6 - Prints
2 - only Hearings

84th Congress
1st Session

COMMITTEE PRINT

AUTOMATION AND TECHNOLOGICAL CHANGE

REPORT

OF THE

SUBCOMMITTEE ON ECONOMIC STABILIZATION

TO THE

JOINT COMMITTEE ON THE ECONOMIC REPORT

CONGRESS OF THE UNITED STATES

Printed for the use of the Joint Committee on the Economic Report

UNITED STATES
GOVERNMENT PRINTING OFFICE
69847° WASHINGTON : 1955

JOINT COMMITTEE ON THE ECONOMIC REPORT

(Created pursuant to sec. 5 (a) of Public Law 304, 79th Cong.)

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LETTER OF TRANSMITTAL

NOVEMBER 25, 1955.

Hon. PAUL H. DOUGLAS,
Chairman, Joint Committee on the Economic Report,
United States Senate, Washington, D. C.

DEAR SIR: Transmitted herewith is a report of the Subcommittee on Economic Stabilization which you appointed on March 23, 1955, pursuant to Senate Report No. 60, 84th Congress, 1st session.

This report presents findings and recommendations of the subcommittee, based upon its recent hearings and study of the impact and prospective impact of automation and of technological change on the economy.

Sincerely,

WRIGHT PATMAN,
Chairman, Subcommittee on Economic Stabilization.

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AUTOMATION AND TECHNOLOGICAL CHANGE

INTRODUCTION

Since the Joint Committee on the Economic Report is charged under section 5 (b) of the Employment Act of 1946 with the responsibility of making continuing studies of matters relating to employment, production, and purchasing power, the committee directed its Subcommittee on Economic Stabilization to study the impact of so-called automation on long-run employment and investment levels (S. Rept. No. 60, 84th Cong., 1st sess., p. 6). In keeping with this responsibility, the subcommittee looked into the current and prospective significance to the economy of rapid technological change through a series of public hearings and case studies.

During intensive hearings covering 9 days with 15 separate morning or afternoon sessions, the subcommittee heard from well over a score of witnesses closely associated with production and industry on the side of both management and labor, together with experts in the field of technology and economics.

Along with information submitted to it by various interested parties, the subcommittee heard expressly from Dr. A. V. Astin, Director, National Bureau of Standards; William W. Barton, president, W. F. & John Barnes Co., Rockford, Ill; Joseph A. Beirne, president, Communications Workers of America; Dr. Cledo Brunetti, director, engineering research and development, General Mills, Inc.; Dr. Walter S. Buckingham, Jr., Georgia Institute of Technology; Dr. Robert W. Burgess, Director, Bureau of the Census; Dr. Vannevar Bush, president, Carnegie Institution of Washington; James B. Carey, president, International Union of Electrical, Radio, and Machine Workers; Ralph J. Cordiner, president, General Electric Co.; Howard Coughlin, president, Office Employes International Union; Ralph E. Cross, executive vice president, the Cross Co., Detroit; D. J. Davis, vice president, manufacturing, Ford Motor Co.; John Diebold, John Diebold & Associates; M. A. Hollengreen, president, Landis Tool Co., Waynesboro, Pa., president National Association of Machine Tool Manufacturers; S. R. Hursh, chief engineer, Pennsylvania Railroad Co.; W. P. Kennedy, president, Brotherhood of Railroad Trainmen; Don G. Mitchell, president and chairman of the board, Sylvania Electric Products, Inc.; James P. Mitchell, Secretary of Labor; Marshall G. Munce, vice president, York Corp., York, Pa., chairman, industrial problems committee of the National Association of Manufacturers; James J. Nance, president, Studebaker-Packard Corp.; Dr. Edwin G. Nourse, former Chairman of the Council of Economic Advisers, vice chairman, Joint Council on Economic Education; Clifton W. Phalen, president, Michigan Bell Telephone Co.; Otto Pragan, research director, International Chemical Workers Union; Walter Reuther, presi-

dent, Congress of Industrial Organizations; John I. Snyder, Jr., president and chairman of the board of directors, U. S. Industries, Inc.; Robert C. Tait, president, Stromberg-Carlson division, General Dynamics Corp.; Dr. Thomas J. Walsh, professor of chemical engineering, the Case Institute of Technology, Cleveland.

