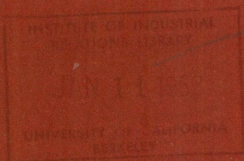


*SOLVING PROBLEMS OF PRODUCTIVITY IN A FREE SOCIETY*

Productivity  
(1962 Folder)



*SOLVING PROBLEMS  
OF PRODUCTIVITY  
IN A FREE SOCIETY*

J. J. Jehring, Editor

John W. Kendrick

Paul T. Ellsworth

Chalmer E. Jones

Harold J. Ruttenberg

Rawson L. Wood

Rev. E. J. O'Donnell, S. J.

James F. Lincoln

JUNE, 1962

THE CENTER FOR PRODUCTIVITY MOTIVATION  
SCHOOL OF COMMERCE  
THE UNIVERSITY OF WISCONSIN  
MADISON, WISCONSIN  
\$1.00

### CENTER FOR PRODUCTIVITY MOTIVATION

The Center for Productivity Motivation was established December 1, 1960 in the School of Commerce at The University of Wisconsin through a grant made by the Johnson Foundation of Racine, Wisconsin. The purpose of the Center is to study objectively the factors affecting productivity. It is hoped that such investigations will shed new light upon those emerging forms of industrial organization which give evidence of stimulating and maintaining capitalism through a widespread private diffusion of the benefits of ownership, with the result that our industrial system can better meet the challenges which it will face in the future.

The Center is concentrating its efforts in studying the area of total group productivity motivation. This is evidenced in business by such devices as profit sharing, productivity sharing, and employee stock ownership programs.

The Center will furnish reference and materials where available to any individual or group interested in the general area of total group productivity motivation. Inquiries may be addressed to:

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**SOLVING PROBLEMS OF PRODUCTIVITY IN A FREE SOCIETY**

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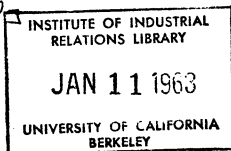
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PAPERS PRESENTED AT A SYMPOSIUM,  
WINGSPREAD, RACINE, WISCONSIN,  
NOVEMBER 15 AND 16, 1961,

SPONSORED JOINTLY BY

THE UNIVERSITY OF WISCONSIN-MADISON  
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The Center for Productivity Motivation  
School of Commerce  
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## INTRODUCTION

This symposium was designed to focus attention in a new and important direction insofar as productivity motivation in our business enterprise is concerned.

The most pressing problem facing the modern industrial leader in our free society is to find new methods of making human effort increasingly effective in the production and distribution of goods and services. This can be done by designing and operating more effective business organizations. Because of several factors which are developing in our economic system, older forms of business organizations which have achieved high rates of productivity in the past are losing their effectiveness, and new approaches are called for.

A widespread introduction of automated equipment is resulting in a need for a new approach to the human effort problem. In the modern business organization, because of automation, there is a growing demand for the release of more of the creative talents of the individuals who make up the firm. It is also becoming imperative that we fuse the knowledge and skills of all those who make up the company so that the organization can survive. All this calls for organizational forms which will result in a much closer identification on the part of all the employees with the goals of the enterprise.

The new organization pattern must not only concern itself with the contribution of the individuals to specific jobs, but must pay increasing attention to the problem of tying the potential contribution of all the members of the company to the objectives of the enterprise as a whole. Organizations must be developed in which the highest level of the contribution of each individual is focused on the common goals and the common output of the company.

The papers presented in this symposium are divided into two groups. The first group is designed to give perspective to the problem of productivity. Prof. John Kendrick attempts to answer the questions: What is Productivity? How is it measured? What has our record been like in recent years? Professor Ellsworth discusses what effect more efficient foreign competition is likely to have on our productivity problem. Chalmer Jones indicates what the future impact of automation is likely to be. These three papers are concerned chiefly with setting our productivity problem in perspective.

The next group of papers is concerned with new approaches to the solution of these problems. These are in the direction of what we at the Center refer to as *total group productivity motivation*. Harold Ruttenberg refers to the human problems involved in achieving an organization of this newer type. Rawson Wood speaks about a specific successful application of these new

organizational techniques to the business enterprise. James F. Lincoln reviews his successful application of these new organizational principles, and indicates what he has been able to achieve by way of increased productivity. Rev. O'Donnell devotes his paper to the role of education in these new types of organization.

A growing number of American companies are adopting devices such as profit sharing, production sharing, progress sharing and employee stock ownership programs which lend themselves to achieving total group productivity motivation. However, the installation of such programs are but a half-step. Accompanying them must go the human relations and organizational changes which will enable the enterprise to achieve higher degrees of efficiency. It is to research and study in this area that we must devote an increasing share of our attention.

J. J. Jehring, Project Director  
Center for Productivity Motivation



## WHAT IS PRODUCTIVITY

by

Prof. John Kendrick

I am a conservative in the sense of trying to conserve what is best in our free enterprise, market-oriented economic system, but I am a progressive in that I want the changes made that will make our economy work better and more efficiently as time passes. The subject I have been assigned is, "What is Productivity?" This is a timely topic, not only because productivity is such an important element in our economic growth, and growth is so necessary in the years ahead, but because it's necessary to be clear about just what productivity is. There has been a lot of confusion in the use of this term. This confusion has included identifying productivity with production, which of course it is not. Production is output, whereas productivity is the relationship of output to input. But also there have been confusions associating productivity with very narrow concepts, with labor efficiency as such, which is only one small part of productivity, broadly construed.

**What is productivity?** I'd like to answer this question on four or five different levels to start with, which will, I think, give a preview and brief summary of some of the points I will be making later.

First of all, productivity is a relationship, often expressed in ratio form, between output and input in the production process in real physical volume terms. When output is related to only one class of input, such as labor input, it indicates to us how much economy has been achieved in the use of that particular input per unit of output as a result of improved efficiency in production, or as a result of substitutions of one type of resource or cost item for another. But when output is related to all of the associated inputs, then changes in the ratio measure essentially changes in productive efficiency—that is, the net savings in resources used per unit of output.

A second way to answer the question, "What is productivity?" is to say that productivity has been the most important element of economic growth of this nation in the last half century. Two-thirds of our 3.33 per cent-a-year rate of economic growth, as measured by the real national product, is attributable to productivity advance. All of the increase in our planes of living, in real product per capita, have been traceable to improvements in productive efficiency or productivity.

At the industry level, we can see that those industries that have improved productivity more than the national average have been able to reduce relative prices, that is, not increase prices as much as the national average. As a consequence, these more efficient industries have experienced an increase in relative sales and a faster increase in employment of both labor

and capital than the national average. More stagnant industries, those that have not kept up to the national average in productivity, have not increased sales or employment or investment on the average as fast. There are exceptions to this, but on balance this is the picture at the industry level.

At the company level, I don't need to tell this group that the rate of productivity advance is one of the fundamental aspects of management efficiency that determines the fortunes, and even the survival, of the firm. Unless the firm does keep up with the industry rate of productivity advance over longer periods of time, relative costs will rise in relationship to price, profit margins will be squeezed and eventually disappear, with all the implications that has for survival.

"What is productivity?" Another answer is that as an efficiency measure it is a measure of the creativity of our society from the bottom up. It's a measure of the creativity of scientists who increase our knowledge of natural law and of social uniformities, of our inventors, scientists or engineers working in complex labs, work managers, or workers who see better ways of doing their jobs or ways in which machines can be substituted. It's a measure of the creativity of our management people who have the responsibility for recognizing opportunities for innovation and making the necessary decisions for improving the efficiency of the production processes, and also the creative imagination of the investors in the country who risk their capital in backing new ventures or expansion of existing enterprises into untrod areas.

But perhaps a more fundamental approach is to say that productivity is the material result of the values of a society and of the institutions that channel our values and motivations as individuals. In the United States, of course, from the beginning we've had a strong desire for material progress, for raising our planes of living, and a willingness, not to say eagerness, for variety and change. We have desired as individuals to grow and to express our creative ability and make the best use of our energies. All of these constructive attributes get reflected in the rate of growth productivity.

Also, productivity advance is some reflection of the efficiency of our institutions that permit individuals freely to seek personal advancement and development, that hold out rewards for superior efficiency and impose penalties for inefficient use of resources. It is a measure of the efficiency of our institutions of private property, the profit motive, and competition that serve as the spur to advancing efficiency. These aren't the only institutions that are possible in a society to promote productivity advance, but I believe that the records show that these institutions have been peculiarly effective in achieving advancing efficiency and rising planes of living here, although we still have no room for complacency as to our recent performance.

**Definition of Productivity** I would like to get a little more into the matter of definition.

First of all, I shall put down the major elements in the productive proc-

ess. If we use the symbol "O" for output we can say that output is a function of the several classes of resource input in the economy which we will summarize as being labor, "L", capital, man-made capital and natural resources, "K", and the material inputs in the case of the company making material purchases from other firms that go into the making of the final output of that firm (or industry), "M". Not only is output a function of the quantities of these various resources that are used, but it is also a function of the general level of technology, "T", both as incorporated in the capital and as incorporated in the minds of the workers. In "L" I'm including not just the production workers but right up through the top management. The level of technology includes the organizational set-up by which the factors are combined in the production process. And this "T" I'm using as a symbol for the various factors we would include under the term productivity. Thus,  $O=f(L,K)(T)$ .

You can't measure productivity directly; there's no way to attach up a machine to an outfit any more than to a man in order to find out how much energy he is putting into the job. So we can measure this only indirectly by looking at the changes in output in relation to the input—labor plus capital plus the materials. Thus,  $T=O/L+K+M$ . As the physical volume of output grows in relationship to the physical volume of resource input, we would say that there has been a net in savings in the cost elements that go into the production process.

A measure of output in relation to labor input alone can increase not only as a result of improvement in technology, but also as a result of more capital equipment, or perhaps it could increase as a result of better material or savings in materials per unit of output. Output per man-hour is a partial productivity measure. It is useful to show there has been a decline in manpower requirements per unit of output as this ratio rises due to a greater amount of capital equipment or different types of material, as well as because of rising productive efficiency generally. Where possible, I think it is desirable to relate output to all inputs, as well as to each of the inputs separately in order to measure the net savings of inputs per unit of output, and thus the change in productivity.

At the national level, our output measures the national product in constant dollars. The physical volume of output represents a consolidated production statement for the economy. It eliminates the inter-industry or the inter-firm purchases and sales of raw materials and semifinished goods so that at the national level output is only output of *final* goods and services: consumer foods, increases in capital stock, and government purchases. Therefore, at the national level we relate real national product just to the labor and the capital input.

At the company or industry level though, we can relate output to labor, capital, and material. Or, we can net out the materials and talk about gross

output less materials input in relation to the so-called "factor" inputs of labor and capital. This term gross output less the material inputs is familiar to you as the "value added." The Census Bureau will ask you every five years the value of your shipments and then the cost of purchased materials, containers, fuel, etc., and the difference between those two quantities they call value added. This is value added at each stage of manufacturing, in the case of the manufacturing segment, and is comparable just with the labor and capital, including natural resources, employed in the industry.

Total national output is the sum of value added in all of the individual industries in the economy, and of course, productivity at the national level depends on what happens to the productivities in all the industries of the country and what happens in all the industries of the country depends on what happens to each individual company and plant. So we build up to our national productivity picture from the plant and company level. One of the things I try to do in my book is to show varying contributions of different industries to our over-all result of a little over 2 per cent a year. Some industries contributed more than 2 per cent a year, and others considerably less than that.

Just a word about how these concepts were implemented. Physical volume of output means what it says. We aren't concerned about price changes but only changes in physical output. We can get this by counting the number of units produced over a period of time of different kinds of goods or services and weighting these, i.e., multiplying each series of physical output units by the average price in the base period. In that way, prices are held constant and aggregate production is moved by changes in physical output alone. There are certain problems when we have changes in models of a product, but we don't want to get into all technicalities of measurement at this point.

With respect to the inputs, labor input is usually measured in terms of man-hours worked, which seems to be the basic unit of labor input. However, in my own estimates I try to weight man-hours in different industries, and where possible in different occupations, by the average earnings per hour of the different kinds of labor in the base period. Whereas I know that market remuneration doesn't always correctly represent relative importance of different kinds of work, I accept the average wage-salary as a rough indication.

Capital input may be conceived of as machine hours or plant hours, including all that goes with the plant, the land, the buildings, the machines, etc. In practice we measure capital as a constant dollar stock of physical assets and we assume that the services of capital move parallel with labor by the remuneration of capital in relationship to labor. In our national income, capital compensation counts for about a quarter of the total, labor compensation counts for about three-quarters. In the case of an industry,

the weight of materials input would be indicated by the expenditure for materials in the base period as a portion of the total outlay.

**Meaning of productivity measures.** So much on the technical side; now just what do these measures indicate? Changes in total productivity, as briefly described, indicate primarily advances or changes in the technology of production, whether it is a result of changed plant layout, changed organization, improved equipment, or new plant. Over the very short run, changes in the rate of utilization of capacity would be important. As you know, when operations fall from 90 to 70 per cent this is often accompanied by a decline in output relative to inputs, because certain overhead costs are not cut back proportionately with output. But if you look at the trends over a long period of time, particularly between years of high level activity, the major factor in productivity advance is improvement in technology.

Also, changes in general economic organization show up here. For example, as industry has grown, we tend to have greater specialization of plants and even of companies. The railroads used to make their own rolling stock but, as they expanded, specialized car-building companies grew up and this increased efficiency. If we define technology broadly to include organization of the economy generally, the productivity measure also reflects improvements here.

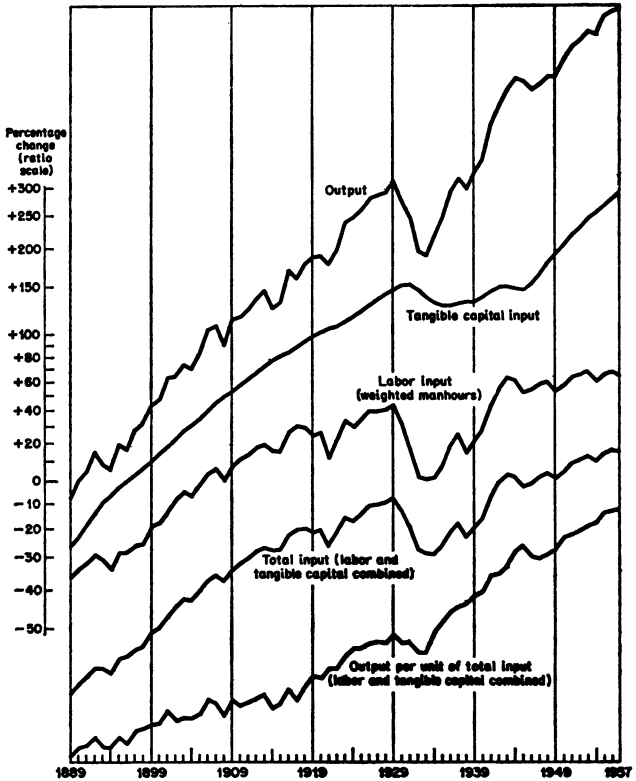
As I have already indicated, the technological advance that productivity measures reflect is a result of investments designed to increase new knowledge and new know-how in respect to the production processes. Perhaps one of the best measures of investment in increasing knowledge and know-how is research and development outlay. Research and development outlays have increased very substantially in the last half century in relationship to national product. Also expenditures for education to increase the average level of training and education of people has been an important factor in making it possible not only for innovations to come about, but also for the labor force to adapt to the higher skill requirements of a more complex technology. So in a sense technological advances are a result of these intangible investments in research and development in education. Behind that stand the values and the institutions of a society.

**Productivity Trends.** Now, let's take a look at the record of productivity advance in the United States and see how these measures have behaved over the last 60 or 70 years. The charts all come from *Productivity Trends in the United States* (Princeton University Press, 1961).

