New Conception of Industrial Efficiency

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The New Conception of Industrial Efficiency*

By Louis D. Brandeis

As I look at the watch I feel a greater regret at the brevity of life than ever before; because there has been said by some of the speakers who preceded me so much that was not true, and so much that shows a failure to understand what scientific management is that I should like to enter upon such a statement of that science as would make it possible for every one of you to know what it means, and what it offers to this country; what the introduction of knowledge as opposed to ignorance offers to the great world of human industry. It means the opportunity to secure in a much-neglected field advances in production which would enable our people to satisfy those just demands of labor, the satisfaction of which is essential to the development of American civilization.

I am amazed to find a representative of organized labor as able and as enlightened as Mr. Duncan, taking, in ignorance of the principles of scientific management, the position which he has. It is a position which must necessarily rest, if it is to be taken literally, upon the proposition which belies everything upon which American prosperity rests, and which is necessary, and has been necessary for that prosperity which we enjoy. It is as if he said we can not make progress.

Isn't it a fact that the prosperity we have in America to-day comes not so much from illimitable, or so-called illimitable resources of America, as because we in America have advanced—or had until recently advanced—beyond all other people, in eliminating the waste of human labor? That is what we stand for. The prosperity of the South began with the cotton gin. The prosperity of the West lay not so much in her fertile fields as in her agricultural machinery, and in her transportation system, which enabled us to eliminate waste, to create a field for profit out of which we, and all of us, were able to get a living, better than was obtained in foreign countries. In our New England, and in parts of the East where manufacturing prevails, it has been our necessities, and not our resources that have been the sources of prosperity. It has been the necessities, the poor soil, which drove us to manufacturing, and high wages, fortunately,

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35
The Journal of Accountancy

which made us the Mother of Invention. Unfortunately that movement to invent, to save labor, was arrested. Why? Because of the illimitable resources of foreign labor. It was easier to tap the foreign labor supply than to think, and to work persistently upon the lines of saving labor.

Mr. Duncan speaks with joy of his knowledge of the building trade. I was reading the other day a poem with which I dare say many of you are familiar, a very recent poem by Rudyard Kipling on the bricklayer. It seems to me extremely apt in this connection.

I tell this tale, which is strictly true,
Just by way of convincing you,
How very little, since things were made,
Things have altered in the building trade.

A year ago, come the middle o' March,
We was building flats near the Marble Arch,
When a thin young man with coal black hair,
Came up to watch us working there.

Now there wasn't a trick in brick or stone
That this young man hadn't seen or known,
Nor there wasn't a tool from trowel to maul,
But this young man could use 'em all.

Then up and spoke the plumbers bold,
Which was laying the pipes for the hot and cold,
"Since you with us have made so free,
Will you kindly say what your name might be?"

The young man kindly answered them,
"It might be Lot, or Methusalem,
Or it might be Moses (a man I hate)
Whereas it is Pharaoh, surnamed, the Great.

"Your glazing is new, and your plumbing is strange,
But otherwise I perceive no change,
And in less than a month if you do as I bid,
I'd learn you to build me a pyramid."

