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FOR RELEASE: MONDAY P.M.
APRIL 1, 1963

HUMPHREY URGES GREATER USE OF HUMAN

RESOURCES TO BOOST ECONOMY

Senator Hubert H. Humphrey (D., Minn.) said today that the Nation must put more of its brain power and technical resources into an effort to solve the country's economic problem.

"We are throwing heavy financial and intellectual resources into the arms race and the space race," Humphrey said. "But while we are maintaining a strong position in those areas, we have a domestic economy that is erratic, spotty and unsatisfactory in many respects."

Humphrey's remarks were prepared for an address to a meeting of the American Management Association in Washington.

The Senator noted that "the basis for our national power, prestige and prosperity is shifting from natural resources to human resources."

"A technological revolution has transformed our society from one based on natural resources and raw manpower to one based essentially on brainpower," Humphrey said He added:

"We are not going to solve the many specific economic problems caused by increasing automation, changes in raw materials usages, competitive international trade and other economic trends without a massive upgrading of our human resources.

"We must put more of our intellectucal capital into solving the Nation's economic and social problems.

"And we must create more intellectual capital by moving much harder and faster and with more determination to the task of training, retraining and higher education."

Humphrey noted that the economic growth rates of the United States lag behind other industrialized nations, that its volume of exports and the balance of international payments are unsatisfactory, and that unemployment continues at a high rate.

(more)

"To solve these problems, we must broaden the technical base of our economy and put more American brainpower to work in the economic and industrial sectors of the Nation," Humphrey said.

The Senator listed what he called the "more pressing technical needs of our industrial economy" as:

1 -- More effective development and use of existing and new science and technology by industry.

2 -- Better methods to adapt the research results developed from our military and space programs for economic purposes.

3 -- A more adequate supply of people trained and educated in the application of science and technology to industry's needs.

4 -- More effective dissemination and use of technical information.

Humphrey called for a better balance in the use of both government and private research and development efforts.

"We have enormous research and development programs," he said, "but three-fourths of this technical effort is federally sponsored for such purposes as defense, space, atomic energy and public health---all vital objectives but none particularly directed toward promoting economic growth."

ADDRESS BY

SENATOR HUBERT H. HUMPHREY

THE AMERICAN MANAGEMENT ASSOCIATION

WASHINGTON, D. C.

APRIL 1, 1963

"The Changing Basis of National Power, Prestige, Prosperity"

As the world spins into the middle sixties, one great fact is becoming clear: the basis for national power, prestige, and prosperity is shifting from natural resources to human resources. This is a rapid shift, and it is accelerating.

The problems and opportunities implicit in this trend are crucial to our welfare.

If we are to meet these problems and opportunities, all sectors of our society---management, labor, government, and the general public---must join in formulating national policies based on the new facts of international life.

Our Nation's greatness has been due in large measure to our ability to adapt to the needs of changing times. Are we still as adaptable and imaginative?

The direct relationship between science and technology on the one hand and our military capability and effort in space exploration is spectacularly obvious. Not nearly so obvious is the dependence of our general economic and social well-being on science and technology. And for that matter, only a strong, vigorous economy can enable us to continue to sustain a staggering effort in defense and space activities.

The strength of our economy, and our economic growth, depend upon and are limited primarily by our technical capability.

A second great fact must be understood and that is that a technological revolution has literally transformed our society from one based largely on natural resources and raw manpower to one based essentially on brainpower.

Technology has made agriculture so productive that today one American farm worker supplies food and fiber for 27 people, and agricultural workers constitute less than 7 per cent of our labor force.

The shift of workers from farm to factory provided manpower for our rapid industrial growth. But technology also made manufacturing workers more productive. It has shifted employment opportunities from the assembly line to the services and trade -- wholesale and retail

trade, finance, insurance, real estate, public utilities, transportation, services, and government. This shift from farm to factory, and now to services and trade has demanded high skills, better training and more education. It has also sloughed off onto the unemployment rolls those with little skill, inadequate training and incomplete education.

Technological change today accounts for about half the annual rate of economic growth, and has radically altered the income pattern of our economy. The agricultural

component of our GNP, for example, is only half what it was three decades ago. The composition and characteristics of our labor force have been altered. Whole regional economies have been drastically affected. Many areas of our country find themselves bypassed by technical change, relying still on natural resources for which there is diminishing demand or on the conversion of materials---an activity that now requires fewer workers.