The first chart shows our over-all national product on the top line in constant dollars, 1889 through 1957. (If we had 1960 here it would be still higher of course.) This broadest measure of our national output has grown at the rate of about 3.5 per cent per year over this almost 70-year period. We also had about a 2 per cent increase in prices, so that in current dollars our national product has grown maybe 5.5 per cent, but we are squeezing out

## CHART I

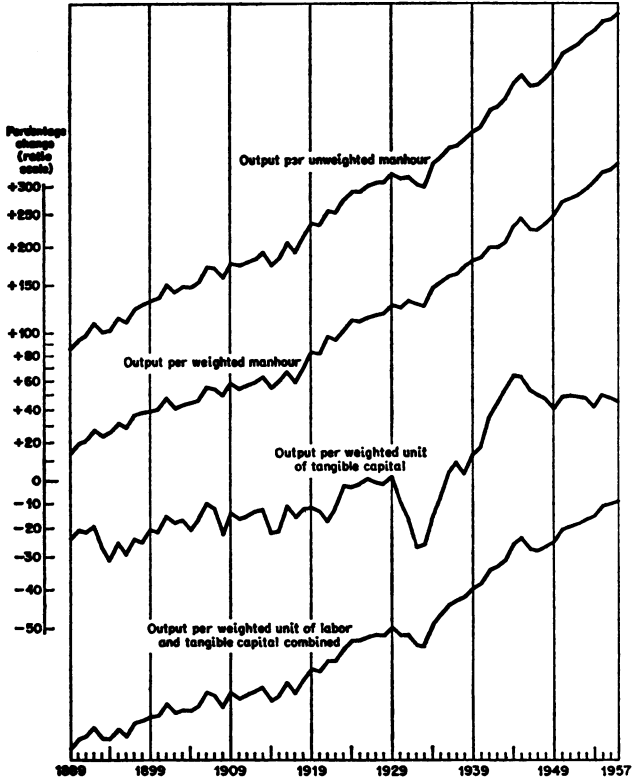
Output, Input, and Productivity, 1889-1957  
Estimates for the Private Domestic Economy



Note: This chart and all others except Nos. 7 and 10 are taken from "Basic Facts on Productivity Change," by Solomon Fabricant (Occasional Paper No. 63, National Bureau of Economic Research, New York, 1959).

## CHART II

Indexes of Productivity in the United States, 1889-1957  
Estimates for the Private Domestic Economy



that price increase in just using the physical volume of output. It is just an average because you get the annual zig-zag, the effect of the great depression, the world wars, and so on, but the average has been 3.5 per cent. Now the capital stock of the country has grown about 2.5 per cent over this period. Therefore output, in relation to capital input, has grown about 1 per cent a year. Capital stock has gone up faster than labor input, which is weighted man-hours worked. Labor input has increased almost 1.5 per cent a year. Thus, in relationship to the 3.5 per cent increase in output, the increase over the 70-year period in output per weighted man-hour has been about 2 per cent. Then when we combine capital and labor inputs, we find that over-all input has gone up about 1.7 per cent a year on the average, which is just half of the increase in output. Thus, productivity (output per unit of total input) has also gone up about 1.7 per cent a year over this period as a whole.

Looking at this long historical period, you will see that until World War I we had a slower rate of productivity advance, about 1.25 per cent a year, but since World War I the average trend rate of increase has been about 2.1 per cent a year in output per unit of total input. Output relative to labor input has gone up about 2.6 per cent a year in the last 40 years since World War I. From now on I am just going to talk about the performance since World War I, since that is more relevant to the present.

Output per unweighted man-hour has gone up about 2.6 per cent a year, on the average, relative to the increase in output per weighted man-hour of 2.3 per cent. (Chart 2)

The difference of 0.3 is due to the shift of workers to higher paying industries. In other words, weighted man-hours go up more than unweighted because labor has gradually shifted from agriculture and other low pay segments to higher pay segments.

Output per unit of capital input has shown a very small increase. Capital stock has increased much more than the labor force since 1919, about one per cent a year faster, so that output in relationship to capital input has gone up about only 1.25 per cent a year. Actually in the post-war period our investment has been so high and our capital assets rose so much that there has been no increase in output in relationship to capital input. Nevertheless this increase in capital has been an important element in the over-all increase in productivity and in the increase in output in relationship to labor. This doesn't mean that capital has not become more efficient—it merely means we are using more capital, we're substituting capital for labor, and using more efficient capital which shows up in our over-all efficiency measures.

Total factor productivity since World War I has increased 2.1 per cent a year, but since 1955 or so, the rate of increase is not as great. This was an issue in the last campaign. Both parties were calling for faster rate of eco-



conomic growth because of the slowing down which had occurred in the past half-dozen years.

### CHART III

Average Business Cycle Pattern of Output per Man-hour

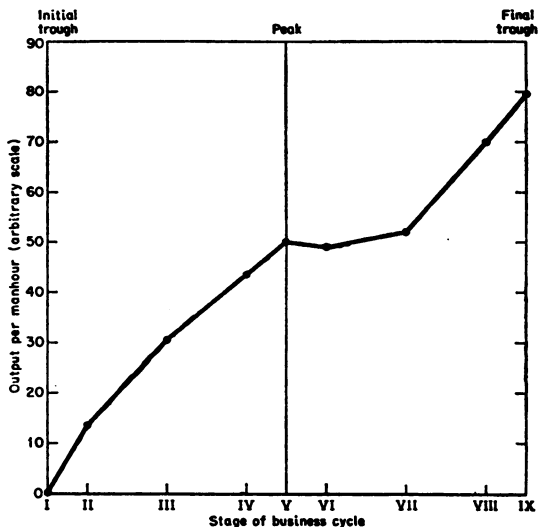
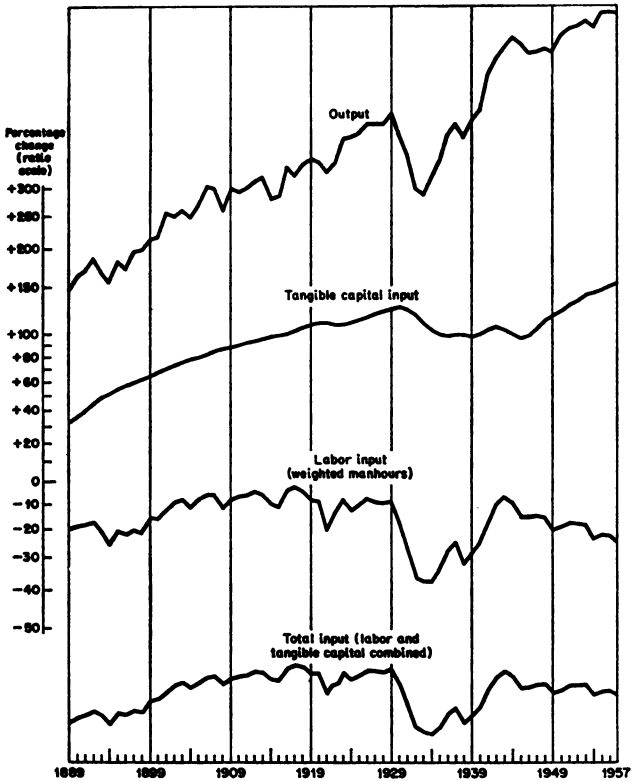


Chart 3 shows what happened to productivity over the business cycle. This is included because we are now coming out of a recession. It may be interesting to you that from trough to peak we find a rather rapid increase in productivity in the early phase of expansion, slowing down a bit before the peak, then after the peak of business has been past, as we go into the recession, there is very little gain in efficiency at first, but then quite a sharp pick-up later.

In conjunction with the behavior of average wages this helps to explain the business cycle. Wesley Mitchell, of the National Bureau of Economic Research, pointed out that in the latter phase of contraction there is a greater increase in efficiency because management is more cost-minded, trying to

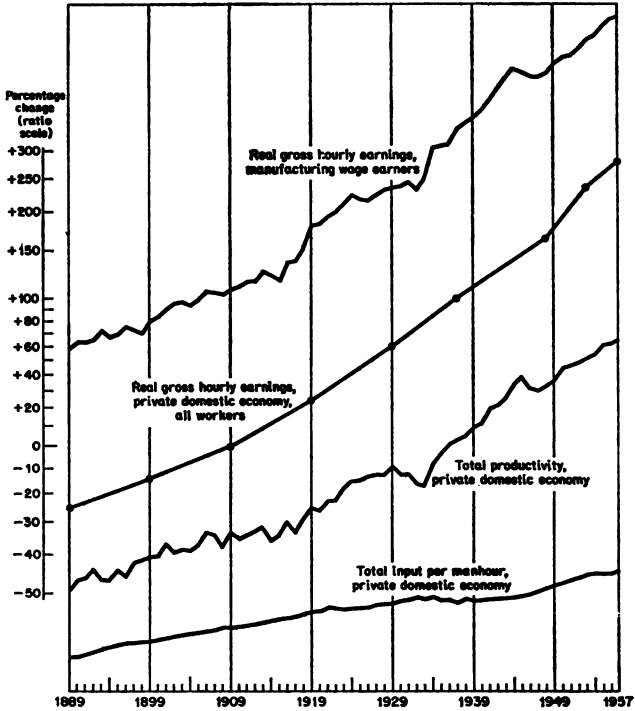
## CHART IV

### Output per Head of the Population



## CHART V

Real Hourly Earnings Compared with Productivity  
and Total Input per Man-hour, 1889-1957  
Estimates for the Private Domestic Economy



cut costs because sales are not going so well and it is not as easy to pass on increased costs in higher prices. Efficiency starts going up as profits are squeezed toward the end of recession. On the other hand, higher unemployment means that wage rates are not going up as fast at the end of a recession period, so unit labor costs actually fall and profit margins start widening a bit before the bottom of the recession. This encourages some replacement of equipment which helps to get business going as bigger orders go to the machine industry. During the early phases of expansion, this pretty picture continues. Unit costs decline or at least do not rise as fast as prices as volume expands and productivity rises more than wage rates. But as the rate of productivity slows down near the boom phase, we find wage rates starting to go up faster with higher levels of employment, so that unit labor costs rise. If the Federal Reserve system is pursuing a restrictive monetary policy, these costs can not be passed on fully in higher prices, and profit margins start getting squeezed toward the peak of the cycle. So the productivity specifically does help to explain the course of the business cycle.

I would predict that for some months ahead we won't have too much trouble with rising prices because productivity should be increasing pretty well now in most of the industries that are participating in the expansion. I think it will be the latter part of 1962 before we really start getting into a wage-price spiral again, with a squeeze on profit margins.

The fourth chart merely relates our various factors to population. Unless we can increase output faster than population, we are really not getting ahead. Output in real terms per capita has gone up almost 2 per cent a year over this long period—just about as much as productivity increased. The increase in productivity has been necessary for a rise in planes of living to take place, because total input per capita has not gone up; in fact, it has declined slightly. Capital stock has gone up somewhat faster than population, particularly since the end of World War II, and is now higher than in 1929. But labor input has dropped, particularly since World War II, in part due to the shorter hours per year being worked and in part because the labor force just wasn't growing too fast through much of this period. In the years ahead we are going to get a fairly substantial increase in labor input as our post-war baby boom comes into the labor force. This is going to help accelerate economic growth in the latter 60's, even if productivity doesn't accelerate. Of course, our economic growth will be more satisfactory if we can accelerate productivity advance.

Chart 5 shows a facet of advancing productivity which is of particular interest: the relationship between productivity advance and increases in real earnings. These are average hourly earnings, including supplements such as fringe benefits, deflated by the cost of living index. In other words, this is the purchasing power of wages. Notice that the economy as a whole has

gone up a little more than manufacturing according to this chart, but in both, the increase in earnings has been greater than the increase in productivity.

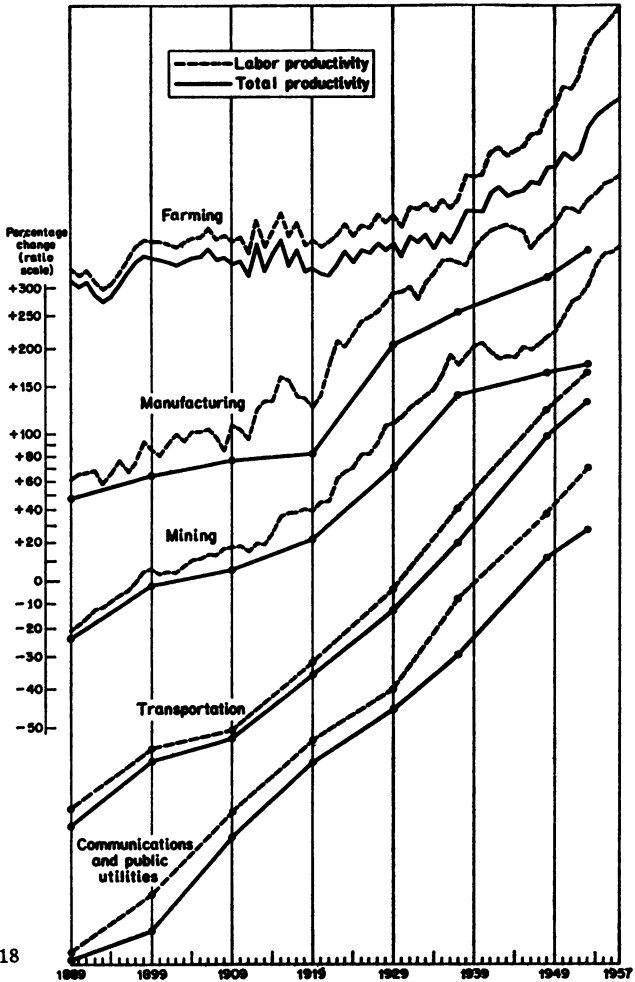
Let me make a few propositions. If average compensation rises in the same proportion as output per unit of labor input, unit labor cost will stay constant. In other words, a drop in unit man-hours required offsets the increase in the pay per hour, so there will be no upward push on prices from the labor side. However, over this long period of time we found the real wages actually have gone up a little more than output per unit of labor input because of the fact that capital compensation—that is, interest, rents and profits—have not increased as much in real terms as output per unit capital input. In other words, wages have been able to increase a little more than output per man-hour because capital compensation has increased a bit less than output in relationship to capital input. As a result the labor share of national income has risen somewhat over the last 40 years. If you impute a labor compensation to proprietors, you will find that the labor share has gone up from about 72 per cent in 1919 to about 81 per cent in 1957. The fact that labor compensation has gone up a little more than labor productivity has meant that the labor share of national income has risen somewhat.

The trend of the rate of return on invested capital has remained fairly stable although it has fluctuated a great deal from year to year. But the average return on capital during the last half-dozen years hasn't been too different from the return back in the 20's, and there has been a continuing inducement for new investment. I think we have to be very careful that the rate of return on capital does not get squeezed too far. Obviously there is some point beyond which the rate of return on capital can't be squeezed without impairing incentives to investment, which is such an important element for full employment in the economy. I think that in looking at ways to increase productivity and encourage investment one point you will want to consider is ways to maintain sufficient incentive for management to improve efficiency, as well as the incentive to labor to co-operate in the changes that take place when technology improves.

The sixth chart shows the change in productivity by some broad industry groups. The top line is output per man-hour; the bottom line is total factor productivity. There has been quite a bit of difference among these broad industry groups. Farming didn't go too much until the mid-30's, but then there was a big increase in agricultural productivity. This, incidentally, intensified our farm problem because we could produce all the nation's needs and more with fewer and fewer farmers, creating the problem of shifting resources fast enough. Manufacturing productivity has risen at about the economy average rate of 2 per cent, but there was a big increase during the 30's with mass production methods and scientific management coming into industry. But since the 20's it is more or less back on the trend of little more than 2 per cent a year. Mining productivity also has risen about 2 per

## CHART VI

Indexes of Productivity in Five Major Industrial Divisions  
Estimates for 1889-1957 or 1889-1953



cent a year, transportation about 3.5 per cent, electric and gas and communication utilities about 5 per cent a year.

So we have a good deal of variation from one **segment** of the economy to another, and we get changes in the rate of productivity advance from one **period** to another. Examples are the spurt in manufacturing in the 20's or the spurt in farming productivity since the late 30's. One industry may lead in one period and another may lead in the next. This shows up when we break this down further by individual types of manufacturing industry. I have done this in my book, "Productivity Trends in the United States," for the National Bureau of Economic Research.

