dongsheng [0917 2639 3932], vice president of the Chinese Academy of Sciences: "The Chinese Academy of Sciences and Key Problem-Solving Efforts in Scientific Research"]

[Text] In his report to the 12th CPC Party Congress, Comrade Hu Yaobang called on us to "organize all forces to tackle key problems in scientific research." Comrade Zhao Ziyang also issued a call at the National Science and Technology Awards Conference: "Organize science and technology personnel to participate in planning and participate in tackling key problems." Many years' experience has made it clear that acting under unified leadership, breaking down divisions and barriers between departments, and organizing and joining forces in solving the important key problems in national construction embody the superiority of the socialist system, are necessary to speed up the development of the national economy, and constitute a powerful force in promoting the development of science and technology.

Since its inception, the Chinese Academy of Sciences has by and large adhered to the orientation of keeping theory in touch with reality and having scientific research serve national construction. As early as the First 5-Year Plan period, the Academy designated as the key topics of its research atomic energy, construction of an iron and steel base, petroleum, earthquakes, planning and developing river drainage areas, plant resources of the tropics, dividing the country into natural zones and economic zones, antibiotics, and polymers. During the period of the state's 12-year long-range plan (1956-1967) for the development of science and technology (basically completed ahead of time in 1962), a number of contributions were made in beginning or developing in work in atomic energy, semiconductors, computer technology, jet engine technology, petroleum prospecting and the smelting of complex ores. During the implementation of the state's 10-year plan for scientific development (1963-1972), the Chinese Academy of Sciences, in cooperation with other related organizations, did much research work on the atomic bomb, the hydrogen bomb, launching of made-made satellites and development of laser technology. For many years, in connection with service to national construction, the Academy of Sciences filled certain gaps in our country's science and technology, set up laboratory equipment, accumulated basic materials and

developed into a contingent with a certain "assault capability," including a great variety of disciplines and types of research.

During the 10 years of calamity, the Chinese Academy of Sciences suffered enormous damage and destructions. After the smashing of the "gang of four," and especially following the Third Plenary Session of the 11th CPC Central Committee, under the correct guidance and cordial care of the Central Committee of the party, the structure and the various operations of the Chinese Academy of Sciences were restored and developed, so that the academy is now in a condition to make new and greater contributions to national construction.

In the last few years, the academy contributed a considerable amount of effort in service to the national economic construction (70 to 80 percent of all manpower and expenditures were used for applied and developmental research), but because there was no strong and forceful organization, its strength tended to be dispersed, and the key projects urgently needed for economic construction, which were capable of yielding large economic results, were not firmly taken in hand. For certain subjective and organizational reasons, the dissemination of scientific research results was not sufficiently effective, and this had an adverse effect on gaining actual benefits from the scientific research results.

Since 1982, in accordance with the repeated directives from the leading comrades of the Central Committee to "organize, strengthen cooperation, and conduct key problem-solving efforts in science and technology," the academy made it a major task of the entire academy to organize cooperative problem-solving efforts in key areas. In organizing to tackle the key problems in scientific research, we are, on the one hand, integrating our work with the key efforts jointly formulated by the State Planning Commission, the State Economic Commission and the State Scientific and Technological Commission, and on the other hand are giving free rein to the heads of the academy's various institutes so that work will progress rapidly, and we have gained the welcome and support of the scientific and technological personnel of the entire academy.

In its present work of organizing and launching joint key problem-solving efforts, the academy will adhere to the following principles governing the key tasks that have to be undertaken:

1. The problems that are to be tackled must be such that they will yield great economic results for the national economy and be of crucial importance for the development of production technology; they also must be able to show important results or intermediate-stage results in practical application within a comparatively short time (in general from 3 to 5 years). To achieve this goal we are actively seeking guidance and support from the leading departments in the State Planning Commission, the State Economic Commission and the State Science and Technology Commission, so that the items which the academy is trying to tackle will be listed as state projects. The academic departments are also inviting academic committee members and leadership cadres of the production departments to give reports and are striving to gain an understanding of the scientific and technological problems in economic

construction, so that our plans for undertaking certain key research projects will be as closely integrated as possible with the needs of national construction. The local branches and research institutes of the academy are also strengthening their ties with the local organs in charge of economic and scientific and technological management. Among the present 38 key state projects, there are 14 in which the academy is one of the directing departments. Among the state's 7 top-priority projects, there are 4 in which the academy is one of the directing departments. As needs arise in our economic development, the academy will become involved in as many additional important tasks as it can.

2. We shall thoroughly utilize the superiority of the Chinese Academy of Sciences as a comprehensive multidisciplinary scientific research center. Internally, we have already held meetings on the affairs of the academy and meetings of the academy's party organization and the office of the academy president. We have organized cooperation and coordination between the various departments and the academy's academic departments and research institutes. In the leadership of the academy we have instituted division of labor with fixed responsibilities and regular checks on the progress of organizing the key problem-solving efforts.