The prosperity of any region of the United States is no longer tied to abundant resources of mine or field or forest. Our most important resource, we now see, is brains. This human resource is highly mobile and flexible. It is not unusual to see bursting prosperity in localities and States in our country that have substantially only one product to sell - brains.

Our educational requirements have been sharply increased by the technological revolution. If a high

school education today is a must, it is not enough. Specialized training and education to the college and post-graduate levels are increasingly required.

Unlike other one-crop economies, brains will never be obsolete.

In view of the great and increasing dependence of our economy and our society generally on trained human resources, how are we as a nation utilizing these scarce resources, developing them, and conserving them? In particular, how do we compare with other countries?

Currently, of course, we enjoy the largest gross national product of any nation of the world, the highest standard of living, and the highest over-all productivity. But our annual rate of economic growth is trailing behind most industrialized nations.

Like the hard, we cannot take our lead over the tortoise for granted.

The U.S. rate of growth of GNP has averaged 3 per

cent recently---far short of our stated goal of 4.5 per cent. Russia's rate of growth in the 1950's was 6 or 7 per cent, and is expected to reach 8 per cent in the 1960's.

In the 1950's, the average growth rate of U.S. productivity (GNP per worker) was 2.2 per cent. This compares with 6.1 for Japan, 4.5 for West Germany, 4.0 for Russia, 3.4 for the Neterlands, and 2.8 for Sweden.

In the same period, the average growth rate of the U.S. standard of living (GNP per capita) was 1.1 per cent---compared with 7.2 for Japan, 6.1 for West Germany, 4.0 for Russia, 3.4 for the Netherlands, 2.8 for Sweden, and 2.1 for the United Kingdom.

If we accept the theses that economic strength depends on technical capability, it is disturbing to compare the rate and direction of the technical effort of other nations with our own. For example, Western

Europe and the United Kingdom, with a much smaller GNP sustain a technical effort to enhance private industry that is at least as great and probably greater than that of the United States.

Moreover, this effort is being stopped up. In France, Germany, and England, for example, non-space, non-military technical efforts have been <u>doubling</u> approximately every 3 to 4 years. The French research and development effort is expected to double again over the next four years, and to exceed the U. S. research and development effort as a percentage of gross national product. In contrast, our own increase has been only a few per cent per year. In fact, we have a diminishing <u>rate</u> of increase. In Italy, Belgium, the Netherlands, Norway, and Sweden, civilian research and development amounts to 100 per cent of their total research and development effort. West Germany, which has the largest civilian research and

development program, had in 1959 (my last available figures) a total of $690,000,000 for civilian research and development---95 per cent of the total West German research and development effort. Two-thirds of France's research and development was civilian-oriented and about half of the United Kingdom.

In contrast, for the same year, the United States civilian research and development was on the order of one-third of our total research and development effort.

Both of these European, and Japanese, developments---the greater rate of economic growth and the greater emphasis on industry-oriented technology---bear directly on two major U.S. problems: we are in an increasing competition for world markets, and we continue to have a stubborn unfavorable balance of international payments.

We in the United States have long counted on our technological superiority, as well as on the economy of

scale made possible by our large continental domestic market, to give us the needed edge in inter-national competition. These advantages tended to offset lower labor costs abroad. But improved technology abroad and the merged economic strength of the Common Market are shaking some of the suppositions of the past.

If we are going to reduce the adverse balance of international payments, we must expand our exports. And to expand exports we must broaden the technical base of our economy. We have to improve the quality of our goods and reduce our costs---indluding both the direct and the indirect costs. Only through research and development can we do it.

We already have an enormous research and development effort, it is true. In the past 20 years, our research and development expenditures jumped 30 fold---from a half billion dollars yearly to more than $16 billion annually today---a quantum increase.

But three-quarters of that enormous national technical effort is federally - sponsored for such purposes as defense, space, atomic energy, and public health---all vital national objectives, but none particularly directed toward promoting economic growth. Indeed, the results of this increasingly esteric research have less and less immediate application to the civilian economy.

Only about $4 billion annually is spent by industry for industry, and of that amount, only about $1.5 billion is aimed at increasing productivity. Although industry-sponsored research increased in the last several years, it was at a significantly slower rate than government-sponsored work. Last year it barely increased at all.

Moreover, 80 per cent of this industry-sponsored research was done in 300 companies.