These hearings, it should be noted, have been the first congressional recognition of this important postwar trend called automation, which has had and promises to continue to have a great effect upon our lives and the operations of the economy in the future.

The subcommittee appreciates and is gratified by the statement of the Secretary of Labor, James P. Mitchell

> * * * that these hearings are contributing very significantly to a broader understanding of the great technological forces that are shaping our national life and economy, and I compliment the committee on its management of them.[1]

In the course of the hearings, the subcommittee considered specifically six different industrial situations in the metalworking, chemical, electronics, transportation, and communications industries, together with data processing and officework. These industries were selected merely as illustrative of the kind of problem which may be faced in the trend toward automation. There are, of course, many other industries which might have been studied with interest and profit had time permitted. The fact that these particular industries were chosen should not for a moment obscure the fact of rapidly advancing technology in other areas. To mention only a few such areas, one might cite the canning and bottling industries. One might cite also petroleum refining, the processing of commercial-bank paperwork, the basic steel industry, the use of ready-mixed concrete, coal mining, the use of electronically controlled elevators in our modern skyscrapers, and numerous others.

No study of automation would, of course, be complete without recognition of the important and overwhelming role which technology and scientific thinking play in the development of our instruments of defense. This defense use must always be in the background but, since the joint committee's primary interest lies in civilian employment and the civilian segment of the economy, the subcommittee did not take up defense applications except in an indirect way.

In hearing persons who have had experience in the selected industries, the subcommittee sought light on the broad economic and social implications of rapidly advancing technology and know-how. Specifically it sought information on (1) the extent of possible and probable displacement of personnel, (2) the possible shifts which may arise in the distribution of mass purchasing power, (3) the distribution of the expected gains in productivity, (4) the effect upon our business structure, and (5) the effect upon the volume and regularity of private investment.

While it was impossible for all members of the subcommittee to be in attendance at all times during the hearings, careful consideration of the transcript suggests that findings and some modest recommendations are appropriate at this time. Under the circumstances, what might have been normal differences in emphasis have been passed over in order to present as large an area of agreement as practical in this

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[1] Automation and Technological Change, hearings before the Subcommittee on Economic Stabilization of the Joint Committee on the Economic Report, 84th Cong., 1st sess., p. 262.

report. The findings and recommendations, the subcommittee thus believes, are sufficiently well founded in the evidence presented to it that they can be accepted generally by all who give thought to the need for progress with stability in the economy.

FINDINGS

I

The economic significance of the automation movement is not to be judged or limited by the precision of its definition.—While it is hardly a duty expected of a congressional committee to formulate, once and for all, a definition of a new word that is not yet in standard dictionaries, there is an obligation upon anyone studying the mysteries of automation to make clear precisely what it is that is being talked about, as well as report upon what has been found under the microscope. As plans for the hearings on automation advanced, it became increasingly clear that the word means widely varying things to different people. The subcommittee has consequently used the term broadly. It has been used to include all various new automatic and electronic processes, along with rapid technological advance and improved know-how generally. One may be taking some liberties, it is true, with a yet undefined term to extend it to cover printed circuitry—etched wiring on a plastic board—and the solution by machine of the "most abstruse nonlinear partial differential equations" (hearings, p. 444), but the effect of such operations upon the economy of the future is just as real, and just as full of implications, as an improved mechanical arm for moving materials about from one machine to another.

