

If one plant has scientific management and the competitive plant does not have it, the whole industry is affected, and whether you like it or not, the thing becomes a question of economics—not only of local economics or national economics, but of world economics.

It is a condition and not a theory that confronts us, and I say that the more discussion there is, not necessarily on the vague aspects of the thing, but on the concrete aspects of the application of scientific management, the better it will be.

I want to give you just two examples, in closing, of how business has neglected to manage, as we would say, in a scientific manner. I have in mind one particular organization that has been in a family for a good many years. They have had a policy something like this: They would run the factory at full tilt, and at the end of the year hold an auction sale to sell off all the stuff they had not sold in the meantime. That was a fine idea as long as it worked, but it brought about a condition of competition, and competition forced this family organization to see what was the matter with itself.

I had the privilege of going into that office where I found the most ridiculous sort of things. They had no idea whatsoever of management. They knew how to make their product, but they did not know how to make it economically, they did not know how to market it economically, nor did they know how to control it from the administrative standpoint.

There could be no installing in that organization! I have been working there a year and I have not done a single concrete thing. I believe I have spread a lot of knowledge on what ought to be done and am gradually building up a consciousness of their situation.

Another example is an organization which has installed almost everything you can think of. They have installed incentive wage payment all through the organization. They spent some twenty or thirty thousand dollars in setting the rates, which are high in dozens of places because there is no proper flow of work.

They have a cost system but they have no costs; they have a planning department but it plans nothing; they have a statistical department with the most modern statistical machinery and they do not have a single report or a control record that is worth looking at.

I believe that we must be very careful about that word installation, and I am not referring now to Mr. Hathaway in particular. We must always talk about

development because, although the Taylor Society has been in existence for twenty years, and although the members of the Taylor Society have done everything they can to develop and spread the knowledge of scientific management, yet we are in one of the worst depressions that has ever been known. Any man of thinking ability will see that this condition could not have existed if all of the principles of scientific management had been carried out.

**King Hathaway.** As the attacked party, I would like to say about three words. First, I will amend wherever I unfortunately used it, the word "installation" to read "development and application." As a matter of fact in anything that I have written on the subject in recent years I have used the word development.

Also if any of you want to make sure that Leffingwell is right in what he said there, want to check up on him, and will go back in the files of the Engineering Magazine to about 1908, you will find an article that I wrote under the title, "The Spirit in Which Scientific Management Should Be Approached." Later, in Thompson's compilation of articles and papers, the title was changed to "Prerequisites to the Introduction of Scientific Management." These prove that there is nothing Leffingwell said that I do not heartily endorse. While Taylor did say that "this list of things is not scientific management," and while Taylor, in the latter years of his life, was wont to emphasize the principles and minimize the mechanism of scientific management, nevertheless, any of you who have had experience, as Leffingwell, Gus Schulz, Joe Carlin and various others in this room have had, in attempting to apply the principles of scientific management in practice, will know that mechanisms or technique are essential to the consistent, continuous and most effective application of those principles; that merely an acceptance of the principles of scientific management, or of the spirit of scientific management, does not make it effective. You must have mechanism; you must have system.

It is the lack of understanding of what is involved in the development of a system of scientific management, or a means of applying scientific management, which is, I think, in large measure responsible for the imperfect applications of scientific management, criticized in my discussion. I do hope that Mr. Clark will bring out the papers I asked for, covering the technique to guide others who may want to follow in his path and prevent their making mistakes.

**G. E. Schulz.**<sup>7</sup> I think we should be careful in changing standards that no change is made except to accomplish real improvement. From working with young engineers I know their tendency to change things continuously.

The bad effects of such things as time studies and rates which are not scientifically worked out are also worth emphasizing. I know of a firm similar to the one described by Mr. Leffingwell where the unscientific setting of piece rates completely destroyed good work that had been done in the organization over a period of years and broke down the spirit of the place. What managers need today is a concept of organization as a whole and the Taylor Society can do much to help them acquire it.

**Sanford E. Thompson.**<sup>8</sup> I am glad to see a tendency to revive the old scraps we used to have in the Taylor Society.

I am going one step farther and disagree with both Mr. Hathaway and Mr. Leffingwell. I feel they did not go far enough.

The remark was made that scientific management could have prevented the depression. I feel that if all of the manufacturing establishments in the country had been operating under scientific methods of management, we should still have had the depression because its causes go beyond those involved in industrial establishments. Scientific management in industry might have prevented the depression of 1921 but not that of 1930. In order to prevent such a depression it would have been necessary to extend scientific methods of management beyond the factory establishment into banking and finance and some of the broader problems of business economics.

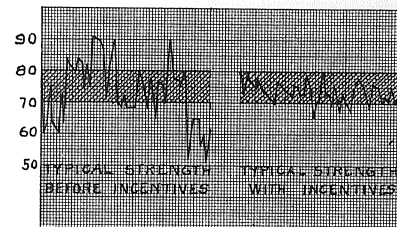
Nevertheless, I do feel that our fundamental prosperity—the prosperity that we have been enjoying until the present slump—is dependent upon our production, or the amount of product that we turn out per man in this country as compared with that in other countries.

Mr. Hathaway spoke of the pulp and paper mills with which Mr. Taylor and I were associated. In recent developments in this industry, we have gone much farther since that time. The general principles employed in this type of industry are quite different from those in industries like a machine shop, where there

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are separate operations. In a continuous manufacturing process, such as paper making or in a chemical process like cooking pulp, it is maintenance of standards of quality and not quantity that must be emphasized. For example, in fixing incentives in the cooking of wood pulp, which is the most important operation in pulp making, we do not say that we will pay a certain rate for a definite amount of production. Instead, we fix definite standards, teach the operators how to attain them and then pay an incentive for keeping within the required limits.



The diagram shows the actual variation in tested strength of pulp from consecutive cooks of wood. The standard strength is between seventy and eighty pounds per square inch of a hand-made sample. Note the remarkable effect of the standardization with incentive for maintaining this as shown at the right of the diagram. This permitted the manufacture, from this pulp, of a paper of high uniform quality which increased its value by many tens of thousands of dollars per year.

Similarly, in a paper mill we set up very careful standard limits of moisture, strength, thickness, moisture content and formation, and give an incentive for achieving these standards. The result in improved uniformity in quality of the paper and in the saving of material is remarkable.

In setting such incentives one must take into account all of the group of men responsible for meeting the standards. In paper making these are not only the men on the paper machines but the men on the beating engines who are responsible for freeness and consistency, which in turn influence the quality of the paper.