Seventy-three per cent was concentrated in 5 industries. Two of these industries---aerospace and

electronics---represent more than 25 per cent of the research and development, while constituting only 10 per cent of the manufacturing component of GNP.

On the other hand, such industries as building and construction, textiles and apparel, and food processing, which constitute about 30 per cent of the manufacturing and construction components of GNP, perform less than 4 per cent of privately-supported research and development.

The 50 per cent growth of industrial research and development in the last decade has taken place in large firms almost exclusively. (Firms with more than 5,000 employees increased research and development 50 per cent, whereas smaller firms increased research and development about 2 per cent.)

This concentration of research and development in certain industries and in large firms has special significance, because there is a high and direct correlation between growth and profitability on the

one hand and the relative amount of research and development performed.

The growth of military and space research and development has further concentrated technical effort in firms and areas already technically competent. The Pacific States now perform almost half the total military research and development (46 per cent); the Middle Atlantic States almost a fifth. The rest of the country splits less than a third of the military research and development---the South with about 9½ per cent, the Mountain States with almost 9 per cent, and the Midwest with 8 per cent.

A similiar pattern is clear in the geographic distribution of trained human resources---scientists and engineers as a percentage of population.

In 1960, the number of engineers per million population was 3,330 in the South---roughly half the number in the Far West, at 6,570. The Midwest, with

4,580 engineers per million population, was also sharply below the Far West and the East Coast.

In 1961, the number of scientists per million population was 750 in the Midwest, compared with 1,240 on the Pacific Coast and about 1,035 per million in the New England-Middle Atlantic region. It is so serious a problem that the Midwest has become a net exporter of scientists and engineers to both coasts. Our midwestern universities are training men and women with advanced degrees who are increasingly migrating out of the Midwest. State money is being used, in a very real sense, to provide advanced-degree training for out-of-state industry. If there were a two-way flow of advanced-degree graduates back into the midwest from the Far West and the East Coast, this would be a tolerable situation. But so long as the federal procurement dollar is providing the overwhelming majority of job opportunities in limited areas of our country, there will the flow of trained

people go.

There are those of us who feel that a conscious effort on the part of the Federal Government should be made to break this pattern by a wider distribution of government procurement.

Another example of research and development imbalance is the fact that, out of 2,000 universities in the United States, 100 of them, or 5 per cent, perform 90 per cent of federally-supported academic research.

A serious by-product of the present research and development pattern is that university faculty and students tend to commit themselves to technical activity suited to space, defense, and similar missions---instead of to the more mundane, less glamorous, but vital mission of increasing economic productivity and developing new products. Such a bias in the career-orientation of our brightest minds is perhaps the most disturbing problem arising out of the necessary but large concentration on

special national programs.

Of the 400,000 scientists and engineers doing U.S. research and development, about 275,000 are doing research and development for government programs, and 125,000 for industry-oriented programs. But of this industry group, about 100,000 work for the 300 largest research and development companies; only about 25,000 work for all the other industrial and commercial enterprises in America.

This year's increase in the supply of scientists and engineers for research and development is expected to be about 30,000. But the increase in space research and development alone next year will absorb just about the entire new supply. The space research and development increase is equivalent to more than 20 per cent of the total scientists and engineers now doing research and development for the private sector, and about 50 per cent of the research and development people in

universities.

And things are going to get worse. By 1970, we expect to be short by more than 250,000 engineers. Enrollments in engineering in American schools have actually declined; we are graduating about 30,000 engineers each year now while the Russians are graduating 120,000 yearly.

It is my view that trained, educated people constitute the major national resource. And this natural resource deserves national support. By that I mean federal support---federal funds in the form of scholarships and the construction of adequate scientific and educational facilities.

We have recognized this in principle, but we have taken only relatively small and cautious steps---as in the National Defense Education Act---to implement the idea.

The cold facts are that engineering graduates are declining---as are Ph.D's in education and government. We cannot permit this to continue.

Neither can we afford to permit the continued and accelerating concentration of our most talented young people in almost purely defense-oriented industry, without risking intellectual starvation of the civilian-oriented sector of our society.

The worsening supply and demand situation in trained manpower is only one of the serious limitations on an expanded development and use of technology for industry and commerce. There are others---including the rising costs of the many operations connected with the introduction of new products and processes, and the increasing risk of innovation.