3. As far as possible, we have had the key problems to be tackled conform to the originally scheduled orientation of the various research units, allowing them to bring their scientific and technological specialization fully into play, have emphasized organization and cooperation, have made full use of existing organizations, manpower and equipment and their potential, and in general have not set up any new organizations or separate undertakings. In this way we can fully utilize existing manpower, material and financial resources and also start up actual work with much greater speed, as well as making many more contributions. This is also possible due to the academy's advantage of having built up reserves in every discipline over a long period, so that once our organization is strengthened, the academy will be in a position to play an important role in national economic construction.

4. We will organize specifically focused visits by scientific and technological personnel to become closely involved with the front lines of production to conduct investigation and research and find topics for study. The academy, its academic departments and branches and some of its research institutes will organize their scientific and technological personnel to visit localities or enterprises in order to undertake investigations and research, to gain an understanding of the key technological questions that affect production development, and to study and identify the scientific and technological problems that require solutions. For instance, the leading comrades of our academy took a group composed of the scientific and technological personnel of more than 20 research institutes to the energy resource base area in Shanxi Province for a multidisciplinary survey, which was accorded great importance and energetically supported by the relevant departments of the state and of the Shanxi Provincial Government. Through our investigations we were able to provisionally identify more than 80 topics that our academy could take on, and of these about a quarter were areas in which our academy had already achieved results and disseminated them for application. The academic committee of the Department

of Chemistry divided into four investigation teams that visited various production departments to conduct investigations, and as a first step put forward over 200 topics from which selections could be made as a basis for further analysis and research. The group studying comprehensive management of the plain of the Huang, Huai and Hai rivers, which has already been at work for a long time, revisited 11 counties in Shandong, Hebei and Henan under the leadership of scientists for further investigation and rechecking in order to lay the foundation for more purpose-oriented research.

As a result of the first phase of work, the Chinese Academy of Sciences provisionally designated 37 key items to be tackled in eight areas including technology for increasing agricultural production, energy resource development and conservation technology of natural resource development and new materials, electronic technology and equipment, environment and ecology, and new technologies. Most of these projects involve the synthesis, concentration, supplementation and further development of earlier dispersed research, but there are also some new topics. Most of them have the potential to achieve fairly large economic or social results or partial results during the Sixth or Seventh 5-Year Plan periods.

For instance, in the field of agriculture we selected the large plain of the Huang, Huai and Hai Rivers, which suffer most from drought, waterlogging and salinization, and the swamps and marshlands of the "Three Rivers Plain," with their immense potential, as targets, and will present the state with plans for their scientific, comprehensive management and development. Research on the development and utilization of shallow-water offshore areas for the cultivation and breeding of aquatic products may allow our coastal area of 20 million mu to be used for raising fish, shrimp, shellfish and sea vegetables and could double and redouble the quantity of our aquatic products. Research into comprehensive control of the insect pests of cotton will help increase our cotton output.

In the area of energy resource development and energy conservation technology, we have the following projects. With regard to the crucial problems in the development of the Shanxi coal base, we have selected coal slurry research, since this technique is suitable for pipeline transport and direct combustion, and the study of equipment for the combined fuel gas and steam cycle, which has high thermal efficiency and saves water. After successful development, these items could provide an important technological approach to solving the difficulties of transporting coal out of Shanxi and the problem of insufficient water for pit-mouth power generation. The study of coal combustion technology and combined steam circulation in power generating installations can open paths to energy conservation. With regard to energy shortages in rural areas, a special study will be made to develop sources of energy in the villages. As regards the development of petroleum and natural gas resources, it is intended to undertake studies of geological conditions and geochemical characteristics involved in the formation and evolution of coal gas, studies of China's sedimentary basins and their petroleum and natural gas prospects, and studies of the scientific and technological problems of the exploitation of underwater reserves of petroleum offshore.

In the area of natural resource development and new materials, we are making energetic preparations to do research on the development of new types of materials. We have provisionally made plans to develop: petroleum cracking installations; multi-capability materials that can resist high temperatures, corrosion, sulfide and carbide formation, and wear by mud and sand, which are urgently needed for hydraulic and gas turbine blades; inorganic structural materials that are resistant to high temperatures and have high tensile strength and wear and corrosion resistance; inorganic and polymer functional materials and sensitive materials; and highly light-sensitive color films and X-ray films. The successful development, production and widespread application of some of these materials can bring about economic results through large-scale energy conservation, a higher level of automation in the industrial control, and improved product quality. In some cases they will greatly extend the service life of equipment, raise production efficiency and in this way achieve economic results. The development and comprehensive utilization of large reserves of paragenetic minerals and rare earth minerals will also yield enormous economic results.

In the area of electronic technology and equipment, it is intended to begin the development of large scale and very large scale integrated circuits and the development of computer systems, magnetic discs and other key peripherals.

In new technologies, we shall concentrate primarily on such items as optical fiber communications technology, remote sensing, lasers, superconduction, isotopes and irradiation technology. We shall focus on both the development of new technologies and their effective dissemination and application.