Now, gentlemen, is that something to be proud of? Is it something to be proud of that bricks were laid, and in most countries are being laid, precisely as they were laid in the days of Pharaoh? No! Mr. Gilbreth, after he had studied Mr. Taylor, came to think whether the principle which Taylor had applied to the machine shop and other things could not be applied to
bricklaying. What did he do? He did just what Taylor had done. He put the mind of the scientist on to the operation. The great fundamental work of the scientist is to observe—observe and take nothing for granted. So Mr. Gilbreth, who is a bricklayer by trade, who fitted himself to that as he did to other branches of the building trade, began to dissect this operation of laying brick. He began at the beginning, and said, "What is the first thing I do?" Well, the first thing was to reach down to the floor or the scaffolding and pick up a brick; and it occurred to him, for the first time, although he had been in the building trade for nearly twenty-five years, that it was a fool thing for a man to bend down to the floor to pick up a brick. It took a good deal of effort. It took a good deal of time. He said to himself, "The thing for me to do is not to go down and pick up the brick, but to have that brick up where I am, and to have it where I can just reach out my hand and get it." He said it will save me a good deal of labor, and it will save me a good deal of time. So he invented a shelf—it was a very slight invention—he arranged that it could be screwed up from time to time by a boy who passed around, so that the brick would always be up at the hand of the man who has to lay it. He would simply have to stretch his hand out, instead of going through the athletic performance of picking it up off the ground. Then he said, "What is the next thing I do? I take that brick in my hand, and I take my trowel and test it two or three times. If it is not a good brick I take it and throw it down on the floor. I am up on the fifth or sixth story. Those bricks which have been painfully and expensively brought up to where I am are painfully carried down again. Wouldn't it be better to have only those bricks come up that are selected instead of being pitched on the hod, or raised by the derrick, and sent up without being tested?" He concluded that would be economic. Then he said, 'What is the next thing I do? I look that brick all over to get the face of that brick and to get it just right. Wouldn't it be better when that man down below is selecting the good brick, before it comes up to me, that he should put those bricks in a packet right side up, so that when they come up they will be delivered right side up, right on this shelf, right at hand. All I would have to do, I, the bricklayer, would be to take each brick, knowing that all bricks were sound, and knowing all were right side up, is to
lay it." Then when the time came when he was ready to lay it, he put it down on the wall; then he tapped it with the trowel again (that had always been done since the days of Pharaoh.) It occurred to him that perhaps that was not necessary. If the mortar was just of the right texture, the weight, the known weight of the brick, would be sufficient to press the mortar down to where it belonged. In that way, with some other changes, he found that the eighteen motions which were ordinarily involved in laying a brick could be reduced to six.

Now I want to ask you gentlemen whether that method of laying brick is not more in accord with the ideas of America, and the Twentieth Century, than the methods of Pharaoh.

What Mr. Gilbreth did with brick has been done in many other industries. It must be done in thousands and tens of thousands, and hundreds of thousands of operations, before we reach what? Before we reach a right way of doing things. And to learn the right way of doing we must do just what the scientists have always done, in all other fields. To observe! To study! To test! To look at every operation, and everything that exists with the eye of a skeptic, or the eye of a Missourian who wants to be shown! That is what he does. That is what Taylor did. That was the method which Taylor pursued. One of the first things he did everyone doubtless at this time is familiar with. He found out how to do the simple operation of loading pig iron from the yard into a railroad car. He increased the performance of the individual man from twelve and a half tons up to about forty-seven tons. Did he do it by speeding up? Not at all! He did it by precisely the same methods as are pursued in the careful training of a man to do any work. He found out how to do it. He found out the laws that govern it. He gave careful thought to the individual. He said that this man who picks up the pig iron and carries it into that car, if he doesn't know how to do it best, will be just like the man on the college crew who wears himself out when he gets into the boat. There is some speed which is the best speed for that man to go. So fast, and no faster. There is a certain period that man ought to rest in order that he can work the full eight hours or nine hours in the day. There is a certain angle which is the best angle for that man to walk up the inclined plane from the yard into the car. By studying those things he finds out there are
The New Conception of Industrial Efficiency

laws, there is a science, in much that has heretofore been regarded as unskilled and unscientific. The great aim of scientific management is to establish that there is to be nothing unskilled—not that is not to be worked out, as scientists are working out for us day after day the problems in other departments of human activity.

If Mr. Duncan and his friends would come to understand what scientific management means, he would see how important it is to the working man, and to us, because we and they are all together. Mr. Fagan talked as if the railroads were opposed to this idea of efficiency. Mr. Willard’s letter shows you that is not the fact. What say you to this as a proposition? “Let things be cheap, and men and women and children more valuable. Let there be more abundance for the many. In this principle of efficiency is bound up the welfare of our race.” That, gentlemen, is a quotation. Those words were spoken within a fortnight, in this city, by Frank Trumbull, Chairman of the Board of Directors of the Chesapeake & Ohio Railroad, three weeks after the decision of the Interstate Commerce Commission denying the advances in freight rates which the railroads of the country had sought. Isn’t that a platform on which every man and woman here can stand? Isn’t that the only platform upon which we should stand? Isn’t waste sinful, however it may come?