If one has to have a short, dictionary-type definition, one witness, closely associated with the man most often credited as having been the originator of the term "automation," defined it for the subcommittee as "the automatic handling of parts between progressive production processes" (hearings, p. 53). In a sense, automation clearly is not at all new. Witnesses at the hearings vied with each other at citing an "earliest" example. One critical word in the definition just stated is, of course, "automatic." So long as one understands that machines and processes can be automatic, more automatic, and still more automatic, one can accept automation as an old concept and merely an extension of familiar forms of mechanization. A somewhat more precise definition might emphasize that the essential element in modern automation appears to be the introduction of self-regulating devices into the industrial sequence through the feedback principle whereby electronic sensing devices automatically pass information back to earlier parts of the processing machine, correcting for tool wear or other items calling for control.

In popular usage, the word "automation" has, however, come to mean much more than mere automatic material handling or the refinement of assembly-line techniques.

While, in the interests of precision, there is a natural inclination to narrow the term, it is clearly wrong to dismiss automation, however, as nothing more than an extension of mechanization. We are clearly on the threshold of an industrial age, the significance of which we cannot predict and with potentialities which we cannot fully appreciate.

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Working under forced draft, our physical and chemical scientists during the war pushed the frontiers of pure and applied science far, far ahead. That effort continues, little slackened. We are consequently on the threshold of an age which will witness the peaceful use of the atom, enormously increasing the amount of available energy; the development of electronics greatly increasing our ability to control machines; and the output of modern computing machines greatly multiplying man's ability to do mental work. What, too, one may ask, of the age of solar power or of "transistors"—another word not yet in standard dictionaries. The potentialities of such forces taken collectively cannot help but raise automation far above the level of merely advancing mechanization as we have known it. As Gen. David Sarnoff has said:

> The very fact that electronics and atomics are unfolding simultaneously is a portent of amazing changes ahead. Never before have two such mighty forces been unleashed at the same time (hearings, p. 101).

We have certainly not yet seen the full impact of these new technologies. It may be expected, moreover, that the capital and research invested in their advancement will only begin to be felt in the years ahead. The "lead time" of research and investment is always long. The evidence before the subcommittee suggests, therefore, the importance of public policy looking ahead 3 to 5 years or longer when the fruits of accelerated technological advancement and postwar investment begin to accumulate and compound. We don't know what all this will add up to, but we might very well be wrong to think of it as simply "more of the same" technology which has always characterized American industry.

II

The shift to automation and the accelerated pace of technological change is today taking place against the background of relatively high employment levels and of a prosperous economic situation.—Under such conditions, dislocations and adjustments tend to be less painful. Any significant recession in levels of employment and economic activity might very well create new problems and greatly magnify the adjustment pains growing out of increased mechanization. After all, the challenge to the economy in the maintenance of reasonably full employment involves a great deal more than simply finding new positions for those displaced, whether by automation or other cause. Without giving any regard to changing rates of individual participation in the labor force, our work force is increasing at the rate of more than three-quarter million workers each year. If it should become apparent that automation is, on balance, lessening the job chances of these new entrants into the labor force, the appraisal of its significance would have to be greatly revised.

III

One highly gratifying thing which appeared throughout the hearings was the evidence that all elements in the American economy accept and welcome progress, change, and increasing productivity.—This flexibility of mind and temperament has been a conspicuous characteristic of American industry for generations in well-known contrast to that of many other countries. Not a single witness raised a voice

in opposition to automation and advancing technology. This was true of the representatives of organized labor as well as of those who spoke from the side of management. Certainly none of the evidence available before the subcommittee supports a charge that organized labor opposes or resists dynamic progress. Labor, of course, recognizes that automatic machinery lessens the drudgery for the individual worker and contributes greatly to the welfare and standard of living of all.

The fact that representatives of organized labor are watchful lest the material gains of automation become the sole objective, without recognizing the individual hardships that may be caused by job losses and skill displacements, ought not to be turned into a charge that labor, as such, is obstructive to new developments. Whenever one has been in a position to have witnessed firsthand the hardships experienced by the skilled and older worker in any line of endeavor—industrial or professional—suddenly wrenched from his job by the installation of a new machine, or new technology, one can scarcely be unmindful of the inequities which can come about where management and public policy have not given recognition to needs for retraining, relocation, severance pay, and other programs which tend to soften the transition.