Biological and genetic engineering have been designated as key areas for future development. For the present the main targets of attack are to be the development of vaccines against B-type hepatitis, hoof-and-mouth disease and other immunizing or contraceptive vaccines and pharmaceuticals which will improve the health of the people and promote animal husbandry and birth control.

As to environmental and ecological concerns, it is intended to undertake a study of environmental pollution in the Beijing-Tianjin area and of technologies for its comprehensive control. Another study will deal with the environmental and ecological system of the Tai Hu Basin and with restorative measures in that area, and yet another study with the diversion of water from the south to the north and its possible effects on the natural environment.

In general, it would appear that our organization of key problem-solving efforts has had an excellent beginning. Many projects have already been carried out and some are now in the process of being realized, but there is still much to be done to achieve real success. Judging by present conditions, the key task is to do a good job at organizational work, to effectively strengthen leadership and to establish good cooperation inside and outside of the academy. For this purpose we intend to adopt the following important measures:

1. Strengthening the leadership for the key scientific and technological problem-solving efforts of the Chinese Academy of Sciences by establishing a

special leadership team in the academy to handle the key scientific and technological tasks and a key tasks office under this team; in addition each department (or committee or group) and institute should designate one leading cadre to be in charge of work on key scientific and technological tasks so that the entire academy will constitute a powerful organization, leadership and command system. Moreover, provided that they are in line with top strategic priorities, and have the advantage of being able to fully utilize the numerous departments of the academy, the principle of greatest economic and social results should be used to designate certain items as priority projects; these should be divided up among the academy leadership to be carried out thoroughly and completely.

2. Strengthening cooperation inside and outside of the academy. The tasks in all stages from research to development, to trial manufacture and production, should be fully coordinated and the results that are gained should be promptly and widely disseminated among the production departments for application. For this purpose the academy must establish good cooperation with the production sectors. At present we are preparing a comprehensive cooperative relationship with the Ministry of the Petroleum Industry, and this type of cooperation could be gradually extended to other sectors. The various institutes within the academy should also establish close links among each other and strengthen cooperation, so as to fully utilize the advantage of the academy's composite nature and great variety of disciplines. All necessary support must be provided, so that the limited material resources and funds are concentrated on key projects. Every functional sector must cooperate of its own accord and foster the mentality of serving the front line.

3. Establishment of a strict system of responsibilities. Projects, units in charge, and persons responsible must be designated and job responsibility clearly defined. Leadership by the party must be strengthened, and the party's policy toward the intellectuals must be conscientiously implemented. Scientific and technological personnel must be fully utilized; they must be relied upon and their work must be supported. For this purpose certain policies and regulations must be revised and improved so that they will help in thoroughly motivating scientific and technological personnel to serve national economic construction. Questions of rules and regulations that can be solved within the limits of the academy's powers, must be studied and solved as quickly as possible. At the same time, a set of management measures for key scientific and technical efforts must be set up. As we each complete experience in this direction, it will be necessary for us to act creatively in practice and to sum up our practical experience promptly.

4. Earnestly and firmly undertake the work of disseminating the results of completed scientific research. Priority in dissemination must be given to results that are relatively mature and are certain to yield fairly substantial economic results. From 1983 on, a number of such research results should be selected and concrete plans for their dissemination drawn up, to be followed by energetic Implementation.

5. The long-range must be integrated with the near-term. Arrangements must be made in depth for mid-term and long-term work and scientific and

technological reserves must be prepared for the important projects and problems for the Seventh 5-Year Plan, or the period through the year 2000. Vigorous development of the economy depends on scientific and technological progress, and scientific and technological work must be geared to economic construction. At the same time, scientific research must always march ahead of production and must open up the road for the development of production technology. For this purpose we must not only do a good job of planning and organizing leadership work for our key problem-solving efforts, but must also take basic research firmly in hand particularly basic research that is closely linked with applied and developmental research, and establish the necessary scientific reserve for future key scientific and technical efforts and self-reliant solution of China's major scientific and technical problems in economic construction.

9808
CSO: 4008/88

ACADEMY OF SCIENCES SETS UP RESEARCH FUND

OW250201 Beijing XINHUA Domestic Service in Chinese 0213 GMT 24 May 83

[Excerpts] Beijing, 24 May (XINHUA)--Reporter Zhu Weixin learned from the Science Fund Committee of the Chinese Academy of Sciences that by early this year, 504 scientific research projects throughout the country had received subsidies from the science fund of the Chinese Academy of Sciences. This fund was established by the state in 1982. The total amount of subsidies extended came to 28.3 million yuan.

The setting up of the science fund was an important attempt in the reform of scientific management in China. This fund, specifically appropriated by the state, is used primarily for subsidizing the fundamental work in basic research and the field application of natural sciences throughout the country. Scientific and technical personnel must apply for such funding and their applications must be approved by experts in the various fields.

The establishment of the science fund has supported the research of a number of projects of scientific importance that were short of funds, thus giving greater impetus to the initiative and creativity of scientific and technical personnel.