### CHART VII

Total Factor Productivity  
33 Industry Groups  
1953 (1899=100)

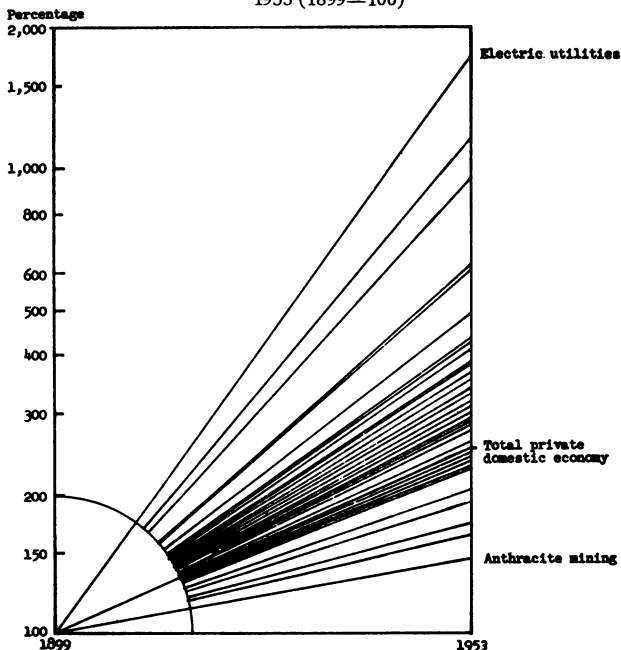


Chart 7 shows better the wide dispersion in the industry rates of productivity advance from 1899 to the early 50's. Electric utilities are at the top, with 5.5 per cent a year. Other leading industries are rubber products, tire manufacturers, chemical industries, and the electrical machinery industry. Since the war, nonelectrical machinery has been showing pretty good gains. However, some industries are well below the economy average—anthracite coal, leather and leather products, and lumber products. However, notice that there is no industry of these 33 which has shown a decrease over this period. The technological innovations spread across industry lines and, of course, each industry is doing some inventive work.

We found out that there is a definite correlation between expenditures for research and development and the rate of industry gains in productivity. In manufacturing, those industries that spend more on research achieve higher productivity gains. Also, those industries which are growing faster, whose markets are expanding faster, have faster productivity gains. This is also true of the industries which are cyclically more stable, which are less affected by recession. Industries like construction, which take a beating in a serious depression, don't have so big a productivity increase. So we see quite a divergent pattern here, and within shorter periods the pattern would be even more divergent.

The next two charts show that those industries which have increased productivity the fastest have been able to reduce relative prices, partly because wages and salaries of the more progressive industry have not risen faster generally than in the economy as a whole. The industries with faster productivity gains have been able to reduce relative prices and increase sales. The firms that are increasing efficiency faster are able not only to increase sales relatively, but also employment, which helps answer the argument of technological unemployment. It is the progressive industries that have been better employers, not the aggressive ones, which often have to cut back on employment.

The 10th exhibit in the form of a table shows productivity since 1950 for several different countries. Over the long run, the U. S. rate of over 2 per cent per year looks pretty good, but in the post-war period we find that Japan and Germany have a far higher rate productivity gain than the U. S. This is a rather crude productivity measure (real product per worker), but it gives some indication nevertheless. It is interesting that Germany and Japan had their productive plant practically wiped out during the war. They were able to start with the latest equipment which was a big advantage to them in competition. I think it might give us a little pause for thought, as to whether our replacement policies are correct or whether they might be accelerated somewhat. Even Norway, the Netherlands, and Belgium have been doing better than the U. S. Apparently the Soviet Union also has been doing considerably better in the post-war period.



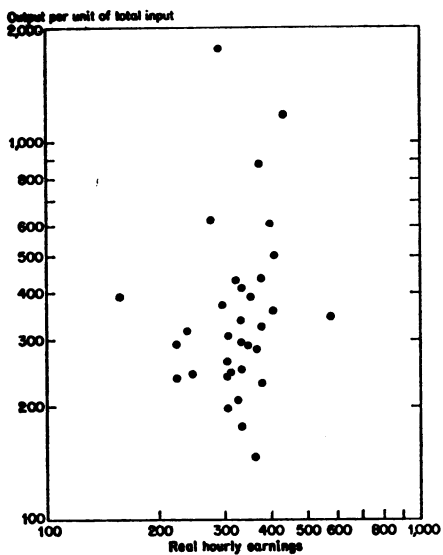
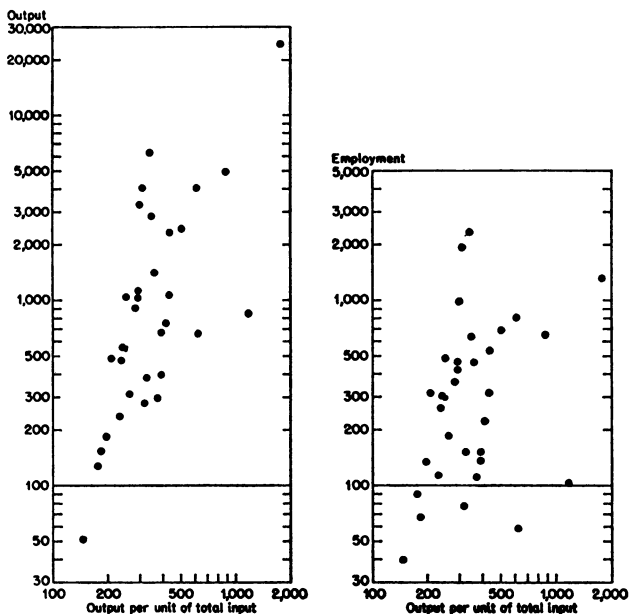


CHART VIII

Relation between Change in Productivity and Real Hourly Earnings,  
33 Industry Groups  
Indexes for 1953 Relative to 1899



**CHART IX**

Relation between Change in Productivity and Output,  
and Productivity and Input, 33 Industry Groups  
Indexes for 1953 Relative to 1899

## CHART X

### Real Gross Domestic Product Per Worker

Index Numbers for 1957 Relative to 1950 as 100

Japan .....	146
Germany (F.R.) .....	141
Norway .....	126
Netherlands .....	123
Belgium .....	118
Canada .....	116
United States .....	116
United Kingdom .....	114

*Source:* International Labour Review, March 1959

There is some question as to whether these higher rates of productivity advance are not just a reflection of post-war reconstruction in these countries—that they are getting back to their trend. If they continue to do better, our competitive position will deteriorate further unless our own productivity advance accelerates in the years ahead. I think that the rate of increase of some of these other countries will slow down somewhat but will still stay above the pre-war rate of productivity advance. I do think the U. S. rate of economic growth will speed up, particularly if we do something about accelerating productivity advance. I think it is one of our chief economic problems at this time.

In conclusion, I would like to give one more answer to the question which is posed by the subject of this morning's discussion: What Is Productivity? Productivity is a key element in our national future, even in our national survival, because after all, it is the rate of economic growth and the rate of productivity advance which builds the base for national security, either potential or in-being. I don't want to place all the emphasis on this material side; obviously the other side of the picture is that we have to build a society which embodies the ideals that men have always fought for. But assuming that our spiritual values are right, and that we can improve our society in these immaterial ways, it is still necessary to build a material base broad enough so that we can defend all that we have built in the U. S. I do think that the group here is in a unique position to take actions which will not only increase the productivities of the companies with which you are connected, but will also play an important role in building our national efficiency and strength.

**Question:** What effect is the population explosion likely to have on productivity in the U. S.?

**Answer:** I would say that, quite apart from the change in the age composition of the population, this rapid increase in the labor force (about 50 per cent more rapid in the 60's) would be stimulating to productivity in general because each worker has to be outfitted with about \$12,000 worth of capital goods. This will lead, I think, to a capital goods expansion as the workers come into industry. And as investment rises, this means that we will get a larger proportion of newer types of machinery, which tends to raise productivity.

I am assuming now that the demand will be there. And demand should stay up because of increased purchasing by a worker group of lower average age. The young people getting married find they will buy houses, household furnishings, etc. I think on the demand side the situation is favorable and also from the viewpoint of increasing investments.

As to the age question, it is true that the group of most experienced

workers in the 30 to 50 age bracket will be decreasing in proportion to the total. I think this is a problem we have to cope with in terms of company training programs for younger workers to get them up to the necessary level as rapidly as possible. This, of course, means larger intangible investments. Training cost is chargeable to current expense, but yet it really is a form of investment.

## INTERNATIONAL TRADE IN RELATION TO PRODUCTIVITY

by

P. T. Ellsworth

I shall begin by outlining very briefly the traditional view of international trade. International trade brings about the most efficient allocation of a country's resources by compelling all producers to face the broadest competition. Through this means inefficient producers are eliminated and a country becomes specialized according to its aptitudes just as individuals competing in the internal market survive or disappear or are allocated to their particular jobs in accordance with their aptitudes. The lawyer specializes in law, even though he might be able to produce twice as much output in terms of typed pages as his secretary, because he is so much better at law—ten times better at law but perhaps only twice as good as his secretary at typing. So with a nation—its aptitudes are put to the best uses.

When we speak of the aptitudes of a nation, we have in mind the relative abundance and cheapness of the factors required in production. To illustrate, Australia, with abundant and cheap land, is able to produce and export wheat, in which land is a dominant element of cost. In the United States, capital-intensive industries have the edge on a great many other countries because we can supply the large amounts of capital needed at relatively low rates of interest. Moreover, heavy investment in the skills of management and in research intensify this advantage. Switzerland, with its plentiful skilled labor, commands the market for watches in which skilled labor is the most important ingredient. India provides the example of jute, which requires large inputs of unskilled labor, permitting India to export that commodity in competition with other countries.

To conclude this very superficial introduction to the traditional view of international trade, I will say that trade is a means of maximizing productivity. In its first and most important task, international trade is distinctly related to productivity. This approach, however, is a static one. It takes as given both factors, supplies and the methods of production currently in use.

In order to see the relevance of international trade to productivity in a broader sense, we have to look at the dynamic aspects of trade. This comes from the fact that industry itself is not static. Methods of production are changing all the time. In old industries, new production techniques are devised and they migrate from one country to another. You can't hold them inside a country's boundaries, as the British found out early in the 19th century when they tried to prohibit the export of drawings of textile machines. In addition technological advance creates new industries all the time.

International trade transmits these changes around the world. Established industries are constantly confronted with new competition, as the British textile industry was in the late 19th century from newly arising German and later Japanese competition. New industries displace old ones: nylon wrecked the silk industry of Japan; synthetic rubber is limiting the expansion of natural rubber and may in the end displace it. With industrial change, international trade becomes a potential engine of progress. Competition from new industries and new methods constantly challenge established industries and firms.

We have some interesting data for the United States illustrating the challenge of international trade. For United States manufacturing as a whole, international trade in the last decade has provided a continuing spur. The increase in total imports for consumption between 1951 and 1958 was 18 per cent. The increase in imports of finished manufactures on the other hand was 153 per cent, so you see here the terrific competition that must have come from abroad in the form of rising imports of new and cheaper goods. We know a good deal about that from recent experience in connection with Japan and Europe. Here is the challenge of international trade. Whether the progress that could be generated by international trade is actual or only potential depends on the response that is made to this challenge.

Two general types of response can be made.

One is defensive, seeking protection against the pressure of this competition. In the past decade or so there have been many illustrations of this defensive reaction to the rising competition of imports: in bicycles, clothespins, felt hats, watches, cotton textiles. The uniform response of these and other industries has been to run to the tariff commission and ask for an escape clause investigation in the hope of obtaining additional protection. When this is granted, it means that the stimulus from rising competition of imports brings us no gain from increased productivity, since our reaction is purely negative and defensive. We freeze the situation in the protected industry.

But there can also be a positive response, in the form of an effort to meet the competition in ways that will increase productivity. I would like to cite just one illustration in specific terms and a few others in more general terms with respect to this positive way of meeting intensified competition. Such a response is illustrated by the steel industry. Steel imports rose from 1.4 per cent of total consumption in 1950 to 5.6 per cent in 1959. That's a large rise but it still does not comprise a major share of the market. It was focused in certain branches of the steel industry and there the competition was substantial. For example, in barbed wire, nails, woven wire fence, reinforcing bars and round wire, from 19 to 52 per cent of consumption was entering this country from abroad in 1959. This increase in competition resulted mainly from the increased output of European and Japanese mills which had

been rebuilt, modernized, and expanded after the war, in part with Marshall Plan and other U. S. funds.

The picture here with respect to competitiveness is somewhat as follows. In the steel industry employment costs range from about 33 to 35 per cent of total costs, so if foreign producers have any wage advantage, this can be important. Europe and Japan, with wages from 1/3 to 1/7 of American wages, do have a very substantial advantage. To some extent this advantage is partly offset by the higher productivity of American workers, though this influence has been greatly reduced by recent technological improvements abroad. The wage advantage is partially or in some cases wholly offset by higher material costs, which amount to around 45 per cent of total costs. In this industry tariffs were not a very big factor—the average tariff on steel products is only 5 per cent, and the maximum except for two products is only 14 per cent.

The steel industry's reaction to increased lower-cost imports was to concentrate on the development of better products. They introduced light weight, thinner barbed wire made of steel of higher tensile strength, aluminum coated in place of the usual zinc coat, and generally attempted to improve the quality of their products. They concentrated also on the less vulnerable products, sacrificing some markets of products in which competition was relatively intense. They gave greater attention to smaller accounts and to display material in an attempt to improve their marketing.

Many illustrations of this sort could be cited from other industries. One is the elimination of high-cost and unprofitable lines and concentration on superior alternatives. Bell & Howell provide a classic illustration of this. Many of you probably know that after the war they began to manufacture a camera to compete with the Leica. When they found it would have to sell for around \$700, they promptly discontinued production and decided to concentrate on what they could do well: moving picture cameras and other lines which they have since expanded.

A second method of responding is diversification. The watch industry provides a good illustration of this. After the industry was refused a tariff increase under the escape clause, Elgin responded by switching from the manufacture of jeweled watches to fuses, aircraft components, auto clocks, precision tools, bracelets, watch cases, and similar items. These comprised a wide range of things they could produce efficiently and competitively, leaving to the Swiss the watches that they could produce considerably more efficiently. (It is unfortunate, in my view, that this promising response was detoured when a second appeal for increased protection in 1954, this time invoking the needs of national defense, resulted in an increase in duties.) Another illustration of diversification is the typewriter industry. Thus Royal is now producing all of its portables in Belgium, concentrating on the heavier typewriters in this country, and diversifying into general office equipment.



Another type of response is the direct one of cost reduction through automation, economizing in personnel, elimination of parts and product simplification. The watch industry also incorporated this approach. The reaction of the American producer to increased competition can be, as we have seen, either positive or negative. But far too often, it tends to be negative, since that is the easiest way out. The manner in which American producers respond to international competition in the next few years will be extremely critical for our future position in the world. The reason for this is the probable strengthening of competition from the European Common Market.

Europe is in the process of eliminating tariff barriers on trade among the six Common Market countries, comprising a market of 165,000,000 people. If other nations join, like the United Kingdom, Denmark, and Ireland, which have already applied for membership, the Common Market could well expand to include a population of some 250,000,000. This would mean the creation of a great new free trade area with a tariff wall against the outside world—a region larger than the United States in terms of population and comparable in purchasing power. What are going to be the effects? What are some of the effects already visible from this partial integration of western Europe? The most important thing is that the competitive winds are already beginning to sweep across the six nations of the Common Market, confronting producers in France, for example, with lower-cost German and Italian producers and leading either to the energizing or to the elimination of high-cost French producers. One effect of this competition has been to stimulate the merger of smaller firms with larger firms, with a consequent reduction in the range of products and increased standardization of the remainder.