Both organized labor and management are apparently aware of and intent upon seeing that these human elements are not disregarded.

IV

Along with automation and the introduction of laborsaving machinery and techniques in some parts of the economy, whole new industries have arisen and may be expected to arise.—The electronics industry, for example, is today made up of hundreds of companies, both large and small, which have sprung up all over the country, employing ever-increasing numbers. The production of specialized transfer machinery for use in the metalworking industries is another instance of an essentially new, growing industry. In some measure these new industries with their employment-giving opportunities do tend to offset the possible losses of employment in other industries where new automatic processes are being introduced. There can be little doubt but that these industries will continue to contribute toward maintaining employment levels in the future in the face of increased automation elsewhere, and even in the particular industries themselves. On the other hand, it would be unwise as a matter of public policy to overemphasize the employment potentials in these new industries and assume that their growth will be sufficient to take care of displacements in the older industries.

In the nature of things, it is almost inevitable that these newest of industries should grow up to be highly automated, employing the most advanced methods, unhampered by tradition, existing plant, and the like. In general, the pattern in these industries has been either to move product and process forward simultaneously or, quite frequently, move from the development of a new automated process to a product, rather than the more familiar search for a better way to make a known old product. The subcommittee was told, for example, that the introduction of automatic handling in chemical processes has

about reached the limit so far as known products and currently operating processes are concerned, but that intensive research on the development of new processes is certain to make new products possible. This leads us directly to another of the subcommittee's findings.

V

One fact not always sufficiently appreciated, however, is the extent to which goods and services not previously available or possible are made possible by the introduction of automatic processes.—In this connection, one must think not only of whole new items but of greatly improved goods and services as well.

Perhaps the most conspicuous case involves atomic energy and atomic isotope technologies. In these cases, the very nature of the materials to be dealt with are such that they could never have been harnessed by hand methods and close human contact. The subcommittee's attention was called to a similar situation involving polyethylene, which has become a commonplace product today around the house in the form of packaging, squeeze bottles, and the like. Production of the basic material in this case is almost completely automatic because of the need for precision of timing, worker safety, and the desirability of making the product at extremely high pressures.

The mass production of color television turns upon the development of automatic processes for placing literally hundreds of thousands of separate and individual colored dots upon the face of a picture tube, a task all but beyond human capabilities for precision and tolerance for tedium.

The new products which flow out of the availability of electronic computing machines even include the promise of better weather forecasts for the future. Without rapid mechanical computation made possible by high-speed computers, it heretofore has been difficult to make full use of all available weather data in time for it to be of use. The control of airline and railroad travel reservations is another chore which it is expected that computers will do more expeditiously.

It would be impossible here to undertake a listing of all of these products of services, the very existence of which is dependent upon the development of automatic ways of dealing with their production. The subcommittee does feel, however, that this is an important item to be chalked up on the credit side of the ledger in any appraisal of automation.

VI

While the employment potentials in these new industries themselves may not be as high as they would seem at first thought, the subcommittee was impressed with and, indeed, would be remiss if it did not draw specific attention to, the employment possibilities arising out of the service industries associated with many of these new products.—For every employee counted as employed in television manufacturing, countless local television repairmen, scattered in every city and hamlet of the Nation, depend for their livelihood on the mass production and mass distribution of the television sets produced by automated industry.

Personnel displacement resulting from increased mechanization in an automobile factory, while affecting, perhaps adversely, the lives of

the individuals immediately involved, may well be small when compared with the enormous number of crossroads garage mechanics, service-station operators, salesmen, etc., who back up the ever-expanding automobile-manufacturing industry. We are often reminded that unemployment directly caused by automation is partially offset by new employment in the machine-making industries. This is no doubt true. Far more persuasive, however, as an offset to reduced employment as a consequence of mechanization, are the opportunities offered by these diffused, less concentrated, less conspicuous, and less vocal associated service industries.

