

Methods Study¹

The Principles and Technique of Analyzing Work Methods

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I. Introduction

Objects of Paper—Historical Basis of Motion Study

IN PRESENTING this paper my objects are:

1. To define the fundamental principles involved in the study and analysis of methods of doing work, which Taylor and his associates designated inadequately, and I believe unwisely, by the simple expression "elementary time study."

2. To review and summarize the history and development of methods-study technique and to point out what appear, in some present practice, to be inconsistencies or violations of principle which may reduce its value and lead to difficulties.

3. To indicate phases of methods study, and the utilization of the results, in which research work is needed.

4. To contribute to building up synthetically a technique which may serve as a tentative standard. This should embody that existing practice which is not inconsistent with fundamental principles.

Before 1916 literature on this subject was quite meager. It consisted chiefly of Taylor's paper entitled "A Piece-Rate System," presented before the A. S. M. E. in 1895, Gantt's paper "A Bonus System for Rewarding Labor," presented before the A. S. M. E. in 1901, and Taylor's classic "Shop Management," presented before the same society in 1903.

Anyone interested in any branch of scientific management, and particularly those actively engaged in this branch, may derive profit from a discriminating reading or rereading of these three papers. Taylor's paper, "A Piece-Rate System," based solely upon his Midvale experience, and Gantt's paper, "A Bonus System for Rewarding Labor," which included experience gained during another six years, both directed

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attention by their titles to incentive wage systems embodying the same basic idea. They made what was actually of far greater importance—analysis of work and the determination of tasks, with all they involved—seem of secondary importance. In "Shop Management" Taylor made an attempt to correct this by a broader discussion of the art of management. He also more fully described there the technique of time study as it then existed.

In retrospect, it is obvious that it would have been better had Taylor and Gantt each presented two separate and distinct papers, one dealing with the study and analysis of shop operations, methods and conditions related thereto, and the manner in which the results of such studies were used in the setting of tasks, and the other dealing with the novel system evolved by the particular author of rewarding labor for the accomplishment of tasks, based upon the results of elementary time study.

A casual reading of these papers, especially by the uninitiated, gives the impression that "elementary time study" or "the study of unit times" was undertaken not so much with the primary motive of increasing production through improvement in method as with the object of ascertaining scientifically what a "first-class" man, working at his best speed with the then prevailing method, could do. Increase in production apparently was to be attained largely by greater effort of the worker. This seeming emphasis upon the willingness of the worker to put forth unusual effort, i. e., to work hard rather than hold back or soldier, upon his responsibility for attaining a high rate of production, and upon the exercise of his initiative, led Taylor's contemporaries to regard these things as of major importance. This is understandable when we consider that, even at that time, craft knowledge and skill were considered the property of the worker, his stock in trade. They were in general regarded as no

concern of those in higher managerial positions. Engineers in common with managers shared largely in this viewpoint. Such statements as the following from Taylor's "A Piece-Rate System" show that, while he had cut loose from the old viewpoint and practices of management, he was still in a great measure influenced by prevailing conditions and ideas: "As soon as the men recognize that they have free scope for their proper ambition, that as they work harder and better their wages are from time to time increased. . ."; "That the workmen in nearly every trade can and will materially increase their present output per day, providing they are assured of a permanent and larger return for their time than they have heretofore received." And in replying to discussion by Mr. F. A. Halsey, who by the way, wisely pointed out that the superiority of Mr. Taylor's system over piece work lay "not in the advancing piece rate but in the method of fixing rates," Taylor said: "It is quite true that under the differential rate the workmen earn higher wages than under other systems, but it is not that they get a higher price per piece but because they work much harder, because they feel that they can let themselves out to the fullest extent without going against their own interest in the long run." This emphasis on the worker's part in increasing production was further heightened by Taylor's references to "soldiering," then a very real obstacle to industrial progress but understandable and excusable today when one considers that "soldiering" had its roots in many basically unsound economic theories growing mainly out of a fear, based on experience, of unemployment. Soldiering was not primarily due to laziness or unwillingness to do a proper day's work under more satisfactory conditions. The injustices of ordinary piece work as then practiced, and even in some cases as practiced today, were a justifiable excuse for "soldiering"—as was also bad management generally.

Such statements as I have quoted, together with the frequent reference to "rate fixing," had the effect of obscuring other matters which, in the light of present-day experience, are of predominant importance. Nevertheless, these other matters were not neglected, as will be evident to anyone who looks for them. I refer particularly to improvement in method or prevailing practice, resulting from improvement and standardization of equipment, of materials and conditions, and of service by others to the worker. In the absence of such improvements the most skillful and willing employe could not have attained what Taylor referred

to as "maximum production" or what elementary time study established as a standard. For example, in "Shop Management," the following significant statement, referring to work at Bethlehem, appears: "In almost all of the other more complicated cases, the large increase in output is due partly to physical changes, either in the machines or small tools and appliances, which a preliminary time study almost always shows to be necessary. . . ." I recall also hearing Taylor talk of the "art of shoveling," developed at Bethlehem as a consequence of studies which resulted in his having special shovels made, each of an appropriate shape and size, to hold a quantity weighing twenty-one and one-half pounds of materials such as coal, coke, limestone, cinders and shavings. I have seen him illustrate, as he described it, the right method of shoveling. He made the most effective use of the worker's strength with a minimum of fatigue, showed the need for and effect of rest periods, and used an iron plate to facilitate filling the shovel. In unloading cars, the coal or similar materials were slid or pulled across this plate.

As we progress it becomes increasingly evident that studies undertaken for the purpose of increasing production may have more to do with physical things and with service to the worker than with the worker's own effort. The method adopted and the results attained are often governed by and dependent upon conditions over which the worker has little or no control. And this may involve conditions or activities seemingly remote or dissociated from the operation under consideration. Typical of this is the development of a standard practice and system of maintenance in the transmission of power by leather belting, described by Taylor in his paper "Notes on Belting," presented before the A. S. M. E. The influence of time study upon conditions which are beyond the worker's control, but which nevertheless govern or influence both the method to be followed and the results of the worker's effort, was clearly indicated by such statements by Taylor as the following:²

. . . not the least of the benefits of elementary rate fixing are the indirect results.

The careful study of the capabilities of the machines . . . almost invariably results in first indicating and then correcting the defects in their design, and in the method of running and caring for them. . . . They (The Midvale Steel Company) have themselves been obliged to superintend the design of many special tools which would not have been thought of had it not been for elementary rate fixing.

²Taylor, F. W., "A Piece-Rate System," *Transactions of the American Society of Mechanical Engineers*, Vol. XVI, 1895, pp. 877, 881, 895.