In whatever quarrel, whatever controversy there may be between organized labor and employers, I think Mr. Duncan well knows that I have stood, and stand, strongly for organized labor. Isn’t that so, Mr. Duncan? (Mr. DUNCAN: That is true.) Those controversies exist, and should exist, because both sides of every problem of every kind should be represented, but in those controversies, the controversies should be how shall profit be shared between employer and employee and community—not whether there shall be gain. Every economy is gain, and the only question that can arise properly whether it be with organized or unorganized labor, is whether the gain which is being made is being properly divided among all who are interested in it. I say, therefore, when these engineers point out methods of saving and they have pointed out extraordinary instances, the possibility ought not to be carped at. We have not made the successes we have in America through the pessimist. We have not made the successes by men showing us what we could not do.
is by men showing us what we can do. All deeds that were dreamed of have been done; but deeds that were never dreamed of will yet be done.

We cannot satisfy the demands of American Democracy until we have eliminated a large part of the waste which now exists. The talk this evening has been as if that waste lay wholly in what is here spoken of as efficiency or inefficiency of labor. That tells a very small part of the story. There is a very large part of this possible saving that organized labor or any tenet of organized labor cannot possibly be opposed to. Take this illustration from the railroad world. Last year, less than a year ago, the superintendent of motive power of the Erie Railroad, Mr. Hayes, pointed out at a meeting of his associates what might be done in the saving of fuel. He showed the tests which he had made upon his own railroad in the operation of a particular engine, and on a particular division, by the same fireman and engineer in two successive hours. In the first hour that fireman and engineer were operating that engine without any special care as to the consumption of fuel. In the second hour a trained man got upon that engine with them and saw to it that they operated the engine, and stoked the fire as it should be stoked. The result was, as Mr. Hayes pointed out, that although the work actually done in the second hour was greater than in the first hour, the consumption of coal was only one third of what it was in the first hour. All that extraordinary saving resulted from knowledge and care.

Does Mr. Duncan or does any man believe that it is better to go on in the old way allowing the men to waste that fuel instead of seeing to it that the men who fire that engine and who run it should have some regard for the laws of combustion, and the laws of economy? Fuel in this country costs the railroads Two Hundred Millions of Dollars per year. Probably from one fourth to one half of that fuel could be saved simply by securing from the men—in the first place giving the men knowledge, and in the next place inducing them through some proper incentive—to save instead of to waste that fuel. In one of my arguments I referred to Mr. Hayes's testimony in regard to what he found to be possible. That was an argument before the Interstate Commerce Commission. A few days afterward I received a letter from a man who had formerly been a fireman,
The New Conception of Industrial Efficiency

and who had formerly been an engineer, who told this story. He said, "When I went onto an engine as fireman, I was a weak boy, but I needed that money, and I wanted it, and I went there; but it was an awful job for me to do all that shoveling. I began to think whether or not it was necessary. I began to think, too, that that engineer was putting a good deal of work on me that he oughtn't to. I thought I found out a few things about firing an engine, and I made up my mind that when I became an engineer I should not work my fireman as I had been worked." Later that man became an engineer and it was discovered three years after he had been in that position that on his engine he saved forty tons of fuel a month as against those around him. He says that in all the years that he was there as a fireman and as an engineer, and until this discovery was made at that late day, he had never heard one man suggest to him that coal was something to be saved, and but for that experience and that study which he individually made, with a view to saving himself labor, he never would have known how to save coal. It has been said by the efficient engineers that scientific management, that the study of these problems would give joy to work, but Mr. Duncan here scoffs at the idea that a man can get joy from his work in any such proceeding. I want to read you a few lines from a letter which that fireman and engineer wrote to me. He says this: "Through my four years and one half of firing experience, and my first three years as locomotive engineer, I remained in ignorance of the principle underlying the generation of heat by combustion of coal, and the formation of steam, and its economical use. Then came an awakening of intelligence through study of the cycle of operations involved in the process of turning heat into work through a steam engine. I found the awakening of myself the most delightful experience in my life, and I have always believed that it must be more or less delightful to every normal man properly interested in his work, to learn not only the best methods of doing, but the science which makes clear the reason why such methods are the best. No man can be made perfect in his work until he has had this full knowledge, imbibed with the sincere desire to improve his methods to perfection. So I am glad that your argument included an appeal for the proper education of the men in railroad service, for their own good, for their own happiness, and thus contribute to the welfare of the country."
The Journal of Accountancy