VII

While the degree of automation made possible by modern science may well surpass the limits of present imagination, it is important to note that not all workers, indeed, only a relatively small, although conspicuous, fraction of the total labor force will be directly involved.—Certainly it must be expected that increasing numbers of workers will feel the impact of automation. At the same time, large numbers of individuals in the professional and service industries, while it may be hoped can work with improved tools and instruments, will not be significantly affected by added automation, however it may be defined. The same will be largely true of those in trade, finance, entertainment, government—of purchasing agents, shipping clerks, salesmen, actors, and bus drivers.

VIII

However much we may welcome the fruits of advancing technology—however optimistic one may be that the problems of adjustment will not be serious—no one dare overlook or deny the fact that many individuals will suffer personal, mental, and physical hardships as the adjustments go forward.—The middle-aged worker particularly, who may find his skills rendered obsolete overnight or his job abolished as his work is turned over to a machine, has every right to expect that industry, his union, and society will recognize his plight and assist in his retraining, or his relocation if necessary.

The plight of these displaced workers is particularly serious when they have devoted a lifetime to an industry which itself has passed its youthful growing period and is declining relative to other industry. The hardships of the displaced middle-aged and older workers are, of course, not limited to the automation case. This is only one aspect of the general problem of superannuation—a condition found in all occupations and professions and peculiar to none of them.

IX

The most disturbing thing which came to the subcommittee's attention during the hearings was the near unanimous conclusion of the witnesses that the Nation is faced with a threatened shortage of scientists, technicians, and skilled labor.—One may be willing to pass over lightly the expert testimony that there are plants in Western Europe that are "more highly automatic than anything we have got in this country" (hearings, p. 66), even in the automotive business. But we can certainly not dismiss lightly the generally accepted evidence that

professional engineers are currently being graduated at a rate nearly twice as fast in Russia as in this country, and that technicians are currently being turned out at 30 or 40 times our rate. This evidence is not to be taken as necessarily indicating that our science and capacity for technological advancement have been surpassed elsewhere. It must, however, be taken as a plain warning that others can catch up with us and, indeed, at current rates, are doing so. The president of the Carnegie Institution of Washington, Dr. Vannevar Bush, summed up the problem for the subcommittee:

> We already have a shortage in this country of skilled men of various sorts. We also have a shortage of engineers and scientists. And not enough men are entering these fields. It has been brought out in these hearings that Russia is in some ways doing a better job in this regard than we are; they are certainly training more scientists and engineers (hearings, p. 616).[2]

It is, of course, generally accepted that the short-run retraining and salvaging of the skills of those whose livelihood is threatened by automatic machinery should be a first cost upon industry and the particular company itself. Technological change cannot be regarded as progress at all if it is not able to pay its own way, not merely in the junking of old machinery but by giving due recognition to the human costs of retraining and readjustment.

But the larger and longer run problem is that the Nation recognize the need for keeping up and advancing its resources in the form of trained experts in every field. The training problem exists at all levels. Dr. A. V. Astin, Director of the National Bureau of Standards, in expressing grave concern over this situation said:

> I think that the critical area is the high-school level and it is primarily high-school teachers. I don't think we pay our high-school teachers enough, and I don't think we can get teachers who will inspire people to take up science and engineering as a career unless these people themselves are sold on it, and, with the great shortage we now have of scientists and engineers, it is difficult to get anyone with any competence to do the teaching in the high schools at the present time (hearings, p. 587).

Under our traditional system of education, the first responsibility for this must fall upon the local communities and the individuals and business directly interested in specific kinds of skills and expertness. Many companies are already demonstrating their awareness of this problem by providing in-training technical courses and by endowing and supporting company fellowships and advanced education.

There are important reasons why this need for increased attention to the training of experts should be underscored and recognized as a real problem. The fact is that much of the knowledge and personnel upon which we are drawing so heavily today comes as a by-product of the military background of the past decade. Under the necessity of war and defense expenditures, the Federal Government has contributed immeasurably to the building up of a comfortable

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[2] After the close of the hearings a report of the National Science Foundation entitled "Soviet Professional Manpower," by Nicholas DeWitt, gave statistical substantiation to indications that in technical fields the number of Russian graduates currently exceeds those in the United States.

