

My own experience in this comprises mostly change, modification, revision; and, like the rules of French grammar, standards and rules are stabilizing even if the majority of applications are in the exception. It is in management for profit, the most important point in Mr. Clark's paper, that the exceptions are most interesting.

Consider seriously, then, first, the stability of standards and next the variations, set by policy or personal judgment, that shall be related to the established standards but, due to current conditions, are of a special interest to management for profit.

The most stable standards are those which are set by exact science and those which occur in dimensions and forms, established as a result of study and research. The variations more often occur in operating standards, which are essentially "dynamic" as compared with the relatively "static" conditions of established facts or axiomatic premises. Notice that standards controlled by equipment, too, are easier to maintain than standards for personal attainment and, in management for profit, my first observation would be that equipment facilities are more easily managed and controlled than human abilities.

In material inventory, the maximum and minimum quantities previously set would hardly apply under the exaggerated conditions of a boom market, or under the very depleted conditions of the present time. It is in a great many instances good business to reduce the minimum for inventory under present, existing production conditions.

Performance standards are subject to a multitude of influences that vary from the weather to ivory, and aside from controllable factors and measurable losses that may be discovered, there is even yet a great amount of wisdom required in applying them judiciously under the alterations of methods that may be required by fluctuating volume. In other words, the formula for economic lot sizes develops new factors of importance with each swing of production.

When such swings are in process, there is another factor brought out by Mr. Clark to which more than nominal interest should be granted, and that is the relation of non-productive to productive labor under conditions at either end of the scale.

Having indicated such thoughts to you, I am sure that before this audience it is not necessary to carry them in further detail of thinking on my own part, but to offer them to you now for further discussion. Mr. Clark states that standards are not an end, but

a means to an end; and I would carry it one step farther, in a paraphrase, and state that "of their setting there shall be no end." They are found, therefore, in varying degrees of stability, in varying degrees of relation to the exact performance that might be expected under certain given conditions. Therefore, in management for profit, I consider them a most valuable guide. "Moreover, by them is Thy servant warned, and in keeping of them, there is great reward."

H. S. Person.³ I should like to raise the question whether it is not better psychology to consider a given standard as fixed for a given set of conditions rather than to consider it a guide for guessing variability of new conditions. Should not every new set of conditions give rise to a new standard reflecting these new conditions?

For example, in determining maximum and minimum inventories, volume of production and time of procurement are the important elements. As long as these two remain the same the standard of maximum and minimum inventories should remain the same. When either changes, should not a new standard be computed rather than a guess made as to the variation from the old standard?

King Hathaway.⁴ During most of this week at meetings of the A.S.M.E. and the Taylor Society I have been listening to papers and discussion dealing with the economic problems with which the world is struggling. While I should hesitate to question the importance of such papers I must confess that they have left me feeling rather helpless, hopeless and befuddled. It has seemed to me that we are striving to deal with factors so numerous, so intangible, so widespread and so complex as to place them beyond our understanding or control and that in doing so our attention has been distracted from factors which are tangible, understandable and within the control of the engineer and manager.

It is refreshing, therefore, to hear and discuss a paper dealing with so concrete a subject as the application of scientific management in a specific industry to which, so far as I know, a complete and thorough application had not before been made. While an application may not be of much help in ending the present depression, in my estimation, such applications, if they

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were more general, would contribute greatly to the prevention of future depressions or render them less severe.

Let me here quote a statement of Taylor:⁵

"No system of management, no single expedient within the control of any man or any set of men can insure continuous prosperity to either workmen or employers. Prosperity depends upon so many factors entirely beyond the control of any one set of men, any state, or even any one country, that certain periods will inevitably come when both sides must suffer, more or less. It is claimed, however, that under scientific management the intermediate periods will be far more prosperous, far happier, and more free from discord and dissension. And also, that the periods will be fewer, shorter and the suffering less."

Our retiring president, Mr. Henry P. Kendall, in his talk last night made the statement that there are many ways in which industry can help itself. I think we may all agree that had the management of our country's industries exercised more prudence and foresight and been governed in its actions more by facts than by hunch or emotion, we should be better off today. And is not a well-worked-out system of scientific management, with its properly established standards and the control that it affords, an almost indispensable tool if industry is to avoid its share of the costly errors that contribute to economic maladjustment?

Mr. Clark very modestly states that his paper presents nothing new. In general this is true; his approach to the problem and his manner of dealing with it are classic. They are the same as those followed by Taylor, Barth, Gantt and the rest of us who were associated with Taylor and have attempted to follow in his footsteps. Nevertheless, those who have gone through the trials and tribulations of working out and putting into practice an application of scientific management in a field where there is little of precedent to fall back on will appreciate the magnitude of his task and regard him as a pioneer.

He has used the term "standards" in the title and body of his paper in a broader sense than we have generally accorded it in scientific management, but his doing so only serves to emphasize the fact that without standards we cannot have true scientific management. His paper deals not only with the development and establishment of standards but outlines the plan

⁵Taylor, Frederick Winslow, "The Principles of Scientific Management," Harper & Brothers, New York, 1919.

of organization, management technique and mechanisms essential to their effective use in the running of a business.

There have been applications of the Taylor technique and principles in industries which, while differing widely in the nature of product, are from the standpoint of organization and management similar to that described by Mr. Clark. The first of these was Taylor's own application, in the early nineties, in paper-pulp mills. About five years ago I worked out an application for a company engaged in packing dried fruits whose processes presented in a great measure problems similar to those with which Mr. Clark is dealing. Unfortunately, however, there is no available record of these more or less comparable installations.

Industries seem to group themselves not so much by character of products as by similarities in the nature of their processes. While it is true that in no two plants, even in the same line of industry, may the mechanism or system for the application of scientific management be identical in all its detail, there does seem to be for each group or class of industries a basic type of mechanism. A plan of organization, a system and a technique which have proved satisfactory in one concern in a given class of industry, to use as a base and modify to suit the needs of a new application within the same class, are of great assistance.

The literature dealing with the means through which scientific management may most successfully be applied is meager and deals mostly with its application to a single class of industries, with some variation within that class. The successful application of the principles of scientific management and the successful use of standards is, as Taylor realized, dependent upon organization and properly articulated mechanism.

Unfortunately today we have too little to guide us in the way of good examples of true-to-form, thoroughgoing and comprehensive applications of scientific management, such as would have been approved by Taylor. There has been widespread application of Taylor's teachings but in so diluted, so incomplete and so superficial a manner as to fall far short of the possible results. Apart from the mass-production industries I feel safe in saying that production with the same plant and personnel could be increased, in a great majority of plants, from fifty to seventy-five per cent, or a corresponding saving in cost effected, through such complete and painstaking application as that dealt with in Mr. Clark's paper.

Taylor's prediction that the adoption of scientific