It seems to me that far more important in holding back European efficiency in the past than the relatively small size of the market, which some writers have stressed, has been the excess number of firms and of product types. A very good argument can be made out for this. It seems to be more realistic as an explanation of high European costs and relative backwardness in many lines of production. Many of the firms in Europe originated before the era of large scale production, at least before it reached the shores of Europe as an export of the United States. As a result, their plant and their equipment were fixed in an older mold, their habits and outlook were established and were hostile to mass production methods. Along with this there arose a considerable degree of cartel and other types of restrictive devices to keep up prices and hold down competition, in France in particular. Thus much of European industry was typically small-scale producing a wide variety of patterns or models at high unit cost, these high costs often being maintained through restrictive agreements. These peculiarities were reinforced by the habit of cash buying, by the low purchasing power of the working class, and by the consequent necessity of selling predominantly to the carriage trade.

Intensification of European trade as a result of the elimination of inter-

nal trade barriers will have other important consequences. International trade operates on productivity not only through the stimulus of competition; closer business and social contacts follow the spread of trade, and with these follow the exchange of ideas and new practices. Superior institutions of one country will be more quickly noted, and then imitated or adopted in others. Illustrations that come to mind, though they reflect the adoption of American institutions, are the supermarket, which is expanding rather rapidly in Europe, and the motel.

As a result of the increased competition from more extended trade in Europe and the higher productivity that results, wages will tend to rise. The high rate of investment in Europe will have a similar effect. This will mean broader markets, standardization, and therewith economies of scale—a factor which already is making European producers more efficient and more able competitors.

There will also be gains from the increased size of the market, although these are subordinate to the possibilities to which I have already alluded. Industries that were not undertaken in the past will be able to get started in a united Europe where they couldn't if Europe were still fragmented. For example, atomic energy requires more than the resources of a single country. Certain industries, too, that have been held back by the small market will be able to expand with its growth and to introduce economies of scale and perhaps also to achieve certain of the external economies about which we don't know a great deal. Among these industries are certain types of machine tools, electrical equipment, and many varieties of office equipment. The typical output of electric refrigerators in a large European plant is about 10 per cent of the output of the United States plant; the situation is similar in paper, office equipment, and in many other lines. Expanded trade will also mean the more rapid spread, within the European area, of technological change.

What is the problem an integrated Europe presents for the United States? Obviously it means an intensification of competition from larger, more efficient competitors over a wider range of industries than we have ever known. It will be a severe challenge to U. S. industry. If our response should be the defensive one of seeking protection, I think it would be very dangerous. It will be a denial of the challenge and a withdrawal into our shell. It will mean a relative decline in our productivity and a stagnation in relation to Europe. If we refuse to meet European competition in our own territory, we will surely see a falling off in our foreign markets. Can this have any other consequence than a tremendous decline in our prestige and influence in the world? Disagreement and friction with our NATO partners would also appear unavoidable.

A positive response is certainly possible. Casualties will be inevitable. Some industries are bound to shrink, some even to disappear. Industries subject to possible injury are a distinct minority; their injury is bound to be

short-lived; and the damage can be minimized by appropriate policies. In the longer run, greater national specialization under expanded trade will be better for all of us, and for Europe as well.

The situation that will confront us is not new. Britain faced it in the 1880's and 1890's. During the 19th century, Britain had had the world market almost to herself, in textiles, ships, coal, iron and steel products—almost anything in the field of manufactures. She had become accustomed to having things her own way, then suddenly upstart Germany began to industrialize and to compete. The Germans, having to edge their way into foreign markets, took great pains to find out what their customers wanted, to tailor their products to their customers' needs, and to package them attractively. They sent their representatives to live abroad where they married local girls and did not, like the British, withdraw into the refuge of a private club. They also gave longer term credit as opposed to the sixty- or ninety-day credit of the British. This put the British into a state of near shock, but the British did respond positively. And what was the result?

In 1913, just before the outbreak of World War I, Britain's balance of payments was in as good shape as ever. They had a large surplus on current account—that is, exports of goods and services exceeded similar imports by a substantial amount. They were able to devote this surplus to expanding their long-term foreign investments. Some British industries shrank absolutely; the woolen textile industry, for example, whose exports in 1913 were about half of what they had been 30 years earlier. The cotton textile industry about held its own, while some other industries expanded.

In particular, there arose a great deal of interstitial specialization. The Germans specialized on lower-grade textiles, the British on the higher grade. The British didn't hold the whole market any more, but they did hold part of it. The Germans specialized in the cheaper clocks and watches, the British in the more expensive.

There was plenty of room for national specialization, and as the United States and Japan came to the fore, the same sort of thing went on again, and it will continue to go on in the face of intensified competition from a united Europe. This is going to strengthen and unite the West. This will increase the productivity in Europe and the United States provided we meet the challenge positively and not negatively. We cannot afford to meet this challenge with a defensive withdrawal.

**Question:** You mentioned you feel there will be some industries that will shrink—this is inevitable. What American industries do you think will particularly feel the effect of the expansion of the Common Market?

**Answer:** Cotton textiles for one. Typewriters are already feeling the competition. In some areas of business machines—in the computational de-

vices and electronic devices, I think we will forge ahead to an even stronger position, and I am sure we will keep our lead in heavy road machinery—nobody can compete with us on that. Just run through the list of heavily protected industries now—gloves, women's handbags, felt hats, briar pipes, clothespins, bicycles, and so on. The light consumer industries, particularly those that are labor intensive in character, probably will shrink.

**Question:** What about automobiles in that category?

**Answer:** We are already meeting competition in the smaller cars. European competition started us producing them and so far, if you can compare our compact car with the small European car, but I don't really think you can, ours are more costly. I doubt if we could meet their competition in the same size car at the present time. My guess would be, and it's only a guess, that you will find first a tendency towards specialization on types of cars, with us producing certain ones, perhaps the heavier, the more luxurious cars. That would mean the shrinkage of the entire industry. If we are going to maintain the volume of the industry, I think it will increasingly take the line of our producing certain components and exporting those to our own plants and to other plants in Europe and their producing other components and sending them here with the assembly of a mixed batch of parts in both areas.

**Question:** Do you think wage costs and other costs in Europe, for example a united Europe, will rise faster than in the United States and close some of these general cost gaps?

**Answer:** The answer has to be rather "iffy." At present they are rising faster. Germany has had a labor shortage for the last several years and wages are rising there. They are not rising as fast in the other areas as they are in Germany, but they are going up. I think that as the Common Market is fully established, and now of course it's only one-third established, duties have been cut 30 per cent, you'll get increased pressure for higher wages and of course a movement toward more automation just as we've had here. They are adopting our methods and that is what is making them such tough competitors. The "iffy" part of it is whether we can succeed in our policy of holding down on wage-cost inflation. If we get that, we're in trouble. But I think if we can hold down wage-cost inflation, inevitably the more rapid rise of productivity in Europe is going to be followed by an increase in wages which will help offset the wage differential.

**Question:** A German industrialist made the statement that on industrial machinery he doubted that the United States in the last analysis would ever compete with European counterparts until we switch to the metric system; that it is just impossible for Europeans, for South Americans, for Asians using the metric terms to transfer our common dimensions and all the other problems we have into their own thinking, and we are faced, immediately before the catalog is ever written, with the problem of communication.

**Answer:** That's a reform that's long overdue and I think this competi-

tion will force us to adopt the metric system sooner or later. I hope we do; it's so much simpler.

**Question:** If we're not completely successful in meeting the challenge placed before us and we lose more industry than we anticipate, isn't this going to create a greater amount of unemployment in this country which will then bring the labor organizations to the point where they will request a much shorter work week and then put us in a more difficult position than we started with?

**Answer:** I don't see that as a very serious possibility because these changes come gradually; this wave of competition doesn't come like a tidal wave, it's like a series of waves that gather in intensity over a period of time, and I'm hopeful that the time granted us will be sufficient to allow us to make the necessary adjustments. If it isn't, there is a very grave danger of stimulating the people who are interested in protectionism into demanding protective tariffs. I'm glad to see that Mr. Kennedy just announced an all-out attack next year to try to get authorization to make across-the-board cuts in categories of tariffs and to use the methods of assistance to industries that are injured: low-interest-rate loans for long periods of time for industries that have to convert, technical assistance, more rapid amortization, and for the workers, retirement at an earlier age, assistance in retraining, and all the sorts of things that are being discussed in connection with the results of automation in depressed areas.

**Question:** This still doesn't tell the manufacturer what is he going to retrain his workers to make with the loans, or the assistance, or the fast amortization.

**Answer:** Can't they learn from the firms that have adjusted to this in the past? I've given one illustration from the steel industry and cited the watch industry before it got its tariff increase. Many manufacturers have adjusted by diversifying, and who knows better than they what the opportunities of diversification are? If they can't answer it themselves, then it seems to me that managerial consultants can offer them help. They're meeting this problem all the time from internal competition. There is really no difference between international competition and domestic competition; it's just a matter of degree and extent.

**Question:** Do you foresee the possibility of the Inner Six and the Outer Seven combining into one common market and America joining the Common Market?

**Answer:** It will be a matter of four or five years before the Outer Seven and the Inner Six can combine effectively, but I think it's coming. Britain sees that she has to get into the Common Market. But all the necessary negotiations are going to take a lot of time, so that gives us a breathing space to consider what we want to do about it. I would hope that we would have an Atlantic union of tariffs, perhaps even broader than that, perhaps a free world, a free trade area—the ideal of the economist of Adam Smith's day.

## **APPROACHES TO INTRODUCTION OF NEW TECHNOLOGY**

**by**

**Chalmer E. Jones**

What are the fields of technology? I would say that one is human comfort. Communication is a field of technology, production is a field of technology, and education is a field of technology. War is one which we do not like to think of but it is also a field of technology. A new one which you have not yet heard of, which is just beginning to be created in the minds of the university professors and advance planners for large business enterprises, is the field of organization.

I will confine my remarks chiefly to the fields of communication, production, and education, with perhaps something on organization. The people who are involved with the introduction of technology in these areas are those in business, unions, and government. There are several forces at work which will result in the introduction of technology in these fields. We have already developed much technology which is available to us. For instance, in the area of computer control of manufacturing processes, we began work in 1957. In 1962 we will have 80 installations in operation; in another five years we will be putting in some 200 per year. The adaptation and application of computer control is a science which is already here and few of us realize it.

A significant fact is that unlike the business machine, the accounting and controlling machine, there has not been a single installation anywhere in this country of a computer for control of a process which has not proved economically justifiable and has not of itself set off second and third generations of computer application. In this area it is not technology, it is not the science of the hardware which is holding us back. It is the actual understanding of the working of the process, the working of the organization. It is the equations to program these computers that is proving to be the stumbling block.

Operational research is finding more and more applications for the computer. This, coupled with the gigantic ability of a business machine to program, to try alternate programs, gives rise to operational research taking over with linear programming and critical path methods. All of these are names for increasing the efficiency and timing and lowering the inventory costs of productive units.

This is a difficult field to cover completely because there are so many new applications arising out of optical electrical communication which is 200 times as effective as the microwave. Medical electronics can make use of computer controls for post-operative control of a patient for analysis, or for statistical analysis of data from a diagnosis. Education now has ma-

chines that can teach at two times the speed and in more depth than human teachers can teach. We already have machines which are beginning to replace teachers or at least to work with them.

Such technologies are now on our doorstep. We don't realize it because we have a tendency to become a little myopic in our own industry and we have an attitude "well, let's see how it works out for someone else before we try it." There are forces at work; we have international competition. As you know, other countries are applying new technology and we will have to if we want to stay ahead. In some respects other countries are better able to apply these new technologies than we are.

Recently in Germany, I saw a hot strip mill in operation. If you are familiar with steel mills in this country, you will know that such a mill is controlled by one or two experts. These are usually old timers who are part production men and part magicians. Because they are wise in the ways of rolling steel they can look up and down their lines and tell which stand is running out of form and how to trim up the mill so that it will give maximum production. But not so in this new mill in Germany. This large hot strip mill had been scheduled a week in advance on a computer and slabs were coming off the mill automatically right to the second.

In the steel industry, the most modern mill shortly will be the Richards, Thomas and Baldwin in New South Wales, England. To show you the steps they are taking in this particular industry, the mill is worth \$400,000,000. This plant takes ore right off the ship and ships it off in forms of slabs, rolls, and finished products. This entire factory will be computer controlled. The hot strip mill is being built now with computer control on it. There will be three other computers with an over-all computer. A visual display on the vice-president of operations' desk will constantly show the efficiency of the mill.

In such installations you can begin to see some of the things that many hardly realize are happening. This will lend credence to my thesis which I will develop later concerning the innovation which we will be seeing in the 1970 to 1980's.

There are advances coming out of the laboratories which are beginning to find application. For instance, in molecular electronics the building block is so small that you will never be able to repair one. You will have to pick out components and throw them away. With this technology a full radio receiver and transmitter has been put into a package which is the size of about a half a pack of cigarettes. These devices, with the reduction in power required, the increased complexities, and the higher degree of reliability, will enable much more complex data information systems to be built and to be applied to larger and more complicated processes. And when I say larger and more complicated, as you will see later, I am referring to the over-all business organization as the system which will be designed. The telephone

company informs us that by 1970 over half the income and more than half of the long-distance lines out of the city will be from computers speaking to each other, rather than human beings. So by 1970 we will be already out-spoken by computers.

We are beginning to develop new fields of mathematics as we develop more complex tools. A course in mathematical models now is taught in the sophomore year. We now use simulation; we don't have to fly a rocket to the moon to train a man how to land on the moon. There are at least five people in the country right now that could have gone through landings on the moon because of simulation. I can bounce a ping-pong ball on the moon, or I can play a ping-pong game on Jupiter or anywhere, as a matter of fact, through the use of simulation. Electronic simulations are far better than the real thing in certain respects because we can stop them and analyze every physical component, so we can understand more about complex organizations.

We are developing new designs for our computers to make them think better; and I use this word "think" incorrectly, because a computer never thinks, but programmed packages appear to make them think. Such packages now come either in a notebook form or on a computer tape. This package, once you program it into a large computer, can make the computer learn how to play chess better than the man that programmed it.

With proper programming, computers can distinguish tiny variations in visual data dimensions, and can do it with far more accuracy than seems possible. We can develop machines that can learn to replace individuals.

There is a computer that has learned how fast a man can punch an IBM card, and it can teach a person in approximately a half an hour to an hour how to punch cards. Normal training in manual dexterity takes two weeks. The field of teaching machines is around the corner and will give rise to many problems. The ones I worry most about are the uniformity and the control of education. We should begin to wrestle with this aspect of the problem before it becomes truly serious.

The technology of war is a field which is forcing roughly 16,000,000 people into new technologies. What steps can the government, unions, and business take in order to adapt to some of these new developments?

Where are we going with innovations and how soon will we get there? Innovation, as Dr. Drucker states, is merely an extrapolation from those things which are known to those things which are unknown. The periodic table is a good example of an innovation. Only 63 elements were known, but we also knew what the balance of them should look like. Because of innovation we had the complete periodic table developed before we knew what the elements were that went into it.

Take society. You can tell pretty much what a society is going to be like if you know what the individual components are going to look like. For instance, if individuals were all pro-profit, anti-suffering, pro-leisure, and



anti-work, we could put these elements together and see the kind of economy and organizations we were likely to have. Extrapolating forces in known areas and filling in the blank areas with technical advances which we say must come about, we can derive what innovation in the 1970's and 1980's is likely to be.

In 1955 electronics were not reliable; for the last 15 months we had an entire system for control of a power plant running 24 hours a day with only 20 minutes down time. The same type of advances are being made in programming and we are coming up with new logical designs.

By 1970 the teaching machine will be on almost every desk. The teaching machine will be the type that will present a slide or a question and the student then will reply. Depending upon his reply, he will be directed into a sub-branch or to continue on. The new concept of education will be one of lifelong learning. We will continue to learn at all times. There won't be a definite stop at the end of college because technology will be moving so rapidly by then that we will be required to continue to learn.

In the medical field by 1970, we will see such things as diagnostic machines; one hospital will be able to talk to another about particular cases through computers. We will be able to analyze a human system and perhaps regulate certain aspects of life by means of these outside, much more accurate, and much better, controls. At the present time an entire \$34,000,000 power plant in New Orleans is being controlled by 1/50 the electrical impulses your brain requires to touch a cup of coffee.