The report concludes: "* * * we must bear in mind that during the last two and a half decades the Soviet Union has made enormous strides towards building up its specialized manpower resources. As a result of its efforts, it has reached a position of close equivalence with or even slight numerical supremacy over the United States as far as the supply of trained manpower in specialized professional fields is concerned. The Soviet effort continues. Our own policies in the field of education and in regard to specialized manpower resources will decide whether within the next decade or so the scales will be tipped off balance" (p. 257).

present supply of trained personnel. This is all well and good, but none of us want a situation to arise in which we must depend upon war or defense expenditures as the means to securing such beneficent by-products. Industry and the colleges themselves must take over and give adequate civilian support to technical education.

In many ways the question is not simply one of Federal support or no Federal support. It is a question of finding and accepting a peacetime program to take the place of in-service training of technicians, the war-accelerated and militarily sponsored college programs, and the later support and encouragement of education afforded by the so-called GI bill of rights.

Some 20 million persons now in civil life have been in the Armed Forces and a large part of these were given specific forced-draft training of some kind. A far larger number, by the use of or the sheer closeness and rubbing elbows with highly developed modern instruments, became familiar with technologies which, under other circumstances, would have been reserved for specialists. As Dr. Vannevar Bush pointed out to the subcommittee, there are in this country today thousands of young men to whom the design of what would once have been fabulous devices is not only possible but a pleasure. They can simply take off the workshop shelf a combination of cheap reliable gadgets with which they are already familiar and whose "queer ways" are already fully understood by them (hearings, p. 613).

This great pool of knowledge cannot be regarded as inexhaustible or self-replenishing. The dangers of its depletion deserve the fullest attention of all in making sure that high-school and college training are made possible for young people with demonstrated ability and aptitude so that the Nation and the economy as a whole can continue to profit by the fruits of knowledge.

X

The trend toward automation will bear watching to make sure that it does not add to troublesome pockets of local unemployment.—The problems of local distressed areas—of chronic or short-run local unemployment—arise from a variety of causes, such as the exhaustion of raw materials, shifts in markets, obsolescence, the impact of imports, etc. It will be ironic and regrettable if the advancement of technology had to be added to the list. Whatever the causes, the distressed area problem is one with which the Nation and the Congress must feel genuine concern.

When we are told, for instance, that automation in Detroit means unemployment in South Bend, Ind.—when we know that such progressive steps as the dieselization of the railroads are partly responsible for persistent unemployment in such localities as Altoona, Pa.—when it appears that automation, by speeding obsolescence of northern cotton mills contributed to a major shift in the location of that industry—it is imperative that industry itself, with the sympathetic support of labor, must develop specific and concrete programs to ease the problems of adjustment. To the extent that those directly involved fail or are unable to cope with the problem, the Federal Government may find it expedient and desirable to assist local people to find solutions to these problems rather than risk their spreading to larger areas of the economy.

XI

The impact of automation upon the structure of our business society and the relative position of large and small business is a matter of utmost concern.—While the subcommittee had this question constantly in mind, the evidence presented is, unfortunately, not conclusive. There can be little doubt but that large business may find some advantage. The realization of the gains of automation are often dependent upon large initial investment in plant and equipment and result in the mass production and necessity for mass selling of more or less standardized units. On the other hand, there was considerable testimony to the effect (1) that smaller, less expensive models and adaptations of automated machinery will in due course become available, and (2) that relatively small business may be in a position to turn its disadvantages into an element of strength by capitalizing upon its comparative adaptability and flexibility. While big business fights for mass markets, smaller business may capture the business left behind. While big business concentrates on mass assembly, the manufacture of components and parts—even the mass production of components—becomes the opportunity for small new enterprises. There is no doubt that the smaller plants will need to give especial study to product design and standardization problems in order to achieve longer product runs and secure the maximum benefits from automatic machinery.