CSO: 4008/115

ANSWERS TO QUESTIONS ABOUT SCIENCE FUND APPLICATIONS

Beijing RENMIN RIBAO in Chinese 7 May 83 p 3

[Interview with senior member of Science Fund Committee, Chinese Academy of Sciences: "How to Apply to the Science Fund"]

[Text] The State Council's approval of the creation of a science fund at the Chinese Academy of Sciences has produced a significant response in the field of science and technology and has been welcomed by scientists and technicians. But many of them still do not understand the nature of the fund and the conditions for such financial assistance. They do not know how to apply. Thus, a reporter from this newspaper interviewed a senior member of the Science Funds Committee of the Chinese Academy of Sciences.

[Question] Who may apply for the Science Fund?

[Answer] The science fund of the Chinese Academy of Sciences represent a new state investment in science. The money comes from special state allocations. It is geared to the needs of scientists and technicians of all departments, regions, and units throughout the country. They can voluntarily join together to send in applications according to the prescribed procedures. Based on last year's actual conditions, among those agencies which received financial assistance from the fund were research institutes, colleges, universities, and enterprises from twenty-two departments and eighteen provinces, municipalities, and autonomous regions. The science fund encourages scientists and technicians to cooperate and to send in joint applications cutting across unit, department and geographical boundaries. Other things being equal, middle-aged and young applicants or applicants who live in remote border regions, will be given priority in consideration.

[Question] What kind of research projects will the Science Fund support?

[Answer] First, the science fund is used primarily to support basic research in natural sciences and basic applied research, as well as a small amount of advanced non-basic scientific research. The proposed projects must fall within these categories.

Second, the proposed projects must be competitive. (1) They must have major scientific significance and applications value, particularly those projects

relevant to the needs of socialist modernization. (2) The projects must have new academic ideas, be satisfactorily presented and supported, and involve a feasible technical approach. (3) The content, methods, and proposed technical approach of the research must not overlap with projects of other units within the country, or they must have unique features. (4) The applicants must have laid a foundation in their research work. They must have the real capability to become closely involved with the development of their research. (5) Their research objectives must be explicit. The work program must reliably promise results within 3 to 5 years. (6) The financial estimates must be reasonable.

Applications which were not approved last year can still be submitted this year if they fulfill the above-mentioned conditions. In short, it is not easy to win a grant from the science fund, but it is not impossible.

[Question] Is there any time restriction for the applications?

[Answer] All projects supported by the science fund are approved at the same time. The allocation of funds is based on the progress of the research work. The funds can be used beyond the current year, and there is no time restriction for the applications. They can be submitted as soon as conditions are ripe. But, examination and approval are, in principle, scheduled once a year. Before the meeting, we must organize people of the same discipline for the review process. Therefore, if applicants would like to have their research projects examined in the current year, they must send in their applications before 31 May.

[Question] What application procedures are necessary?

[Answer] To apply to the science fund, one must follow the format and content of the "Application Form to the Science Fund of the Chinese Academy of Sciences" and conscientiously fill in the required information. Then the applications will be examined, screened, and coordinated by leaders of agencies and academic organizations. Fifteen copies of each application should be submitted to the Science Fund Committee of the Chinese Academy of Sciences. Applicants who are senior scientists and technicians do not need references. Other applicants must be recommended by two scientists and technicians of professorial rank. If applicants from remote border regions genuinely cannot find scientists and technicians of professorial rank to recommend them, they should state the reasons, and then seek recommendations from scientists and technicians of the rank of associate professor from their local Scientific and Technological Commission, or from the higher level departments responsible for their work.

In order to support meaningful, exploratory research by scientists and technicians who are under forty-five years old, the Science Fund Committee has resolved to try to create small financial grants for the study of biology. It will simplify the procedures of examination and approval. The amount of the grant for each project will not exceed 5,000 yuan. Scientists and technicians of middle grade and above do not need recommendations for their applications. Other applicants must be recommended by two scientists or engineers of the rank of associate professor. Application projects for small financial grants will

be accepted by the Department of Biology, which will also respond to the applicants. Scientists and technicians can apply any time, and their applications will be examined and approved immediately.

12397
CSO: 4008/109

HIGHER EDUCATION, SCIENTIFIC RESEARCH MUST ADVANCE TOGETHER

Shanghai WEN HUI BAO in Chinese 27 Jun 83 p 1

[News Report by Zhang Ziqiang [1728 5261 1730]: "Fully Develop the Function of Higher Education As A Front Army in Scientific Research; Higher Education and Scientific Research Must Advance Together: Comrade Zhu Zhenghua [2612 2973 5478] And Others Propose Establishing A Coordination Organization To Share Equipment and Use of Funds"]

[Text] Responsible comrades from higher educational institutions and administrations pointed out that higher education has yet to fulfill the function of serving as a front line army in scientific research. They proposed an organization be established by the central and local government to coordinate scientific research in the two separate systems of higher education and scientific research.