In the business area, the entire organization will be designed as an operating unit taking into consideration the three fundamental components: the production process, the information system, and management.

The new organization will have a group of executives, a group of middle management reduced in number by almost 90 per cent, and an automatic process. This will be far more efficient in design and far more rapid because the entire organization will have been designed together. There will be no such separation as a computing machine for business control and a computing machine for process control. There will be no special statistical machines. The entire information system will work with the executives and the process.

There will be two or three such applications by 1970, and by 1980 it will be pretty much accepted by larger mass-producing companies and will begin to filter down to the smaller organizations.

Top executives will become more rational and less intuitive because they will have access to information that they have never had before; they will be able to interrogate any particular page in a book in the Library of Congress. They will be able to obtain statistics on anything, from the curves of where we are in a current economic cycle to the efficiency of a particular employee on a particular portion of the process control line.

Now I realize I'm challenging credibility, especially because of the nearness in time of the developments I'm talking about, but these things are actually under study now in several places. Organizations are beginning to be built in chemical and power production without the traditional ideas of business management.

If business can benefit by this greater communication and greater analytical ability, so can government. We should find some relatively good news here. I'm sure many of you would agree that our gigantic country is far too complex to be controlled by one man. The information systems which will be available for executives of the government will be so vast and will be so self-adjusting that only the important information and the red flags will be given to the individuals who are responsible. The Security Exchange Commission will have a computer which will record every single stock quotation and it will analyze potential problems which may rise from the stock market as stocks begin to fluctuate. This system is being installed at present.

I have seen a system where every stock broker in a particular company can have on his desk a little interrogating machine which will supply the information about all the stocks, bonds, and over-the-counter trading he wishes from one central exchange memory which is constantly up-dated. SEC could use this type of information and subject it to a statistical analysis to solve problems of the exchange commission's concern. The next step would be for the Federal Reserve System to use simulation on its complex system. This would lead to tighter, more rapid, more predictive controls on the economic system.

With all this there should be a reduction in the number of personnel in the government involved with material handling, with obtaining and analyzing information for data presentation. So government employment, if it is not decreased, at least should maintain the same level. I believe there will be fewer employees than we have now.

About our own life, communications and transportation will make it possible for you to live a great many miles from your headquarters. A man right now who is one of the chief advertising executives on Madison Avenue visits his office about twice a week. He works at his home and has a little radio attached to his belt. If anything comes up he is immediately informed. If he is needed he can get to a telephone and within an hour be face to face with his client. I have an office in New York City and my home is in San Diego. It's becoming more important to live near an airport than the center of town. This is an indication of the forces which are driving us toward large communication systems.

How do we enter into this world of innovation in the 70's and 80's and beyond? From a business standpoint, there are some activities which you might now undertake. The first is study. Have a team, one or two or three informed men to keep abreast of the various fields: factory automation, crit-

ical path programming, new types of information systems and new applications for computers, so that you as an executive can have on tap this information and begin to plan to use it in the future. Then, select your goals for the future, and knowing the type of automation that is coming, set down a plan for the reallocation of your personnel. Plan so that you do not place a stress on any particular portion of your organization. You might lose many hundred of thousands of dollars in production if you do not plan well.

Long-range planning is important, as is employee relations. You must also let your people understand what you are going to do and how you are going to do it, so as to dispel any fear they may have.

What about the unions? What are some of the things that can be done and are being done by the unions to take advantage of these new technologies? The Armour Corporation, in the course of collective bargaining, has set up a half-million-dollar fund to study the problems posed by automation in the meat-packing industry, to find work for displaced employees and to inaugurate retraining programs. A somewhat similar plan has been followed by Kaiser Steel. They have made a labor-management study of the consequences of automation. The Pacific Maritime Association, in a contract recently negotiated with the Longshoremen's Union, has agreed to contribute up to \$5,000,000 a year from the savings brought about by new methods of automation, which will go toward a union operated fund to offset the hardships resulting from the changes. In return, the union has agreed to give up featherbedding which is expected to result in savings estimated to run up to \$120,000,000.

The actual facts when fairly presented are overwhelmingly in favor of automation. There have been many cases in which labor saving was achieved with delays in hiring, with transfers within the firms, or transfers to other firms arranged by the company automating. This prevented harm to the individual workers concerned.

An intensive and continuing study of the human and economic effects of automation should be undertaken by the government. Fear of job dislocation and human displacement must be removed. It can only happen through an honest effort to prevent human harm and such an effort depends on the gathering of facts.

One of the recommended policies for government should be a tax policy aimed at encouraging logical innovation. Realistic depreciation policies should be used similar to some of those under which our western European competitors function. There should be a government technical program aimed at disseminating to business the advances made in military research.

A positive program for encouraging growth and special co-operative efforts among all sections of the economy should be undertaken. Business should initiate programs to assist employees in adapting to changed situations and labor should sponsor retraining programs. This is an area in which unions can really help their members.

At every level of education we must emphasize an understanding of fundamental learning, for in our world the most advanced specialized training is outmoded tomorrow. We should distinguish between engineers and technicians so that we may fill our ever-increasing need for large numbers of technicians without lowering the quality of our engineers. Automation is essential, not only for economic growth but the survival of our way of life.

## THE IMPACT OF INCREASED PRODUCTIVITY ON THE FACE OF SOCIETY

by

Harold J. Ruttenberg

I use the concept of productivity in its cultural sense. It has a common meaning for western man as it embodies the idea of progress. Our western heritage is dedicated to the philosophy of constantly improving the lot of mankind, creating the Kingdom of God on earth. Abraham Lincoln, the only American to achieve worldwide universality, expressed it as "an equal chance" and the better life for "all men, in all lands, everywhere." I express it to my children when I tell them that there should be improvement from one generation to the next. The farmer phrases it in the philosophy that his life's work is to leave his farm in better shape than he found it. The industrialist expresses it in the operating philosophy that he cannot hope to remain competitive in 1965 producing his 1961 models, or using his 1961 production methods. The educator puts it in terms of achieving excellence. The union leader expresses it in demands for a higher plane of living. The Homestead Act, the New Freedom, Hoover's cars in the garages and chickens in the pot, the New Deal, the Fair Deal, the New Frontiers are its American political expression. Increased productivity is a western cultural phenomenon. It rules our lives. Each of us, in our own fields of specialty, are riding our canoes over the rapids, dedicating ourselves to finding new and better ways of increasing productivity, ever accelerating the pace of our racing canoes.

We are caught up in the process of proliferating our planet with more goods and more people. We cry out in helplessness as we participate in this irreversible process. Since we cannot stop this process of producing more and more goods and people, we strive to produce better goods and better people. And within our western world we in America are being disciplined by the forces of competition to produce our goods at a lower cost (which is one of the several specialized definitions of the term productivity). In this paper the word productivity is employed culturally to describe our western *raison d'être*: to produce all the necessities of life and more and more of the better things in life, and to develop the capacity to enjoy the finer values in life, for a steadily expanding lifetime for a constantly rising population.

The impact of increased productivity on the face of American society has been to commit 183,000,000 people to this limitless enterprise. Our society is not an accomplished fact. We are in the process of development. America is still an experiment.

In Calcutta, India, last year, Mrs. Ruttenberg and I heard a lecture by an Indian anthropologist. He spoke on, "The Functions of Caste." After the lecture we discussed with him the contrasting *fluidity* of American society. He laughed at the *evidence* of the United States of America, saying:

Come back and talk to me a thousand years from now. Your young country is a mere four and a half centuries of age. America is just an extension of Europe. Yes, it is just another European experiment. The British, you know, experimented with us for a few centuries. To what avail? I dare say that my Indian people a thousand years hence will have solved their problems of caste, and the poorer ones will still be collecting cow dung, drying it in the sun, and selling dung cakes to Indian housewives as fuel for cooking the family meals. And your America a thousand years hence? What will your experiment have proved? It will probably be a footnote in our history books, a devastated wasteland of interest mainly to archeological expeditions. You are exhausting your resources, and there is a limit to how long you'll be able to live off the resources of other countries. The British found that out. My native state of Bengal is shipping you manganese ore now. That is mere expediency. We need your dollars today. But a thousand years from now nobody will know anything about the *American* dollar.

We found that this proud Indian could not be persuaded otherwise. But we did try to explain to him the impact of increased productivity, of the western idea of progress, on the face of society in India as well as in all other lands on our planet.

Increased productivity in America has released the most potent, revolutionary idea abroad in the world today. Poverty can be conquered. The idea of conquering poverty is not an original American idea. Our contribution is the practical demonstration that poverty can be conquered for a majority of the population and, with increased productivity, for all of the American people. Knowledge and freedom can be shared. The conquering of poverty and winning of freedom are no longer dreams. They are a reality in the United States and can become a reality everywhere. This is the American idea that is stirring the hearts and passions of all peoples. It is the most potent idea in the Soviet Union. It did not originate there. It came from America, the land of the free and the home of the brave. It is infecting our primary fatherland countries in Europe and our secondary fatherland countries that are ruled by Russian tanks. It has awakened that long-slumbering giant, China. It has the entire sub-continent of India in ferment. Latin America seethes with the idea of conquering poverty.

If the Indian anthropologist is correct about our country being a devastated wasteland in the year 2961, it will be because we were unable to get off the collision course that we are on with the Soviet Union, not because we try to provide the good life for everybody. As Rome gave the world the

idea of law, America will have given the world the idea of increased productivity, that poverty can be conquered in this life, if not within the lifetime of this generation.

Life will never be the same again anywhere on our planet because of the American demonstration that by applying scientific management to the organizing of brainpower, manpower, machinery, and raw materials everybody can be well fed, well clothed, well housed, and well educated. And, more important, they can win freedom and learn to use it for individual self-development. America's example is the most powerful force-idea in the world. It is forcing all peoples toward increased productivity, the impact of which is to change the face of all societies—not the least being Indian society.

Increased productivity cannot be disassociated from the fact that America is founded on the dignity of the individual. By providing its individuals with a continuously fuller expression of their inherent dignity, we generate a forward thrust that makes the United States of America the world's greatest power. Because the dignity of the individual is a natural process of life, any national grouping of people that suppresses this process thwarts its own self-development. This is what Mrs. Ruttenberg and I tried to impart to our Indian anthropologist friend. But he would not listen; in 2961 the historical footnote will be the Indian caste system and cow dung vendors.

The face of society is being changed by a primary impact of increased productivity, the phenomenon of a surplus. While America produces more surpluses of more things than any other national state, the phenomenon of a surplus is the result of all productive processes. It has this basic characteristic:

In a more developed country, like the United States, we continue to increase the productivity of productive processes even after they result in a surplus.

In less developed countries like Brazil, Greece, Egypt, Spain, Russia, Malaya, ad infinitum, one or more productive processes has already resulted in a surplus irrespective of the stage of development or form of government or society. And, as in the United States, these countries continue to increase the productivity of their particular productive process that has already resulted in a surplus.

At this point the term surplus should be defined. It is an excess, more than can be used, sold, or is needed. In Russia it is more bicycles than can be distributed. In Brazil it is more coffee than can be sold. In the United States it is a surplus of feed grains. Here we have an example of an absolute surplus. In the case of wheat, we have more than we can sell or give away at home and abroad. In the judgment of some, we even have more wheat than we can afford to store. Yet our creative ingenuity to increase the productivity of growing, storing, processing, and shipping wheat is unabated.

Please do not misunderstand my observations of the phenomena of surpluses. I do not comprehend what I observe, and I find the several theories of political economy about surpluses wanting. They are not a capitalist exclusive. The Soviet socialistic economy produces surpluses also. When a top Soviet communist bragged to the head of one of our largest corporations that the productivity in some of his machine tool plants was so high that they were able to install a 30-hour week, he was confessing that they had a surplus of machine tool capacity working their regular number of weekly hours. The example of the Soviets creating more roller-bearing capacity than they could use for years is well known, and how they were unable to stop the excess flow of bearings for some time is one of the ludicrous cases of a surplus. They just kept building warehouses for them, pretty much like we keep building storage space for our surplus wheat.

Wherever Mrs. Ruttenberg and I have traveled we find each national state has a surplus of something. In Greece it is tobacco. In Malaya it is tin and rubber. In India it is cashew nuts. In Pakistan it is jute. In Cuba it is sugar. In Iran it is oil. In Spain it is olives. In France it is wine. In Israel it is oranges. In Egypt it is long staple cotton. In Denmark it is cheese. In Switzerland it is watches. In Italy it is mercury. In Portugal it is cork. In Chile it is copper. Examine almost every country, and you will find one or more of its productive processes presently resulting in a surplus.

And in most countries we find a surplus of people. In Pakistan we found the government resisting United States-sponsored anti-malaria programs, as this would increase the number of child-producing adults. They felt that they had enough people already and did not want increased productivity in this productive process. In a far eastern country, where population is about evenly divided between two ethnic groups, the prime minister, who came from group A, replied to Mrs. Ruttenberg that it was impractical for his government to support birth control because group B "reproduced like flies." Here is an example where increased productivity in producing people is an instrument of national politics. To be sure, quite an anti-malaria program was underway in that country.

Each political economist or economic political scientist to whom I put this surplus phenomenon has his answer, and it varies by the school of thought which he embraces. It is outside the scope of this paper to discuss the several theories that attempt to explain surpluses. My purpose is to suggest that *all* of the existing theories are in need of rethinking. The most common answer is that there is no such thing as a surplus. What we suffer from is inadequate distribution. Solve that, and the surpluses will vanish. What troubles me about this answer is that the rationalization of distribution is impeded by the multitude of national states in the world, and if the growing membership of the United Nations is any criterion, we are producing a surplus of national states. And within national states, like the United



States where trade is unimpeded, we have continuing surpluses. For example, we have a multitude of products in which we have more capacity than we can sell for cash or credit. And in each such product efforts to increase productivity are unabated.

While I confess that I don't have the answer to this phenomenon of each productive process resulting in a surplus, I do suggest that the answer might be found by searching for a unity in development among the diverse productive processes in which human beings around the planet are finding fulfillment.

The question can be phrased another way. Why is the urge toward increased productivity irresistible even when the productive process in which we find our fulfillment has already resulted in a surplus?

Look at this question in terms of our own related specialties, American industry. I know of no American manufacturing company of any significance that is able to sell today anywhere near what it can produce. The few exceptions about which I do not know merely prove that the productive process of most American industrial enterprises has already resulted in a surplus. Yet, with just enough exceptions to prove the rule, every such enterprise is engaged feverishly in efforts to achieve increased productivity. Such is the purpose of the Center for Productivity Motivation of the School of Commerce of The University of Wisconsin, as well as of this symposium on "Solving Problems of Productivity in a Free Society."

I also am in this business of increasing productivity, functioning as an industrial consultant to manufacturing firms in the metal working industries. This year I have worked with companies in four separate industries. They all have two things in common. There is too much capacity in their industries. They are unionized and have the highest employment costs in their respective industries. They all share the judgment that of every three plants in their industry today only two will be in business by 1965 to 1970, and the attrition may even be as high as 50 per cent during the 60's. This judgment leads to the conclusion that the surviving plants will be those with the lowest costs which, in turn, dictates that no stone be left unturned to increase productivity.

By 1965 to 1970 the surviving plants in these four industries will have buried one out of three to one out of two competitors. The employees in the plants that are in the process of being buried will be 45 years of age or older when their plants go into the industrial graveyard. Increased productivity in the surviving plants that win the competitive race during the 60's will result in adding to the surplus of unemployable unemployed. The existence of a surplus is not a deterrent to developing increased productivity. The surplus in each of these industries is not only unemployable unemployed, but also productive capacity to produce their respective products. Yet the irresistible drive toward increased productivity persists.

This mounting force of unemployable unemployed will have a telling impact on the face of our free society. In the last analysis, no matter what forms the programs to solve the problem of unemployable unemployed take, the cost will have to be paid by the employed Americans increasing their productivity. Hence the drive for increased productivity intensifies in American industry.