Now I ask you whether that engineer and fireman is not a truer American, and does not hold up a higher ideal for his fellow workmen than the man who comes and tells you, "We know it all. We will not listen to advance. What we do not know is not worth knowing." I ask you, gentlemen in business, and in manufacturing, whether the thing you do not know is not just the thing that is worth knowing?

I sympathize absolutely with the apprehension of Mr. Duncan, and his associates. I believe that we have in this country a situation which presents much that we can be proud of, much that we must be ashamed of. The richest country of the world, the country of greatest opportunity has in it horrible conditions, in very many places, and in very many trades—excessive hours, insufficient wages, conditions dangerous to life and health, and conditions which would be infinitely worse if it were not for labor's steady and progressive fight through the labor unions. But while the unions have done and are doing a great work, they stand not only in their own light, but in our light, and in the light of the democracy and the advance of the world, if they undertake to block the introduction of science in business.

Mr. Duncan closes with the suggestion "What more, what better could be done than to undertake to make work regular, instead of sporadic." I agree with him. Of all the disadvantages under which labor suffers, of all the chaos in industry to-day, there is nothing which in its results is as deplorable and as disgraceful as irregularity of work; and the first task, the great effort of all scientific management must be to make work regular.

In one business, one business with which I became very familiar, where the principles of scientific management were introduced, that was the great aim to which they directed themselves, and it led to all the rest. It produced from an irregularity comparable to that which Mr. Duncan spoke of; of two hundred working days in the year, a regularity where the actual working days ran up to the three hundred working days which Mr. Duncan desired. That was by virtue of planning; by virtue of introducing into every department of that business careful thought, the best effort that could be had, to devise what everybody must see is desirable, that there should be no waste. What waste is comparable to the waste that brings the pain and demoralization of men dismissed and thrown into the street to "kill time" as
The New Conception of Industrial Efficiency

best they may until again in the chaotic condition of that business there is a demand for a great number, and they run overtime!

But this attitude which Mr. Duncan shows, and in which organized labor approaches this plan, saying, "You sha'n't do that; you shall proceed as you have proceeded," is the opposite to what we strive for. We should pick out every defect, whether it be irregularity, or waste, or whether it be overtime, or any one of a thousand other defects, and let the mind of man dwell on it, not in the sense of despair, like Mr. Fagan, but in the same view in which everything has been accomplished—with a sense of hope and certainty that the future has in it things better than the present, that same hope which created and has given us the great railroads which cross the continent to the Pacific. What we need is that. We need the open mind, as well as courage. We need patience. It will take a great deal of patience to deal with the individual. It will take a great deal of time to bring about these changes, and the work will never be done, as the work of inventing machinery is not done, and we hope never will be done. But for us, the thing for us to do now is to enter upon it. The thing for organized labor to do is not to stand in the way of the employer, the railroad manager, or the manager of the factory, but to join with him, saying, "We will economize, we will aid you in every conceivable way; but we will use that force, that power which organized labor has, to see to it that we get a fair share as the community shall get a fair share, and as the employer shall get a fair share, by each of us striving, putting before each of the others, the right view, or what seems to us right, what seems to us fair, and thus we shall attain as near to justice as it is possible to attain in this imperfect world."