Prof Zhu Zhenghua [2612 2973 5478], president of Huadong College of Chemical Engineering, said that there is no lack of manpower in higher educational institutions, they are ideally suited to carry out scientific research work and can make a direct contribution to the four modernizations. At the same time, only through the development of scientific research can higher education raise the quality of teaching and become the center of teaching and research. At present, there are many important scientific researches which are undertaken only by research institutes. For example, the coal chemical departments have the important task of developing mineral resources in Shanxi; a scientific research institute first assumed the entire task, but unable to accomplish it in one stroke, they "farmed out" part of the funds to us since the scientific research capability of the university was underutilized, and its full potential untapped. At present, funds for scientific research are controlled by scientific research agencies; educational agencies cannot participate in the management and distribution of the work: relatively few personnel from the educational sector become committee members in the Ministry of Education. It is hoped that some changes will take place here.

The vice president of Fudan University, Prof Hua Zhongyi [5478 0022 0001], pointed out that if the research capability of higher education can be fully utilized, not only in science and engineering, but also in liberal arts, even more outstanding results can be produced. The number of staff in social

sciences research institutes is about one-fourth that of higher education, but they control tens of times more funds and assigned tasks than higher education. At present, higher education lacks the channel to get assigned tasks of scientific research, faculty members must go to professional conferences to fight for a trifling amount of assigned tasks.

Why do such phenomena exist? The deputy chief of the Bureau of Higher Education in Shanghai Municipality, Liu Yongpo [0491 8673 3134], said that one of the important reasons is that in the past, blindly following the experience of other countries, we divided scientific research and education into two separate systems. At the same time, the system of local administration controlling decisions hindered the full use of scientific research capability in higher education, resulting in the waste of manpower and resources. For example, the Department of Environmental Protection in Huadong Normal University, which has a well-developed research capability, can thus function well, but the local administration insisted on setting up its own scientific research institute. The Shanghai College of Machinery had scored achievement in solar energy research and assembled a group of professionals, but because it was not under the local administration, the concerned departments in the local government wanted to set up a separate institute to change the above situation. He suggested that the central and local government establish an organization to coordinate scientific research in higher education and scientific institutes, enabling them to share equipment, cultivate talents and share funds for scientific research. He also suggested that if a university had an academic discipline with research capability, the local government, instead of establishing a research institute, should divert funds and research tasks to the university.

The party secretary of Jiaotong University in Shanghai, Deng Xuchu [6772 2485 0443], said that for a long time the some 40 higher educational institutions have received only about one-tenth of the scientific research funds from the state. It was difficult for schools to get important assigned tasks of scientific research. Departments of economic affairs often assigned important tasks to factories or research institutes which, for the lack of research capability, often turned to higher education for help. Thus higher education served as a main force in tackling problems. But when it comes to reporting research results, higher educational institutions were merely listed as collaborating or participating agencies. The result of the work done by faculty members did not get deserved respect and recognition. Recently the situation had undergone some change. In the recent study and forecast of 17 priority scientific research areas, faculty members of higher education served as group leaders for 9 areas. But basically this problem still awaits further solution, he concluded.

9507
CSO: 4008/161

REVAMPING OF EDUCATIONAL CURRICULUM URGED

Beijing RENMIN RIBAO in Chinese 10 Apr 83 p 3

[Article by Liu Dao Yu [0491 6670 3768], Wuhan University: "Build a System of Specialized Courses Suited to China's Conditions"]

[Text] The curriculum of study in colleges and universities is a question of fundamental importance. It directly affects many matters, such as the direction of development of schools, the formulation of teaching plans, standards for the training of specialists, the scientific research orientation of teachers, and the provision of laboratories and books and reference materials.

Current problems regarding the curriculum fall into three main categories.

First, a disproportion between agriculture, light industry, heavy industry, arts and literature, science and engineering.

During the First 5-Year Plan, a "heavy-industry-oriented" curriculum was established throughout China's colleges and universities to suit the needs of priority development of heavy industry. This kind of structure was correct at that time, but now China's economic structure and conditions have undergone great changes. The university curriculum, however, has not. According to 1979 data, the ratio of fields of study in universities across the country was: engineering 48.35 percent, science 15.3 percent, agriculture 5.9 percent, medicine 5.7 percent, teacher training 5 percent, arts and literature 4.2 percent, economics and finance 5.3 percent, and law and government 0.3 percent.

Second, excessive specialization of courses of study.

At present, since some ordinary colleges merely copy major universities and teacher-training colleges also try to keep up with the universities, some special courses are being duplicated or are overtaught. Excessive specialization of courses of study unavoidably results in a shaky foundation, a narrow range of knowledge, and poor work adaptability among students. There are two factors leading to excessive specialization. The first is the restriction of training goals. The general instructional outline stipulates that universities and colleges are places to grain specialists with an understanding of Marxism-Leninism, a solid foundation of theory, some specialist

knowledge, knowledge of one foreign language, and good physical health. What is emphasized here is the training of specialist personnel. Under the guidance of this kind of educational idea, every specialty strives to be small but complete, specialized courses increase in number but narrow in scope, and the teaching of fundamental theory is neglected. The second factor is the effect of the administrative system of the schools and individual specialties. There are three different types of universities and colleges in our country, under the Ministry of Education, the various functional ministries and commissions, and the provinces, municipalities and autonomous regions. In the past, it was emphasized that specialized education should be under the guidance of the concerned functional ministries and commissions and that personnel should be trained to fill jobs. The concerned departments establish and change courses of study and formulate teaching plans according to job needs, thus leading to overspecialization.