Small business unquestionably has its problems in the contest for survival. These include the terms of competition, the difficulty of securing sufficient capital, adequate management, and the problems of research and development. The trend toward automatic machinery may result in making these difficulties even greater, but it is far from clear that automation itself is going to add a wholly new and overwhelming set of survival problems of its own.

XII

In a dual role, as workers on the one hand and consumers on the other, we can, as a consequence of automation, have a choice between added leisure and added products and comforts.—One question which recurred frequently throughout the hearings involved the prospects for a shorter workweek within the next decade. The prevailing workweek in manufacturing today, as is well known, is about 40 hours per week compared to about 45 in the mid-1920's and about 60 at the turn of the century. The hope is frequently expressed that the fruits of automation may permit us to reduce this still further, to 30, 32, or 35 hours per week in the not too distant future. Perhaps, instead of stemming from hope, the same prediction stems in many cases from fear, that we cannot keep our labor force fully occupied if machines continue to take over parts of the work.

Whether the prediction rests upon hope or fear, the important thing for all to recognize is that we will have a choice to make. The possibility of a shorter workweek certainly ought not to be thought of as a necessity or palliative measure in making a reduced amount of work go around. It is, on the contrary, a great opportunity for mankind to choose between leisure and, one would hope, well-spent leisure, or the physical products and services which could not otherwise have been

except for greater reliance on better machines and increased productivity.

For the most part, the industrial witnesses who appeared before the subcommittee were of the view that new and better products would so intrigue the consumer demand that we would see little near-term shortening of the workweek. Some, indeed, foresee a distinct shortage of labor supply as likely if the expected demands for new goods are to be fulfilled. Representatives of labor, on the other hand, while recognizing that such a choice may have to be made, were rather more inclined to the view that a continuing and marked shortening of the workweek is in prospect.

While the subcommittee is confident that the American public will make the right choice in this respect, it is not always going to be easy. Enlightened collective bargaining can make a contribution. As a society, we shall have to give thought making sure that the gains of productivity and the shortening of the workweek are sufficiently generalized so that those in trades and places remotely removed from automated manufacturing lines may come in due time to share in gains whatever the choice may be. There is also something of an ethical challenge which cannot be neglected in our choice. We do still have in this country substantial groups of comparatively underprivileged and lower income groups who should be remembered before those in the more favored industries can conscientiously turn to a shortened workday or longer weekend.

XIII

The introduction of automatic procedures and advanced technology, along with the problems and benefits which come from them, is not limited to the industrial portion of our economy.—State and local governments, and the Federal Government as the largest of them all, must take advantage of the opportunities for increased productivity. At the same time, responsible authorities in Government must at all times try to see that the Government is itself a model employer in its handling of the personnel and human problems involved. When, in the interests of economy and efficiency, the Government finds it necessary to displace faithful employees from their old positions, the problems of retraining, reassignment, severance allowances, must not and cannot be ignored.

The subcommittee had its attention called to several instances in which layoffs and adjustments were being made even during the comparatively short time while its hearings were in progress. It was not possible, nor is it the function of this committee, to go into the merits of these cases and the details as to their handling, but the subcommittee does feel that every effort should be made to keep the position of Government in this respect at a high level which will serve as a model for other personnel management.

XIV

These hearings will not have been in vain if, in arranging for them and hearing the many helpful witnesses, a feeling of social consciousness about the problem has been stimulated.—It is easy for those in business who are absorbed by cost reduction to forget that automatic

production, if it means fewer and fewer jobs and a disregard of human costs and hardships, will in the end be damaging to the foundations of our free society.