Such limitations do not permit industry alone---as matters presently stand---to achieve the level of

technical effort necessary to increase our economic growth rate to the minimum of 4.5 per cent yearly and to increase our exports.

The Federal Government has traditionally contributed significantly to the advancement of science and technology for economic development. In this fiscal year, for example, the Federal Government is supporting research and technology for non-military, non-space activities in several specialized areas. The major areas include: atomic energy ($230 million; agriculture ($176 million); basic science ($153 million); transportation---mostly air ($121 million); and natural resources ($107 million).

We have as important a stake in the well-being of industry and commerce, as we have in that of agriculture, fisheries, mining, transporation, forests, public health, or space exploration and defense.

The more pressing technical needs of our industrial economy are:

- a more effective development and use of existing and new science and technology by industry;

- a better means of adapting the research results developed from our military and space programs, for economic purposes;

- a more adequate supply of people trained and educated in the application of science and technology to industry's needs;

- a more effective dissemination and use of technical information.

The Administration has taken several major steps to assist industry and commerce---including tax credits, accelerated depreciation schedules, area redevelopment, accelerated public works, manpower retraining, and the

Trade Expansion Act. Now, specifically to the point of our discussion, the President has called for a new civillian industrial technology program.

This proposed new program consists of two efforts. First is the industrial science and technology program.

Here the idea is to provide federal support for technical work and to disseminate technical information that are basic to industrial development. Contracts or grants will be awarded to institutions organized for research, education or the dissemination of technical information. No contracts and grants will go to individual firms organized for the manufacture or distribution of products and services, and no support will go for individual product development nor to solve the problem of the individual companies or a narrowly oriented group of firms.

But support will be designed to develop information

applicable to a broad segment of industry, such as textile or apparel. It will encourage the interaction of people interested in science and technology, economics, and related fields.

The federal program is planned so as to encourage additional industrially-oriented basic research at universities, and thus increase the supply of technical people knowledgeable of industrial problems. It will also seek to encourage additional support by industry itself of basic technical work.

The idea will be to stimulate basic technological development that will have a major effect on industrial productivity; will contribute significantly to our GNP; will reduce the indirect costs of goods and services; or will expand our export trade.

Initially, the major support will go to activities basic to three broad industrial groupings---textiles and

apparel; building and construction; and metal working, including machine tools, foundries, and castings.

A second major element of the new civilian industrial technology program will be the university-industry technical (extension) service. Here is a pilot program designed to improve local and regional technical practices through a closer cooperation between local industry and the universities. A closer association and contact would be encouraged between the scientists and engineers in the universities and their counterparts in industrial laboratories and between technical people and management. At the same time there will be a strong effort to upgrade the dissemination of technical information. The applicable technology must be diffused as rapidly and thoroughly as possible throughout industry.

This is frankly going to be an experiment. Hopefully, an effective technical extension service may later be established---with mathhing funds from state and local governments and from industry---based on the experience gained from the pilot projects.

The prospect is for about a dozen key schools throughout the country to be selected to begin the pilot program. In fact, schools in more than a third of our states have already made tentative proposals. This is good, sound, constructive planning to do something about a serious economic problem.

Now to summarize: we are throwing heavy financial and intellectual resources into the arms race and the space race. But while we are maintaining a strong position in those areas, we have a domestic economy that is erratic, spotty, and unsatisfactory in many respects.

Yes, we have more than 70 million people working at good jobs, at good pay, and under good working con-

ditions. But we have an unemployment rate that is almost the highest of the world's industrial nations, and more than double that of most European countries.

Our four million jobless not only fail to contribute to the gross national product---but they drain off every year $3 to $4billion in unemployment and relief payments and other costs.

We have stubborn, persistent areas of chronic unemployment which sometimes run as high as 30 per cent unemployed.

We have almost sixgeen per cent of our out-of-school teenagers also out of jobs. Some estimates have indicated that by 1970, unless something is done about it, half of our unemployed will be teenagers.

Yes, a tax cut will be a great stimulation to the general economy. I support it.

But I am convinced that we are not going to solve the many specific economic problems caused by increasing automation, changes in raw materials use-ages, competitive international trade, and other economic trends without a massive upgrading of our human resources.

We must put more of our intellectual capital into solving these problems.

And we must create more intellectual capital by moving much harder and faster and with more determination to the task of training, retraining, and higher education.

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