Third, outdated fields of study and weak development of frontier subjects.

China's curriculum model is basically still the same as the early 1950's, the period of readjustment of the adacemy system. During the past 30 years, our country's economic structure has undergone very great changes; but the development of new subjects is still slow, and old courses of study still occupy over 90 percent of the total in our country's universities. According to statistics, universities of other countries have more than 2,500 courses of study, while China currently offers only about 840. The number and variety do not fit the needs of current social and economic development and of China's industrial structure.

For a long time, there has not been full agreement on the question of the curriculum. There are two main schools of thought. One of them advocates abolishing specialized fields of study and practising the European and American style of "general education" instead. The other advocates the establishment of specialities, but maintains that they should be widened appropriately, because the present scope is too narrow. I think that the crux of the matter is not whether there should be specialities but what kind of educational ideas should be used to guide and organize teaching, and what kinds of personnel should be trained. In some countries, the curriculum is comparatively broad, while in others it is relatively narrow, but all of them have trained outstanding personnel. Thus it is clear that the question is not whether we should have specialized courses of study. In response to the development of science and technology, there has been considerable mutual influence among the educational systems and personnel models of various industrially developed countries, aimed at learning from each other's strong points and compensating their own weaknesses. In the U.S.A. some people with insight have noticed the drawbacks of "general education." They think that people trained in American universities lack specialized knowledge, have weak working capabilities, and take a long time to adapt to their work. They have already adopted some remedial measures. In the late 1960's, the curriculum in the Soviet Union also underwent a very great change. It was declared that personnel with "broad and complete specialized knowledge," able to "work even in the far future" should be trained. Thus, it can be seen that at present the universities' central task is not only to give the students a stock of

knowledge, but also to teach them scientific methods, nurture scientific thinking, and make them understand the path of contemporary scientific development and its future so that they can meet the needs of new industries of the future. We must recognize that with this goal, the "general education" of Europe and America and the "specialized education" of the Soviet Union are gradually becoming identical. Therefore, it seems meaningless to argue this already relatively clear question when readjusting the curriculum.

The conclusion ought to be very clear: the curriculum of study in our country's universities and colleges should be neither excessively broad "general education" nor excessively narrow "specialized education," but a system of courses of study which suit China's conditions.

What should China's educational curriculum be? I believe it has the following special characteristics. 1. An appropriate breadth. The curriculum in our country's universities and colleges should neither be too broad nor too narrow; generally it is appropriate to treat specialized subjects as second-level courses. Highly specialized subjects can be established as third-level course, but they ought to be guided, organized, and taught according to second-level courses so as to increase the flexibility of personnel training. 2. Adopt measures to fit local conditions. The world's cultural and scientific knowledge is the common wealth of mankind, gradually accumulated through the long process of practice by human beings. Without question, we should develop these universal courses. However, each nation also has its own special culture, art, technology and resources, and personnel suited to them should be trained. Our country has vast territory, abundant resources, and a splendid culture of long standing; we should establish the relevant specialized courses and train specialized personnel. 3. Unified arrangements for the whole country. We should establish a well-rounded nationwide curriculum system. This means that courses of study in rare fields which are in limited demand should not be established widely, but be distributed on a national, centralized basis. New subjects and new technologies have greater vitality and could be established on a large, cooperative regional basis. Popular, in-demand courses of study should be established in all provinces, cities and municipalities. 4. Establish a structural system for the curriculum which fits the agricultural, light industrial and heavy industrial structure. In the next 20 years, the strategic focal points of our country's economic development will be agriculture, energy resources, transportation, education and science; our curriculum should train personnel for these key areas.

The readjustment of the curriculum is very complicated and elaborate work. The key points in doing it effectively are: first, the national economy's long-term development plan must be used as a basis; second, we must proceed in accordance with the direction of scientific development; third, the departments training personnel and those employing the personnel should coordinate closely to produce a scientific forecast of the law of supply and demand for personnel.

12365
CSO: 4008/93

PROBLEMS IN POPULARIZING SCIENTIFIC AND TECHNICAL ACHIEVEMENTS OUTLINED

Chengdu SICHUAN RIBAO in Chinese 20 May 83 p 3

[Article by Zhao Ze [6392 3419]: "Urgent Problems That Need To Be Solved in Popularizing Scientific and Technical Achievements"]

[Text] Recently we investigated the status of the popularization and application of the 48 major scientific and technical achievements technology introduction projects approved by the Sichuan provincial government; we discovered the following urgent problems that need to be solved.