The genius and industry which create and boast of "thinking machines" cannot and ought not to be allowed to shift all or portions of the problems created by them to the shoulders of Government and labor. While most industrialists, by their willingness to consider these problems with the subcommittee, have demonstrated understanding of the social responsibility of free business, the subcommittee has, unfortunately, found evidence that some of those busy in advancing the technical side of laborsaving machines are still apparently unaware of the overall significance which their activities have to the economy. Government, of necessity and by public demand, is concerned with levels of unemployment, with the impact of technological changes upon our business structure, and with the maintenance of mass purchasing power. Enlightened businessmen are concerned about these things also.

RECOMMENDATIONS

1. The best and by far the most important single recommendation which the subcommittee can give is that the private and public sectors of the Nation do everything possible to assure the maintenance of a good, healthy, dynamic, and prospering economy, so that those who lose out at one place as a consequence of progressive technology will have no difficulty in finding a demand for their services elsewhere in the economy.

2. At this stage of the investigation, no specific broad-gage economic legislation appears to be called for, and the very good reason for this is that we already have on our statute books the Employment Act of 1946. The subcommittee can only recommend that the spirit and objectives of that act continue to be given active instrumentation and support by the executive agencies, the Congress, and the people as a whole.

3. The subcommittee recommends and strongly urges that the Federal executive agencies, the appropriate committees of the Congress, the State and local governments, and all others involved take very seriously to heart the need for a specific and broad program to promote secondary and higher education, to the largest extent possible.

4. The subcommittee similarly recommends that the Federal executive agencies, the Congress, and especially the local areas themselves develop comprehensive and concrete programs to ease the problems and eliminate local pockets of chronic or short-run unemployment, whatever the cause or causes of distress may be.

5. While Government presents a special situation it too must be alert to secure the benefits of advancing technology and increasing productivity. At the same time, in the interests of making the Government a model employer, the subcommittee suggests that the executive departments and agencies and the respective committees of the Senate and House dealing with civil-service administration would do well to keep especial watch over the problems of personnel administration involved in the displacement of employees by machines and improved techniques.

6. In the interests of labor mobility and facilitating the shifts involved in automation, the subcommittee recommends that consideration be given by the executive departments and, if need be, by the Congress to measures which will make for greater effectiveness and increased usefulness of the United States Employment Service, especially in dealing with the problem of the middle-aged worker and the placement of those of higher skills and degree of specialization.

7. From its own experience with such data, this subcommittee joins in what is certain to be a primary interest of the Statistics Subcommittee of the Joint Economic Committee; namely, the improvement of economic statistics, especially those relating to productivity and occupational shifts, and an increased alertness on the part of the executive agencies to the responsibility of providing statistics for policymaking in business as well as in Government.

8. The subcommittee recommends that industry, and management for its part, must be prepared to accept the human costs of displacement and retraining as charges against the savings from the introduction of automation. In saying this, the subcommittee is not unmindful of—and was, indeed, gratified by—the extent to which enlightened management is already aware of and accepting responsibility in this respect. Nevertheless, by careful planning and scheduling, the adjustments of workers and the stoppage of employment can be minimized and due recognition should be given to the timing of investment and technological changes with an eye on the state of general business and the needs for increased employment.

9. Organized labor should continue to recognize that an improved level of living for all cannot be achieved by a blind defense of the status quo. The education of its members, of management, community leaders, and Government officials, such as has been provided by these hearings, is an important function of union responsibility.

10. Throughout these hearings many witnesses have presented thoughtful and thought-provoking recommendations upon which the subcommittee has not had an opportunity to formulate definitive conclusions. In addition to the above recommendations, we commend to industry, labor, Government agencies, and State legislatures alike the study of this record and these individual suggestions, in order that the benefits of automation may be maximized and its hardships minimized.

11. Finally, the subcommittee's investigation convinced it that the problems of automation are by no means negligible nor settled. This prompts the subcommittee to the view and the urgent recommendation that all interested parties should make this a subject of continuing or recurrent study. The Subcommittee on Economic Stabilization considers it to be its responsibility and intends to review regularly the progress of technological change and the statistical evidence of occupational shifts. This is being done for the purpose of keeping informed and of being in a position to recommend further legislation if it should be needed.

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