The dilemma of labor unions is their need to protect their members from unemployment conflicting with their need to collaborate in increasing productivity to preserve their unionized plants from going into the industrial graveyard. Management's dilemma is the need to evoke the co-operation of all employees to increase productivity conflicting with the prospect of some of the employees becoming unemployably unemployed.

While the negative impact of terminating the useful lives of many people before they reach the age of retirement absorbs major attention today, the positive impact of increased productivity during the 60's will enrich American life and strengthen our competitive capabilities in world markets. It is this impact to which I shall devote the concluding portion of this paper.

Your February symposium was devoted to "Profit Sharing and Productivity Motivation." Your sessions now are dealing with "Employer-Employee Co-operation for Increased Productivity." This is the field in which I am attempting to function as a specialist. When I was in the steelworkers union with the late Clinton S. Golden, we called it union-management co-operation. Our associate, the late Joseph N. Scanlon, successfully applied union-management co-operation in several plants and made a significant contribution by creating the Scanlon Plan. "Profit Sharing in the Joint Enterprise System," as described by Admiral A. C. Burrows to your February symposium, comes out at the same place as the Scanlon Plan except that the origins are management while Scanlon's origins are union. They both converge at the point of enriching the lives of everybody involved in the productive process. This is the positive impact of increased productivity. I define it as Humanation.\*

Humanation is the full release of the human creativeness of the working and managing forces, voluntarily co-operating with each other to apply their creative energies to their daily work through organized programs in the productive processes. The purpose of Humanation is to increase efficiency, reduce costs, eliminate waste, and raise quality in order to enlarge the total size of the corporate pie for the mutual benefit of workers, managers, owners, and consumers. The function of Humanation is to bring everyone, irrespective of his point of authority or responsibility, into full participation in the productive process. Its organization is built around the individual and not the machine.

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\* See "Self-Developing America," Harold J. Ruttenberg, Harper & Brothers, 1960.

Humanation results not in higher living standards and greater profits alone, but—more importantly—in new dimensions for the lives of the participants that give a greater meaning to their personalities and add to their dignity as individuals. Far from being competitors, Humanation and automation are collaborators in the limitless American quest for all of the necessities and more and more of the better things in life. Automation by itself cannot fulfill these objectives because it dehumanizes people and debases individual dignity. It tends to fragmentize the personality into meaningless parts. This makes the daily work of millions of people a bore, which forces them either into stultification or into finding outlets for their inherent creativeness away from their employment.

In contrast, Humanation makes daily work fun. People enjoy going to their jobs where they are free to apply their creative energies and where they receive recognition for their contributions. Humanation can be observed in a plant where the individuals put as much energy and vigor into punching in their cards as the automatons of automation put into punching out their cards.

Automation's philosophy sacrifices the individual to the advancement of productivity, not unlike the way he is sacrificed to the welfare of the state in the Soviet Union. The technically trained practitioners of automation no doubt love their families, but they do not like people as such, particularly in the factory. They are motivated by a strong desire to organize the processes of production to operate with a minimum of people—if they cannot be eliminated completely. Their ideal is an oil-refining plant where the valves are electronically operated by a tape recording that they dictate. The manless elevator and missile are the greatest products to date.

By contrast, the practitioners of Humanation are motivated by the basic desire to make life more meaningful and rewarding for the participating individuals. They are not driven by the compulsion to get rid of people that dominates the automationists. That which violates individual dignity is not progress. People are the most important. The full potential of America will not be reached by getting rid of people to the maximum extent, but by bringing the maximum number of people into the creative side of producing goods and services. Industry's technology experts will not be able to create mechanical and electronic ways (that can also be financed) of raising productivity fast enough in the years ahead.

The limitation of automation is that it draws its strength from the creativeness of a relatively small group of technical experts. Automation has to be supplemented by the practice of Humanation, which draws its greater strength from the release and application of the creative energies of everyone engaged in the productive process.

Humanation, the next major development in American industry, will result in two basic changes:

1. The authoritarian type of management philosophy will be replaced by a participative, developmental type of management philosophy that emphasizes human values without abdicating its top sergeant functions.

2. The current patterns of industrial relations will undergo some major alterations. The unions have to move ahead from their inadequate policy of higher wages and better working conditions—which management calls a policy of more pay for less work—and embrace a dynamic policy of higher pay for increased productivity. Management, in turn, has to move ahead into what the president of the Council of Profit Sharing Industries called “joint enterprise,” Joseph Scanlon called “joint participation,” and I define as “Humanation.”

Profit sharing, the Scanlon Plan, and Humanation, as I first defined it in 1956 before the National Industrial Conference Board, all suffer from a common defect, which in no way detracts from their inherent merits.

The defect is that they each tie their common philosophy of joint participation in the joint productive enterprise to a specific type of mathematical formula for distributing to employees their fair share of the proceeds of increased productivity.

While there are many formulae used by practicing profit sharing companies, they begin by tying into an accounting statement of profits.

The Scanlon Plan recognizes that its mathematical formula should be flexible and adjust to changing conditions, yet it begins by tying to a base period that yields a percentage ratio of “total payroll in a particular productive unit to the sales value of what was produced by that payroll.”

I have erred in tying “a pay-by-the-year program that assures an adequate annual income to everyone as the foundation for Humanation,” and in suggesting that it “tie all future increases in economic benefits to wage and salary employees to a comprehensive measurement of productivity.”

The primary move is for management to embrace the “joint enterprise” philosophy and reorganize its managerial force to practice participative and developmental methods between itself and its bargaining unit employees. Many managements are well along this road. The next step is for the union leaders to respond with a joint participation type of relationship that has as its foundation the dynamic policy of more pay for increased productivity. To get labor unions to take this step is one of our key problems. These two steps are the vital ones. From them will flow the third step: how to determine the fair share of increased productivity that should be paid to bargaining unit employees and how to distribute it to them. This has to be a joint undertaking.

We err when we try to create a uniform formula for American industry. Each enterprise, perhaps each productive unit, has to develop jointly its own “modus vivendi” for distributing the fruits of increased productivity. This is the cart. The horse is Humanation, increasing productivity through joint

participation in the joint enterprise. This horse will pull the cart of benefits. For some time the cart may be a collective bargain as we now practice it. The significant advancement will be that the collective bargain will be based on increased productivity, and the union bargainers will be assuming their share of responsibility for increasing productivity, because management will have perfected an operating philosophy that brings employees and their unions into joint participation in the productive enterprise. This is the basis of success for profit sharing and Scanlon Plan companies, and not the mathematical formula for distributing the fruits of increased productivity.

Let me illustrate this generality with a specific example from my experience this year. Company A is the largest in its industry, the pioneer in its nationally distributed product, unionized, and paying 75 cents an hour higher employment costs than its industry average. Always a good profit maker, its earnings have declined substantially since 1957, and sales have dropped by 25 per cent. It has an earned hour incentive system, suffers from low productivity, and its employees peg production. I spent six weeks helping the management avoid a wage increase this year and to get some incentive system changes that might increase productivity. The union kicked like a steer about closing some of the gap between A's employment costs and its competitors, but finally agreed to forego the 1961 wage increase and acceded to some incentive system alterations.

But the basic union-management relationship continues unchanged. It is a combative type of relationship where the employees engage in anti-productivity practices, and the union leaders view their function to be one of protecting their members from management. The job of increasing productivity is management's exclusive prerogative. The idea of increasing productivity being a joint responsibility is not accepted as a common objective. To the union and its active members the "enemy" is management. Let us classify this as a DC-4 relationship.

The analysis of this company's problem, as formulated by management, was this: our sales and profits have declined because our employment costs are 75 cents an hour higher than our industry average. Hence our prices are non-competitive. We must narrow, then close, the gap between our employment costs and our competitors. I accepted this analysis of their problem, and helped them narrow the gap. But the gap is still so large that the management is planning to decentralize and move some of its main departments to lower wage-paying areas. While the union has no moral right to persist in making this company pay substantially higher employment costs than it is able to secure from other firms in the industry, just moving this DC-4 relationship to another state fails to solve the basic problem.

In securing the employment costs of competitors I found one that had a profit sharing program, no union, and employment costs not too much different from company A. Company B had increased its sales since 1957 by al-

most as much as company A's sales had declined, and was making more profits. B's prices were continually undercutting A's, and B was taking away A's business steadily. The union staff organizer knew this, and a couple years ago had given the operating manager of company A a copy of the book, *The Scanlon Plan*, which I found in his bookcase. The Scanlon mathematical formula had thrown him off the main features of joint participation in the plan, so he never gave it serious consideration.

I presented him and the top officials with copies of my book, *Self-Developing America* in which I advocate Humanation. I made no sale. While I made some dent on the operating management with the need for doing something fundamental about its pegged production situation, I found the company unwilling to move into uncharted territory. Company A's employees devote a tremendous amount of ingenuity and effort to anti-productivity activities—beating standards, pegging production, and working in many cases as little as 6-½ hours in every 8-hour shift. Company B feels it will bury company A, the industry leader, whose sales it will probably overtake this year for the first time.

Company B, with a joint participation management, is flying in a jet plane. Its relationship may be classified as a DC-8 one, where employees engage in pro-productivity activities and both management and employees embrace the common objective of increasing productivity. Company A, with a conventional collective bargaining contract, incentive system and attendant pegged production, is flying in an old DC-4 piston engine crate. The union would like to save the plant, but does not know how to convert its DC-4 relationship into a DC-8 jet participative relationship. The management does not know how to take the first step to converting its employees from anti-productivity to pro-productivity activities. So they are planning to move one large department to a lower wage-paying area, and unless they learn how to convert to a DC-8 relationship in their main plant they will move their entire operation to geographical places uncharted. In the meanwhile, company B is racing along at 600 miles plus an hour with a co-operative relationship in which employees devote themselves to pro-productivity practices.

This is not simply a case of union versus nonunion. This is a case of a joint participative management beating a conventional type of management in the competitive race for increased productivity. My criticism of the union is that it is sitting idly by instead of attempting to develop a joint participation relationship with management that would utilize the ingenuity of the employees to increase productivity—an ingenuity that they are now using vigorously to peg production. The irony of moving to a lower wage-paying area is that, with no change in the basic relationship, whether it continue union or is nonunion in the new location, the company will still be flying in an old DC-4 crate, using lower-priced fuel (employment costs), and without the union holding down the rear of the plane—maybe.

The significant factor in this case is the impact upon the employees and management in company B of increasing productivity jointly. They are enjoying a richer work experience, and finding outlets for their creative urges where they earn their living. They have climbed out of the swamp of pegged production, restrictive work practices, and all of the other frustrating, anti-productivity experiences that we witness every time we walk through an industrial plant where conflict and distrust predominate over co-operation and mutual trust and respect.

This positive impact of increased productivity is to give life a greater meaning, to enrich the daily working experiences of both management and bargaining unit employees in the growing number of work places where co-operative employee and union relations are developing. Union employees are not split down the middle with divided loyalties to their employing company and their union. They are whole people, working together jointly with the common objective of increasing productivity. They do not look upon management as "the enemy." They know that the "enemy" is the competitor, whether he be in this country, in the western world, or behind the Iron Curtain.

The source of all the gains that unions have pioneered or accelerated is increased productivity. Their future service to their members will be determined by how much they facilitate the processes of increased productivity. The impact of increased productivity on union-management relations is to convert the DC-4 combative relations, characterized by anti-productivity practices, to DC-8 co-operative relations, characterized by pro-productivity practices. How to do this in unionized plants where the positions have become hardened and attitudes frozen—on both sides—is the particular specialty to which I am devoting my efforts.

The intensifying need for increased productivity, in my judgment, will result in the combative, anti-productivity relations giving way—either by transformation or demise—to co-operative pro-productivity relations. This impact on the face of our society is observable in virtually all of our industrial communities.

After the 1941-1945 war we exported to our primary fatherland countries in Europe and elsewhere what we called "productivity teams." This effort, as reported by Dr. Richard Lang to your February symposium, has created 28 National Productivity centers around the world. What these countries wanted from us was our "know-how" in achieving the good life on earth. We fed back to them our cumulated cultural development of "scientific management." Our cultural word for it was productivity. They are now competing against us with their increased productivity to which we contributed. That was one stage.

We in America are now well advanced into a second stage, the cultural development of achieving increased productivity through the joint, creative

participation of everyone in the enterprise. Many profit sharing companies are outstanding pioneers in this development. A few Scanlon Plan firms are pointing the way. And there are many other firms, in various stages of development, many with unions, who are similarly achieving higher productivity through joint participation in the productive enterprise. I have given this development the name, Humanation. This is the cultural development in process in the United States that is far advanced over most other western countries and over all Iron Curtain nations.

It is America's newest competitive weapon. It is not like a machine that can be transplanted from one country to another. It is the fruitful product of our culture that we are achieving first in the world. It is a new and better way of life to which other peoples will aspire as its outlines and results become evident in the closing decades of the 20th century.



## EMPLOYER-EMPLOYEE CO-OPERATION FOR INCREASED PRODUCTIVITY

by

Rawson L. Wood

**Productivity and Co-operation**—How does co-operation within a business add to productivity? I presume that everyone at this meeting is aware of the many studies of co-operative action in industry that have been published during the last 20 years. During and after World War II the results of labor-management committees in many plants received much attention. Since then a great variety of production sharing plans such as the Scanlon and Rucker plans have been introduced and widely discussed. Recently the Profit Sharing Research Foundation has begun the publication of a series of comparisons of companies with and without profit sharing plans within the same industry, which show that companies which use profit sharing plans earn higher returns on their investments and have seen their common stocks advance further on the exchanges. From all of this data it is apparent that many companies have succeeded in using co-operative measures successfully.

Another group of studies relating to the importance of co-operation approaches the problem from the psychological point of human motivation, trying to determine what actually affects a worker's attitude toward his job. As a result of such work there is now ample evidence to show that the so-called "economic man," who seeks solely the maximum economic return, is very rare. For example, in the book *Money and Motivation*, William F. Whyte reports the conflicts set up by individual incentive plans between a fast worker's desire to earn extra pay and his loyalty to fellow workers who fear an increase in standards. Only a few men are strong enough individualists to ignore the social pressures and produce all that they possibly can. And even these men join in the universal conspiracy to make every job look as hard as possible when time study standards are set. The book gives a vivid picture of the battle of wits between time study men and management trying to increase production, and the workers on the job who resist such pressures. Economic incentive alone, when it does not provide for man's need to belong to a social group, is not effective.

**Role of Supervision**—On the other hand, we know that through production sharing, profit sharing and similar co-operative approaches, individual pro-

ductivity can be increased substantially and maintained at a permanently higher level. But co-operation has much broader effects on a company than an increase in the individual output. For example, the nature of the job of the foreman, the first line supervisor, changes radically when a co-operative approach is introduced into his department. These men are the key men of any organization; the experience of the company is concentrated in them; they know the process and must supply the training for new workers and the supervision of product quality. When they are engaged in a ceaseless battle with the people in their departments to maintain quality and production levels, they have very little time for constructive work. When they don't have these police duties to perform because everyone in the department is anxious to produce high quality work, they can become true leaders in helping their men improve their results. When their experience is used constructively, in making improvements in scheduling work flow, in solving difficulties that arise over individual job variations, they can contribute substantially to increase productivity. In the Arwood Corporation we regard this potential of the first line supervisor so highly that we allot to them a profit sharing portion one and one-half or two times the size of that of the other production workers. Of course this adds to the incentive to become a foreman, and because the job is so much more pleasant under co-operative conditions, more workers are willing to accept the responsibility and training required for such a position.

Higher levels of management experience a similar improvement in the utilization of their time. A factory manager's job is easier if his foremen help each other instead of blaming each other. Grievances are a time-wasting burden upon management which do not develop when foremen and workers are partners on the same team. Although half of the Arwood plants are under union contracts, we have had only one grievance carried to outside arbitration in seven years. This record is by no means unusual among profit sharing companies, which also have a remarkable absence of slowdowns or work stoppages of any kind.

All of these indirect additions to productivity are hard to measure in units or dollars. But they show up in a steady flow of minor process improvements, the elimination of troubles and defects before they become serious, and add up in my opinion to a factor equal in importance to any gain in individual productivity.