First, leaders at all levels should increase their understanding of the importance of popularizing and applying scientific and technical achievements. Only by popularizing scientific and technical achievements in earnest can we obtain greater economic results. Some prefectures vigorously launched the popularization work by holding meetings for technical interchange, technical training classes and meetings for exchanging achievements, by implementing compensation for transfer of achievements and contract responsibility systems linking planned output with technology, and by using scientific research and production associations and coordinated scientific research, design and production. These are good approaches. Some prefectures include the popularization of achievements in the national economic plan and organize and implement it in guided, systematic fashion. This is a practice that deserves to be advocated.

Second, channels and arrangements for all equipment and materials needed by the popularization projects which are included in the national economic plan should be taken care of by the planning and economic departments. The sources of funds needed by the popularization of achievements must be clearly specified. Based on the principle that whoever benefits should invest, units which adopt the achievements should pay for them from technical transformation or equipment depreciation funds or retained profits. Those which truly have difficulties may apply for loans from the financial departments, or the state may give compensated financial aid, to be repaid at fixed intervals.

Third, a policy of encouragement must be followed in order to motivate enterprises to popularize scientific and technical achievements and develop new products. For example, within 1 to 3 years of the time when a unit puts a popularized achievement into production it may apply to the local financial

department for tax reduction or remission; the pricing departments may allow new commodity prices to fluctuate in a certain range based on the principle of pricing according to quality and setting high prices for products of good quality; and all products whose variety and quality enables them to replace imported goods may be priced equivalently to the prices of similar imported goods. In short, the commercial, foreign trade and materials departments should adopt measures to encourage enterprises that have achieved outstanding results in the active popularization of new achievements. Penalty prices must be set for enterprises which do not actively popularize new achievements but instead continue to produce outmoded products for a long period.

Fourth, we must closely link the economic results of popularizing scientific and technical achievements with the economic interests of scientific and technical personnel in order to motivate the broad masses of scientific and technical personnel to try hard to popularize scientific and technical achievements. In popularizing achievements we can implement the system of technical performance contracting, sign technical contracts, and use technical consulting, technical training, the hiring of trained personnel and other forms. Scientific and technical personnel who undertake the popularization of scientific and technical achievements should receive the same treatment as scientific and technical personnel engaged in scientific research work in terms of salaries and promotions to higher technical positions.

9586
CSO: 4008/118

HEBEI SETS UP A SCIENCE AND TECHNOLOGY LEADING GROUP

Shijiazhuang HEBEI RIBAO in Chinese 3 Apr 83 p 1

[Article: "Provincial Government Sets Up a Science and Technology Leading Group"]

[Text] In order to strengthen the leadership of science and technology work and to enable all aspects of the province's science and technology work to progress in harmony under the unified planning and unified supervision of an authoritative, efficient organization, the Provincial CPC Committee and Provincial Government have decided to set up a provincial government science and technology leading group. Executive Vice-Governor Li Feng [2621 6912] is the group leader; representative comrades from the province's Planning Commission, Economic Commission, Scientific and Technical Commission, Agricultural Bureau, Higher Education Bureau, Personnel Bureau and Finance Bureau are members of the leading group. According to work needs, the leading group unifies organizational dispatching to concentrate and use provincial science and technology workers, exercises unified leadership over the long-term planning of science and technology, including the formulation and implementation of technological transformation plans of industry and key enterprises, studies the making of major technological policies and the execution of principles and policies for science and technology work, decides on the importation and assimilation of major technologies, defines major technological breakthrough projects and the dissemination and application of technological achievements with outstanding economic benefits, and coordinates the science and technology work of different departments.

The science and technology leading group recently held its first meeting, which was chaired by Li Feng. After discussion, the documents "Hebei Province Experimental Regulations on Management of Scientific and Technological Breakthrough Projects" and "Hebei Province Experimental Regulations on Unified Allocation of Resources for Scientific and Technological Breakthrough Projects" were passed and have been handed down to the lower levels by the province's Scientific and Technical Committee for execution.

12365
CSO: 4008/93

REFORM EXPERIMENTS IN SHANGHAI RESEARCH UNITS REPORTED

Beijing RENMIN RIBAO in Chinese 13 Mar 83 p 3

[Article: "Six Shanghai Scientific Research Units Carry Out Reform Experiments"]

[Text] The Shanghai Municipal Scientific and Technical Commission decided to carry out reform experiments in six scientific research units, and to gradually expand the reform once experience has been gained.

The six units involved are the Shanghai Research Institute of Laser Technology, the Shanghai Research Institute of Mechanical Processes, the Shanghai Research Institute of Light Industry, the Shanghai Research Institute of Construction Science, the Shanghai Research Institute of Textile Science, and the experimental farm and crops institute of the Shanghai Academy of Agricultural Sciences. In the last few years these six organizations have obtained considerable experience in expanded autonomy and improvement of contracted budgetary performance. Now the municipal scientific and technical commission has requested them to proceed one step further in their reform activity and to find new ways of scientific research management.

The organizations are mobilizing their scientific and technical personnel to discuss the reform program for the scientific and technical contract responsibility system. Specifically, some of them are preparing for test implementation of the unit contract responsibility system, some are carrying out the research topic contract responsibility system, and some are studying ways of instituting level-by-level contracting within research topics. They have done preliminary research on contract indicators with reference to the characteristics of the various institutions and have concluded that economic indicators cannot be the primary or sole contract indicators, but that contacting must be done on the basis of a combination of such technical and economic indicators as increased amounts of high-level, benefit-yielding results or development of increased numbers of qualified personnel. Some of the units have used the benefits resulting from transfer of research results since 1979 and the like as a contracting basis, using a weighted scoring method. In the contracting process they have used the method having the scientific personnel freely choose topics and having the topic group leader "form a cabinet." The municipal labor and wages commission, the finance office, and the personnel office have sent representatives to the six units to gain an understanding of their situations and to participate in their studies of how to make a success of the reform experiment.

8480
CSO: 4008/66

PROMOTION OF TECHNICAL CONTRACT SYSTEM URGED

Shijiazhuang HEBEI RIBAO in Chinese 7 Feb 83 p 1

[Article: "Energetically Promote Technical Contracts on the Scientific and Technical Front"]

[Text] How can the scientific and technical front free itself from the situation of the "iron rice bowl" and "eating from the big pot", how can it stimulate the enthusiasm and creativity of scientific and technical personnel to the greatest degree, fully make full use of their wisdom and intelligence in such activities as key scientific and technical efforts, technical modernization, dissemination of new technologies, and popularization of scientific information? The answer lies in energetically promoting the technical contract responsibility system. This is the view of all participants in the conference of scientific and technical committees of all of Hebei province's prefectures and cities and some counties held recently by the province scientific and technical commission. Following a summation of current experience with technical contracts, eight approaches to promoting the technical contract responsibility system in on the scientific and technical front were suggested.

1. A contract responsibility system should be implemented for all key projects and general applications and development projects handed down by the various levels, in which every level signs a contract and specifies tasks, timing, expenses, and rewards and penalities.

2. The scientific research units and advanced academies and schools can link up directly with factories in the countryside and contract for scientific and technical research topics and for the training of personnel. They also may unite with a prefecture or city or industrial branch to carry on comprehensive technical contracting.

3. Large and medium-sized factory and mine enterprises can sign contracts with medium and large enterprise, collective enterprises and rural commune and brigade enterprises to provide technical assistance and technical personnel for compensation.

4. The signing of single-project or comprehensive technical contracts between specialized scientific and technical personnel in agriculture, forestry,

livestock raising, sidelines and aquaculture and the peasants should be energetically promoted.

5. Technical evaluations, technical and economic documentation, consulting services and use of instrumentation and the like can be contracted for on a fee basis, with assumption of technical responsibility.

6. Scientific and technical personnel who take the initiative in applying to plants, villages, mountain areas or areas above dams to conduct technical contracting should be given energetic support and preferential treatment. Scientific and technical personnel who are in jobs not in accordance with their training or who cannot be used in their original units may keep their jobs without wages without while traveling to other units for technical contracting, and may keep most of their earnings.

7. Provided that their own units' work is not affected, scientific and technical personnel may accept spare-time jobs for rational compensation.

8. Within their units, scientific and technical personnel should be on the contract responsibility system; the persons to participate in it may be selected by the topic leader.

In the forms describe above, a certain proportion of a unit's earnings from external contracting should be paid to the scientific and technical personnel who did the work, while the remainder should be retained in the unit's scientific and technical fund and benefits funds. The principle of payment according to work should be adhered to, compensation and bonuses should not be subject to limitations, and those who achieve major successes or produce major economic benefits should be given large bonuses or extraordinary promotions, so that some of the scientific personnel will lead the way in becoming prosperous.

Permanent Deputy Province Chief Li Feng [2621 6912] and Deputy Province Chief Yue Zongtai [1971 1350 3141] said in their speeches at the conference that scientific and technical departments at all levels should liberate their thinking, break out of "leftist" fetters and the trammels of old ideas and old methods, resolutely carry out reforms, vigorously experiment, and summarize new experiences and new creations of the masses so that the technical contracting system will continually improve and develop through practice. In addition they must carry out reforms in several other areas so as to create a new situation in science and technology through reform.

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BRIEFS

RAISE S & T FUNDS--In order to accelerate the development of science and technology in Hebei province and solve the problem of inadequate scientific and technical funds, the province's financial office recently decided that this year the budget for the three areas of science and technology should be increased considerably. It has made a preliminary decision that in 1983 the funds budgeted for the three areas of science and technology will increase by 45 percent, exceeding previous records. These funds will be used primarily for 26 major scientific and technical projects and other key scientific and technical projects to be organized in 1983. The issuance of this decision greatly stimulated the province's relevant science and technology management departments and scientific and technical workers, who resolved to manage and use the funds well and to gain even better and greater benefits from limited financial resources. [Text] [Shijiazhuang HEBEI RIBAO in Chinese 17 Mar 83 p 1] 8480

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