**Acceptance of Improvements**—A second indirect gain is the acceptance of technical improvements. Some years ago, a group of visiting European businessmen, touring this country at the invitation of our State Department's productivity program, visited one of our foundries. After showing them the process, we invited them to sit in at a conference with our elected profit

sharing committee to ask any questions they wanted. Their first question was, "What happens when you try to introduce new labor-saving equipment? Isn't there resistance?" I turned to the chairman of our profit sharing committee and asked him to express his feeling about this. His reply was scornful, "What new equipment? We have been waiting three months now for those new cut-off machines you promised us. We could turn out a lot more if we only had them."

**Stretching Plant and Equipment**—So far I have noted three ways in which co-operation improves productivity: better individual effort, more effective use of management skill and time, and ready acceptance of engineering improvements. There is one more way which has been especially important to our company. Arwood Corporation has grown very rapidly and during these years was usually short of working capital. All of the factors mentioned above helped us to expand production and earn profits on a minimum of capital, by stretching our plant and equipment capacity far beyond the limits we had anticipated. Whenever we could get another 15 or 20 per cent output from an existing plant, we saved the cost of borrowing or other financing for more equipment. So this is one other way in which co-operation helps productivity. It works for us by generating constructive suggestions for improving efficiency, plus a willingness to work well under crowded conditions, and these increase the productivity of available capital.

**Co-operative Effort and Co-operative Reward**—So for all of these reasons, productivity can and does increase when co-operation is obtained within an enterprise. How can this co-operation be obtained? Is there any reliable management technique that will insure it?

One essential is to show that each job holder will benefit from a joint effort. It is a psychological absurdity to expect a man to consider himself part of a co-operative team, if all the proceeds go to only one player on the team. Much has been written recently about the need for profits in our industrial system, and how a company's future success depends upon them. But as long as these profits belong to someone else, such arguments are very remote and abstract from the worker's point of view. They only become personal when the rewards become personal.

A few ambitious men want advancement and will try to improve their positions until they, themselves, reach top management levels. Such men are self-motivated. But for a co-operative company one needs the combined efforts of everybody, including those who can never get to the top and know it, but can still add a lot to total productivity. So an essential to co-operative effort is co-operative reward. Somehow every member of the team must

have tangible proof that the teamwork pays off for him as well as for the boss. One way to bring this about is by a profit sharing plan. I happen to think this is the best way and shall now take up some of the problems involved in using such a plan.

**Obstacles**—Right now there are two serious obstacles faced by a businessman who considers profit sharing for the first time. The first is the existence of an economic theory that all profits belong exclusively to the owners of capital, and that it is either morally or legally wrong, or both, to share them with anyone else. The second obstacle is the lack of any authoritative body of information to help a man draft a profit sharing plan for his own company with some assurance that the formula will be correct and will meet his own financial and personal requirements—that it will both represent a reasonable additional income to the worker, and will not be an exorbitant cost to the corporation.

To deal first with the theoretical objection, most of us who have learned economics in college or business school were told, as students are still being told today, that the free enterprise system depends upon an entrepreneur taking the factors of land, capital and labor and combining them to make a salable product, with all excess over and above minimum costs of these three factors belonging exclusively to the organizer. This theory, when first introduced by Adam Smith and later developed by Ricardo, was an extreme reversal of the old mercantile position formerly held under which all economic decisions were rigidly controlled by government.

The extreme nature of this view led to such desperate exploitation and poverty of the laboring force that public opinion revolted against it. Most of us know about the factory system in England under the early industrial revolution, which was so vividly reported by Dickens for example. It was this same revolution against the injustices of early capitalism that led Karl Marx to develop his opposite theory, to claim that all of the proceeds should go to the worker and none to the supplier of capital. Of course, we all know that this theory led to even greater hardship and oppression, because it needed the power of the state in tyrannical form to make it effective.

In actual practice in the United States we long ago abandoned close adherence to the early form of liberal economic theory. Currently, work rates are not set by subsistence levels, but by negotiations between unions and corporations which recognize that high purchasing power in the hands of the public creates better markets. Government action has established minimum wage, health and safety regulations, social security and unemployment benefits to level out individual incomes under the impact of various misfortunes. None of us would dream of going back to the economic jungle of 150 years ago. But in our theoretical description of the economic system we have not

yet advanced beyond that point. Therefore, it still troubles some people when one talks about some of the profits going to other than stockholder and management groups.

From a practical, common sense point of view, however, it does not seem unreasonable to many businessmen to share the proceeds of a joint operation in some fair proportion between those who supply the capital and those who supply the manpower skills. This is basically what profit sharing tries to do.

It is on the point of this fair distribution of the proceeds between the two groups that a great gap still exists. It must be filled before profit sharing can become a widespread management tool.

If a business man wants to install a pension plan, an electronic computing system, or a branch factory in a foreign country, he can find all the material he needs to compute the costs and probable return on his investment. But if he wants to implement his interest in co-operation as a management policy, he can find very little specific help. The Council of Profit Sharing Industries in Chicago will tell him what other companies have done with profit sharing plans, but cannot help him set up the formula for his own company. Should he set aside 10 per cent, 25 per cent, or 50 per cent of the profits? Should he reserve a basic minimum return on invested capital before profit sharing, and if so, how much? When there are no authoritative answers to these questions, a manager is naturally suspicious of the practicality of the idea. In his experience, if an idea is workable, workable plans for using it are available.

This gap exists largely because no systematic study has been given to the problem of selecting the appropriate formula for each type of business. The plans existing today have survived, but we know of other attempted profit sharing plans that have failed because too small a percentage was shared, thus making the tangible reward to worker participants negligible and useless for incentive. Others may have failed because they allotted too much profit sharing and did not retain enough for the company and its stockholders. Such a survival-of-the-fittest method of selecting successful plans is too costly; businessmen need guidance based on sound theory and careful research so that they can set up a profit sharing plan with some assurance that it will be effective.

If we start by examining the existing successful plans, we can see a broad relationship between the ratio of payroll to total costs and the percentage of profit to be shared. In a foundry such as Arwood, we have over 50 per cent of our costs represented by payroll, and we contribute to our profit sharing pool 50 per cent of profits after deducting 5.5 per cent on invested capital. Over a seven-year period, the payouts to workers have ranged from 3 to 19 per cent of base pay, averaging 12. Other manufacturing companies which have payroll ratios running from 20 to 30 per cent, have plans with 25 per

cent of the profits shared. Service companies, such as banks and retail distributors, can operate with equal effectiveness on a 5 or 10 per cent share of profits, because their payroll ratio is still lower. On its surface this looks like a reasonable relationship, because co-operation has its greatest effect on payroll items of cost and only lesser, indirect effects upon overhead and material costs.

This ratio of payroll to sales is surely one basic factor to consider in working out an economic theory to guide profit sharing, but there are others. The amount of invested capital needed to produce the sales level is also of great importance, as is the question of whether a minimum basic rate of return on this capital should be set aside before profits are shared. My own belief is that this will be necessary to achieve any formula with universal validity, because of the variety of ways of obtaining needed capital equipment. If one company rents its equipment, and another borrows money to buy it, they will have different charges set up in their income statements against earnings. And if a third company issues shares of equity capital for the same purpose, it must set aside an equivalent amount as return on these shares, else its profits will appear overstated compared to the first two. If such a reserve for capital return is set aside, what should the rate be, and should it fluctuate with changes in the money market? This factor is of course especially important with banks and other financial institutions, where the contribution of capital to the earnings of the enterprise is far heavier than that of personnel.

All these and lesser factors must be taken into account in developing a basic formula to make co-operation through profit sharing possible. It will take economists of vision who can see the needs of the future.

If the survival of our free social system in America depends upon securing the co-operation of all members of the political community, so does the survival of our private enterprise system depend upon securing the co-operation of all members of the economic community. My point has been that such co-operation requires sharing in the proceeds of the joint effort, and that for this to be put upon an exact and scientific basis is a most urgent need. I hope that some of those present today will find a way to bring this about.

## EDUCATION'S ROLE IN SOLVING THE PRODUCTIVITY PROBLEM

by

The Very Rev. E. J. O'Donnell, S. J.

Looking over the program and the imposing array of learned papers already given on the techniques and specialized problems involved in productivity, it would be, I think, highly presumptuous on my part to attempt to deliver yet another technical paper on this subtle and complex subject.

For one thing, I must confess my limitations in the area of economic productivity. Frankly I believe I shall learn more from this conference than what I could possibly contribute to it, particularly to the purely technical aspects of it.

Secondly, I would gather that you are more interested in what a university—as a university—has to say not only about productivity but about the broad, general context in which productivity can flourish, and about the education of young men and women whose economic activity will be characterized by largeness of view, a wide range of human understanding and a depth of compassion.

What is the traditional statement of “the productivity problem”? In its simplest and most primitive economic terms, it is the problem of how to use men, money and machines in the most efficient way to insure maximization of production of goods and services.

The components of the problem—as they are traditionally stated—include such matters as the productive process, cost-saving methods, plant engineering, quality and cost control, the line-supervision function, development of new products and materials, and the general flow of goods through the firm and associated systems.

Throughout the productive process there are three ever-present dimensions: (1) the development of physically feasible alternatives; (2) the identification of the most economical of the alternatives; and (3) the final choice of one alternative based upon the human aspects involved.

Now, as I hope to show, the “productivity problem” admits of a somewhat broader statement—or at least a broader consideration—than this. And it is in this broader aspect that the university, I think, can play a distinctive role.

But before I consider that distinctive contribution of the university, may I observe here that one of the most significant developments in the history of business education in this country has been the recent appearance of both

the Pierson report and the Gordon-Howell report sponsored respectively by the Carnegie Corporation and the Ford Foundation.

If, as I believe, the general recommendations of both these reports are sound, then the business and economic life of our society, and this includes, of course, all of those manifold activities involved in the production of goods and services, has everything to gain from the incorporation of these recommendations in the curricula of our schools of business administration.

As a footnote, I am pleased to report that our own College of Business Administration, after a year-long self-analysis of its curriculum and a thorough study and discussion of the Pierson and Gordon-Howell reports, has embarked on a curriculum revision program designed to accomplish many of the objectives so sanely and urgently proposed by these reports.

It is instructive, I think, that the recurring theme throughout the Pierson report, the emphasis, the leitmotif, is on the need for a broadly based, humanistic education for business men. I note this here because it is relevant to what I shall say later in a consideration of productivity and the university.

I might add that it is not only a broad, humanistic education which business and industrial leaders are requiring from university graduates whom they employ, but also the functional ability which will enable them to quickly become contributing members of the productive organization. Intelligence and skill is the combination that is desired.

Not only the business schools but the engineering colleges as well have broadened the curriculum of their students. Our own College of Engineering—if I may add another proud footnote here—under the direction of Dean A. Bernard Drought, has developed a curriculum and established an atmosphere which is in the best tradition of humanistic education.

With respect to the business and industrial community, let me quote briefly a few sentences and phrases from a summary of the Pierson report. They indicate the direction of business education today.

"Ideally," says the report, "the student aspiring to a responsible managerial post should, in his undergraduate years, acquire a solid foundation in the arts and sciences—especially English, economics, mathematics and the social sciences.

"Education for a career as a manager in one of tomorrow's complex technological industries necessitates the fullest expansion of a student's knowledge and rational ability in business-related disciplines; otherwise it becomes mere training in technical skills.

"Employers prefer preparation in liberal arts to specialized business programs."

Pierson found that 30 per cent of business school graduates wished that they had had more mathematics in college. And half of the graduates felt they should have had more psychology.



"Both employers and employees," says the report, "seem to agree that a specialized business program, particularly for undergraduates, does not provide a sufficiently broad background for a career in business management."

Because business processes and policies are dependent upon historical, political and human factors as well as upon economic factors, says Pierson, "substantial familiarity with the social sciences is . . . essential for serious business students."

I cite these observations and findings from the Pierson report because they illustrate, I believe, a healthy trend in American business and industrial life—a trend which seeks to broaden the base of business and industrial activity in this country by broadening the educational and cultural background of our future businessmen and industrialists.

It is a trend which will bring to business and industrial life many of the characteristics of our traditional professions: that is, a central, continuing concern for the common good of our society; awareness of and devotion to goals and values beyond our immediate self-interest; and the ordering of our work to the deepest and noblest aspirations of man.

Now anybody who has watched the development and maturing of American business and industrial life over the past 25 or 30 years knows that this trend is not the birth of something new. It is rather the inevitable culmination and the systematic realization of something that has been growing for a generation.

What we are now witnessing is the emergence of what hitherto had been an instinctive social responsibility and humanistic concern into its natural next phase where these ideals and principles are not left simply to instinct or intuition but are cultivated formally in the educational preparation of business and industrial leaders.

Indeed this formal, educational phase has been foreshadowed by businessmen themselves. Some of our largest corporations have been sending key executives back to school for intensive courses in the humanities and the liberal arts. There has been a sharp and vivid realization that something was lacking in the educational process 15 or 25 years ago—namely, philosophy, literature, history, social and political science and acquaintance with the fine arts. The book published a year or two ago by the Fund for Adult Education, entitled *Toward the Liberally Educated Executive*, is undoubtedly familiar to all of you as an illustration of this widespread concern in American economic life.

The problem of productivity—no less than the problems of business and industrial life in general—must be faced, I believe, in this broad context of the socially responsible professional and humanistic orientation of economic activity.

This is what I meant earlier when I suggested that the problem of productivity must embrace more than the merely technical and economic elements involved. It cannot ignore those elements. But neither may it ignore the social and humanistic considerations.

And here I can only raise questions; I cannot answer them. But I think these are the questions which a university is best qualified to raise and which a responsible university does raise.

For example, is it sufficient for the quality standards of a product or service that they be set at a competitive level, or is there an objective level—perhaps superior to the competitive level—which responsible manufacturers should try to maintain?

What can manufacturers do, with or without the collaboration of union officials, to enhance the craftsmanship of American workers and their products?

What are the unsolved human problems, if any, of assembly line manufacture?

If it is true that all men are meant by nature to be creators, that is, makers of things, how can their making, or creating, instinct be satisfied within the context of modern industrial procedures?

Are wages and profits the only incentives to more efficient productivity; or are there other motivations, perhaps even more profound motivations, that can and should be explored?

In the introduction of new, automated production techniques, are there certain human values which must be safeguarded and perhaps balanced off against the economic advantages that accrue?

What sort of a business and industrial environment best stimulates the imaginative, critical and creative faculties of employees—from production workers to managerial executives?

I repeat, I have no answers to these questions. But I do have a lively interest in the questions. And I do think that these are the kinds of questions with which universities and graduates of university schools of business administration must be concerned if the "problem of productivity" is to be faced in its broadest aspect.

As you may have detected by now, there is more than a whiff of the moral in my approach to the "problem of productivity." I do not see how we can avoid the moral element in economic life. Man is indeed a moral being. If we deny that, then we must—it seems to me—subscribe to the Communist doctrine that man is nothing but an economic unit, a cipher, an animal whose only significance is how much he can produce and consume in any given period of time.

In America, thank God, we have a different concept of man; we have the Judeo-Christian concept which recognizes that man's origin and destiny are beyond time and that what a man does in his economic life will have an eternal resonance.

The characteristics of man as a moral being are freedom and responsibility. Man is not free to do as he pleases, but to do as he ought. The benefits of freedom are inseparable from the burden of responsibility.

Productivity is not an end in itself. It is a means to an end, to what the philosophers call the "good life." It is instrumental to the purposes of man. It enables man to satisfy not merely his material wants, but his spiritual and social needs. If productivity does not do that then there is something wrong with the productive process, with man, or with both.

My remarks here today would be misunderstood if anyone were to believe that I am either indifferent to or underestimate the importance of a dynamic, productive economy. Entirely aside from our nation's internal requirements for a dynamic economy, there are the obvious external considerations. There is European prosperity and competition, the European Common Market and our relationship to that market, the extent to which we can help new, underdeveloped nations, and, of course, the threat posed by Soviet Russia which has all the advantage of the momentum of a determined drive, but all the disadvantage of totalitarianism which suffocates the human spirit.

I, for one, refuse to believe that our free society cannot continue to surpass the lock-step productivity of the Soviet society. But it is my deepest conviction that our definition of a "dynamic economy" must include these humanistic elements, these spiritual elements, if you will. And as I say, all signs in American business and economic life point to a maturity of understanding of this truth.

The natural soil for creativity is freedom, not tyranny. Here again the university can make a special contribution to the solution of our productivity problem by encouraging creativeness in its students.

A few weeks ago, in a talk to our students and faculty, I stressed the indispensability of creativity, the need for it on all levels and in all areas of American life.

"We need creativity," I said, "in our political thinking. We need it in our international relations. We need it on such knotty and complex matters as arms limitation and arms control, on automation and on the rebuilding and revitalization of city life. Indeed, we need creativity, the fresh approach, to virtually all the old and certainly all the new problems that man faces today.

"The creative student is critical of society, but he is not corrosive.

"The creative student is more interested in reform than he is in revolution.

"The creative student is flexible in his methods, but not fickle in his goals.

"The creative student is willing to change what needs changing, not because he loves novelty but because he wants to construct something better.

"The creative student respects the complexity of reality, but he does not multiply subtleties.

"The creative student is patient in the face of a problem, but he does not hesitate to move to a synthesis when he has the data he needs and has reflected sufficiently on that data."

Creativity should not be confused with cleverness or glibness, nor should it ever be confused with affectations of oddity in dress or manners.

However, the creative person IS individualistic in his ideas. If he sometimes seems out of step with his fellows, it may be because, as Thoreau said, "he hears a different drummer. Let him step to the music which he hears, however measured or far away."

This, I think, is what modern business and industrial leaders are looking for in today's university graduates. This, I am convinced, is what universities must do all in their power to foster and enlarge—creativity, competence and compassion.

If we in the universities do this we shall have made our most important contribution to the solution of the productivity problem taken in its total relevance to the destiny of man.

## ORGANIZING BUSINESS FOR INCREASED PRODUCTIVITY

by

James F. Lincoln

I would like to outline for you the problem of incentives as we see it. Although American workers are among the highest paid workers in the world, they are, I believe, in some cases, at least, among the most inefficient. Why is it that the worker does not develop his abilities enthusiastically to produce and also to reduce cost?

Let us look at this from the worker's point of view. In general, whenever the worker is not needed, whenever there are no orders for him to work on, he is out of a job. The most important thing to the hourly worker, outside of his family, is his job. He thinks more of that than any other single thing. Yet he has no control over his employment. The people that do have control over his employment, the top management and the sales manager, are safe in their jobs. They are not thrown out on the street every time business slumps. To go to the hourly worker who has no control over his future, or over the future of the company and say, "Let's increase efficiency," would suggest an action completely contrary to his thinking. He thinks that as soon as his job is finished, he is out. Therefore, obviously he should spin the job out as long as he can. So would you, and so would I if we were in his place.

Therefore, the first thing which is essential, in my estimation, for installing any kind of a program that will increase efficiency is to make sure that this fear is eliminated from the worker's mind.

To the worker increasing efficiency usually means making more profit for the stockholder who in many companies has no knowledge whatsoever of the company's activities, no interest in it at all. As a matter of fact, he may not know what the company does. This stockholder is the man who ordinarily is rewarded by greater efficiency. The worker does not believe that the stockholder is doing anything to benefit him, and he is not interested in earning bigger profits for him. The first thing, then, that must be done to create a co-operative organization is to guarantee the worker continuous employment.

The second thing to do is to insure the proper use of profits of the company. The first person to think of in the distribution of profits is the customer. The customer pays all wages, buys all materials, pays all taxes, gives all the money that you ever use. He is most important.

Second in importance is the man who gives the customer a greater income or a better and lower-priced product. This is the worker. He is second because only he can do this.

Unquestionably stockholders are very important to a company, particularly for the man starting a company. Stockholders are necessary but the person of primary importance to the business is the customer. It is industry's job to give to the customer more and more for less and less.

What has industry done over the years? It has been geared primarily to make better profits which go not to the customer, in most cases, but to the stockholders. You are not going to get enthusiastic co-operation from the workers under those conditions. If you are going to have a profit, it will be produced by the workers and by workers I mean all the people from the janitor up to the president. These are the people who should be rewarded in proportion to their contribution. The last man to reward is the stockholder, particularly the ones who have no interest in the company outside of bigger dividends and the higher price of the stock.

What happens when you organize business on the basis of rewarding people in proportion to their importance? First of all the workers, from top to bottom, will have an entirely different attitude toward efficiency. In the factory not organized on this basis the workers will generally do their best to reduce output on the job. After the shift is over, however, they will go out on the lot next to the factory and play a baseball game, putting into it all the enthusiasm and all the ability they can muster. They receive nothing for playing baseball, but they do have satisfaction of accomplishing something. This is one of the greatest incentives—the sense of achievement.

Money is not nearly as great an incentive as is status. You have the case of the present Secretary of Defense who gave up a job which probably paid him half a million dollars a year and a stock ownership probably worth another half a million or more. Yet he gave up that job to take a job as Secretary of Defense at \$25,000 a year. Well, if money were the greatest incentive, he wouldn't have left the job he had. Obviously the status which he expected to get as Secretary was more important than the income from his previous job.

Suppose that you organize a business on the basis of providing continuous employment and giving status to each person as he deserves it. As the company progresses, positions of greater authority, responsibility and importance go to the men who deserve them. And suppose that the profits that are made are used first of all for rewarding the customer with a better product and/or a lower price, and secondly, by paying the people who produce this product at a lower price in proportion to what they have done. What happens?

Well, I can say that since 1934, when we started such an incentive program, we have reduced the man-hours per unit of production by over 90 per cent. Because of that reduction in man-hours, and the imaginative development of methods and designs, we have been able to reduce the price of the product we make to less than it was in 1934, with the profit per dollar sales

remaining constant during that period. This is a perfectly normal result if you have in the organization the desire on the part of all the people involved to make the company more successful, and if they want to find ways of doing the job more efficiently as well as to find methods which will make a better product at a lower cost.

Two or three other things also happen, most important of which would be what happens to the man himself. The psychologists tell us that no man ever developed as much as 50 per cent of his latent ability. When you have an organization or group of people trying their best not to do a more efficient job, which you know is perfectly true in a great many organizations, it is not surprising that you do not get any development of those people. But suppose you reverse the situation and instead of their not wanting to develop, their whole desire is to develop. And suppose management makes it possible for them as they develop to be paid in accordance with the results they attain and to advance in position, depending upon their abilities.

When this happens a remarkable transformation occurs. You have a tremendous development on the part of the individual to a point where they are entirely different people than they were as far as industry is concerned. Under such conditions results as far as productivity is concerned are in line with what I have been saying.

Please don't think that I am trying to tell you that we have done the ultimate. We have made a few halting steps in the right direction, but with those few halting steps we have been able to get results. The potentials are far beyond anything we have seen.

A large portion of all Americans were Europeans a few years or a few generations ago. They came to this country because they were seeking the freedom to develop themselves in a business or in a job without the restrictions they had in the old country. They have made the greatest nation that has ever been developed in the history of man. They succeeded not because we have a greater population here; three other countries have greater populations than we have. They succeeded not because of greater natural resources; many other parts of the world have much greater resources than we have. They succeeded rather because with the incentive and the freedom which they found here they were able to develop themselves into a nation which is unique.

That is not unusual. It would occur in any case where that same incentive, that same freedom, that same desire is developed. As far as business is concerned we have the people here who can do that. We also have the very, very great necessity. Yet we have hesitated largely to take advantage of our opportunity in the last generation. We have, at the present time, competition from other countries increasing at break-neck speed. I have spent a good deal of my time in foreign countries particularly to see what they do in industry which would be parallel to my experience in this country. I can

say that the developments there in the last 10 or 15 years, particularly in the Common Market nations, have been stupendous. There isn't any doubt it is going to continue.

In the case of Russia there is a development which is completely different than we have, and one which is far from as good as what we have. But the people there are dedicated to the program they have. We can well understand why that is true. Since the revolution their standard of living and the freedom of the individual has enormously increased. The workers there are dedicated to the program and are co-operating completely as far as industry is concerned.

The difficulty in Russia is that competition does not exist; there is neither a desire nor an attempt on the part of the manufacturer to build a better product for the customer. The customer has to take what is being built by the dictatorship. Because of this the progress which they have made is relatively small. Nevertheless, they are still dedicated and they are still in the position where under certain conditions they can do an outstanding job.

There isn't any doubt of the tremendous competition between so-called capitalism and so-called communism. The difference between capitalism and communism is to a large extent that we still have freedom for the manufacturer, the managers, and the owners to operate a company as they may wish to do. This doesn't exist under Russian dictatorship. However, if we do not find how we can get the co-operation of the worker, how we can make him want to do better, how we can make him feel that the thing he wants is to build a better product at a lower price, we are going to have competition from Russia that may be extremely difficult for us to meet.

Remember, at the present time government spends over a third of the total income of all people in this country. If government spending continues and this is carried to its logical conclusion, there isn't the slightest doubt that eventually we have to go to dictatorship. You can't have an activity that important run by people who are changed every four years or every eight years. I think we should recognize we are facing these threats, which we must meet. We cannot expect that the freedom and the potentials we now have will continue unless we do meet them—both the threat from without as well as the threat from within.

**Question:** What are the most important factors in increasing productivity?

**Answer:** A relatively small part of productivity is the result of increased manual skill of the man. A more important factor is finding more economical ways of doing the job. The man on the job can be of tremendous help in doing this. Another way is through change of design which would



make the operation more efficient or a product which is more easily manufactured. I would say that the most important one is the fact that the man himself, because of his knowledge, is able to assist management in finding the more economical ways of doing the job. This may be different tooling, different methods, different machines or whatever.

**Question:** Do you pay for individual suggestions?

**Answer:** Yes, for any suggestion that is made and accepted. The man who made it is paid one-half of the saving that results from the suggestion made over the year. We limit it to one year because we think no process, no method should be good for more than a year. We keep changing them all the time.

**Question:** How come other companies have not followed your plan?

**Answer:** What we have done is not the ultimate or anything close to the ultimate. Various kinds of incentive systems are used by companies—I think it runs into the thousands or more. The results vary. Some are extremely successful, some are less successful, and some have not succeeded at all. The difference is one thing. Do the workers involved want to do it? Do they want to work with management to reduce the cost and to make the operation more efficient? It's what goes on in the worker's mind that determines success or failure. The plan itself is of relatively small importance.

**Question:** Isn't your plan successful because of the high return it gives the workers?

**Answer:** I wouldn't know that because I don't know what salaries and wages are paid by other people. Sears Roebuck have had a very successful incentive program. They have achieved a very difficult thing with it. They are a large organization spread all over the world, and to be able to get an organization of that kind to work together as they have, I think, is a tremendous triumph. Thousands of other concerns have incentive programs which are more or less successful. The success of an incentive program depends upon the acceptance of the plan by the people involved. The various plans that have been used and the variation in the results achieved can very well be illustrated by what happens in marriage. Thirty per cent of all the marriages that will occur in Ohio, so I am told, this year will end in divorce. Seventy per cent of them will remain married. Now the marriage contract is the same for all of them. The difference is the acceptance of the responsibility that marriage means between the people that were married. If they accept the responsibility, it succeeds; if they do not accept the responsibility, it ends in divorce in very many cases. The same sort of thing is true in incentive programs. You have people working together for certain results. If they will accept the responsibility and all the people involved do the best they can, they can't help but succeed. If some of them back out on their responsibility, the success is likely to be entirely different.

**Question:** Mr. Lincoln, you have several plants. Are they all unionized?

**Answer:** None of them are. I think that we have that same acceptance of the program of building a better and better product for lower cost in all of them and the people in those companies do have that point of view and that desire. Success of the programs varies. I think we are more successful in Cleveland, perhaps, than we are in our other plants, but they are all successful. All plants are paying way above the going rate and they are all universally profitable. The people that are involved do accept the responsibility. I understand that in Australia we are the only company that is not unionized.

**Question:** To what aspect of your program do you attribute most in making it succeed?

**Answer:** In my estimation, it's management's job to organize the company in such a way that fear of lay-off disappears. Don't forget that the people responsible for the orders or for continuous operation are not laid off. The people who are not responsible for it are the ones who are laid off. Can you expect a worker to go along with that unfairness? Would you if you were in his place?

**Question:** What kind of incentives do you have in your foreign plants?

**Answer:** The same program. The amount of bonus which is paid in these foreign plants at the present time is not as high as it is in the United States plants. We have, since 1940, paid in bonuses more than the wages and salaries of all the people each year. That's not because we're giving them something for nothing. At the present time, we have reduced the man-hours per unit production by over 90 per cent.

Our output per individual worker, measured in dollars, is more than two and one-half times the average output of organizations like General Motors and General Electric. If our prices had gone up, as their prices did, we would be getting more than six times the productivity that they would be getting. We would sell six times as many dollars worth of product per year as they are selling, per individual worker.

**Question:** Don't you have trouble in getting acceptance of your incentive plan on the part of the workers when you start one?

**Answer:** Acceptance is a progressive thing. In other words, the enthusiasm and the feeling of responsibility that the workers have now is tremendously greater than when we started. The worker has the feeling, whenever you put in any kind of an incentive program, of "let's see what's going to happen." I think we had a fairly good belief in the management of the company from the start. Yet I am very sure that the acceptance of this program has been progressively greater as time passed. The feeling of responsibility to the organization has also been greater.

**Question:** Have you had much turnover?

**Answer:** Well, some of our key people have left. For instance, the president of Emerson Electric was our sales manager. We have a number of other people who left, but the turnover we have is less than 1/10 of that of industry generally.

**Question:** When are the bonuses paid?

**Answer:** They are paid once a year. They will be paid on the 8th of December this year.

**Question:** Who participates in the bonus?

**Answer:** Everybody, with the exception of myself and the president, shares in the bonus. The share is determined by rating everyone twice a year on the contribution which he or she has made to the success of the company for that period. On that rating each share in the bonus is determined. To illustrate it: if the bonus would be 100 per cent of wages and salaries and the person got \$5,000 a year as a salary, if his rating was 100 per cent, he'd get \$5,000 in bonus. If his rating was 90 per cent, he would get \$4,500. If his rating was 110 per cent, he would get \$5,500. This gives us competition between individuals and that I think is a very helpful thing.

**Question:** What was the average bonus for the last year?

**Answer:** Our total bonus consists not only of this money that is paid once a year to the men. We also have a retirement annuity, we have paid vacations, and a number of things of that kind. The total incentive bonus last year, including those so-called fringe benefits, was over 100 per cent of the wages and salaries.

**Question:** Was it all in cash or part of it deferred?

**Answer:** We pay most of it in cash. We also buy for our people retirement annuity, which is part of the bonus. That buys for each person 2 per cent of the wages each year if they retire at age 60. It would be about 30 or 40 per cent more than that if they stay on until the age 65. For instance, if a man has been there 25 years at age 60, if he retired at the age 60, he would get 50 per cent of his wages or salaries the rest of his life.

**Question:** How do you determine retirement age?

**Answer:** This is a matter of agreement between management and men. In general, when a man gets to the place where he is slowing up because of age, we can find some work for him if he desires. But in most cases, he wants to retire, because he's safe as far as his income is concerned.

**Question:** How do you rate the employees? Who rates them?

**Answer:** That would vary. In the case of the hourly worker, he is rated by four people: his foreman, time-setting man, his inspector and the production department. The rating would be on "What kind of a fellow is he? How much has he helped in finding more economical ways of doing the job? How accurate is his work? How much did he produce?"

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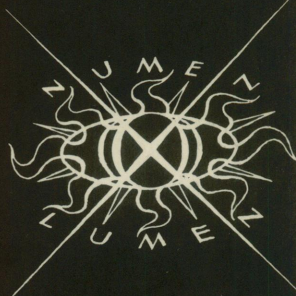
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