

matter of entirely subordinate detail . . . there is not one who uses the same methods in any two successive establishments," he wrote to a friend.<sup>8</sup> Briefly, this mental attitude involves "the substitution of exact scientific investigation and knowledge for the old individual judgment or opinion, either of the workman or the boss";<sup>9</sup> and "the substitution of peace for war, . . . of hearty brotherly co-operation for contention and strife; of both pulling hard in the same direction instead of pulling apart; of replacing suspicious watchfulness with mutual confidence."<sup>10</sup>

But the manner in which a mental attitude expresses itself in conduct is hardly less important than the attitude. Although the practices of scientific management may vary according to their adaptation to particular circumstances, nevertheless, if the attitude is definite and consistent, there must be a permanent nucleus of practice which reflects the consistent attitude. Considering both mental attitude and practice, and looking back from 1928 over forty-eight years of its development, scientific management may be restated as involving:

1. The discovery by investigation and experiment of a factual basis for every determination of policy, program, product, material, machine, tool and method in the operations of an enterprise;

2. A system of control of operations, determined by research and experiment, which brings individual specialized efforts into co-ordination with the result of a minimum expenditure of the human and material energies involved;

3. Both research and procedures which, although in design and application chiefly the work of specialists, must be open, reasonable, just, acceptable to all individuals concerned, and expressive of a common purpose and good will.<sup>11</sup>

It is obvious to one experienced in human affairs, and particularly in enterprises in which many types of individuality must join in common effort, that here is not an inflexible system of procedures which can be bought and installed like a boiler or a loom; that on the contrary here is something of an organic nature which, although conceived and guided by an outstanding leadership, grows out of a harmony of

<sup>8</sup>Op. cit. 11, p. 309.

<sup>9</sup>Ibid. I, p. 12.

<sup>10</sup>Ibid. I, p. 11.

<sup>11</sup>For a picture of an outstanding case of scientific management, see the description of Kendall Mills Incorporated, a group of seven cotton textile plants, in *Bulletin of the Taylor Society*, Vol. XII, No. 6, December, 1927.

desires and understandings within the group. That is one reason why there are so few complete developments of scientific management even though American industry generally has been profoundly influenced by its spirit and has come to utilize many of its mechanisms. In the first place, there are too few managers of vision, leadership and energy who do not require the compulsion of circumstances to undertake the patient development of something new; in the second place, because of natural basic conditions of prosperity, there has not been any general serious urge toward ideals and methods marking a radical departure from opportunism. The urge for a consistent and well rounded development of scientific management, as distinguished from unconscious influence of its spirit and conscious appropriation of some of its waste saving mechanisms, has been felt chiefly by those rare leaders who are capable of response to ideals of perfection in technical accomplishment and in human relations.

Another reason is that the American executive has not taken to doctrines, theories or systems. A doctrine or a system consists of an integrated group of detailed beliefs or practices, many of which may be held or practised by individuals who do not accept or even are not informed concerning the doctrine or the system as a whole. The American industrialist has lived in a period of opportunism, has been concerned chiefly with dynamic problems of frontier industry, and has been engaged in doing things rather than in reading and thinking about things. Doctrines and systems do not excite his interest; in fact, a new doctrine or system is likely at first to invite rejection without serious consideration, although in time it may have great influence if it has integrity and vigor. The planning room, for instance, is now common in American plants, and the concept of high wages and low labor costs now has considerable vogue; yet many do not know that the mechanism came from Taylor, and that in the introduction to "Shop Management" he said: "This book is written mainly with the object of advocating high wages and low labor cost as the foundation of the best management."

Appraisal of the influence of a movement is a matter of historical research, analysis and judgment. One who searches the literature of American management since its beginning will find abundant evidence that the aims, principles and procedures first presented by Taylor have, like the

ripples of a stone cast into a pool, spread out into American industry, although many a management of 1928 may not know the source of that which it believes or practises.

In addition to such direct and indirect influence of scientific management, it should be noted that its influence has been enlarged and extended by supplementary forces of independent origin. Those who have made research and experiment the basis of the pursuit of their special interest in management—whether in human relations, merchandising or general administration—have found themselves developing techniques and expressing philosophies essentially identical with the technique and philosophy expressed by Taylor nearly half a century ago. Even the very recent developments of psychology in the field of management are more closely related to Taylor's early empirical studies of fatigue in shoveling, handling pig iron and inspecting balls for ball bearings, than to the introspective psychology which was contemporary with Taylor. He had a vision of such things. Asked why he had not turned attention to scientific management in other phases of management than production, he replied that life was too short, that the best he could do was to make a thorough demonstration in the field of production management, leaving to others the problem of carrying the development into other fields.<sup>12</sup>

The phenomena of mechanization and mass production, so characteristic of American industry during the past quarter century, and so economical in the production of large quantities of identical items, should not be confused with scientific management. Scientific management and mass production may coincide, but they are not the same thing. Where they are found together the results are noteworthy; but frequently where mass production and a high degree of mechanization dominate a scene, scientific management is not found. Mass production has its origin in large markets, a huge volume of orders, standardized products, and the possibility of economical fabrication by means of a steady flow of materials through single purpose machines and highly specialized workers; and these factors are not infrequently accompanied by some degree of monopoly advantage. If such is the case—and there are such cases—the enterprise may be highly

<sup>12</sup>*Bulletin of the Taylor Society*, Vol. IX, No. 2, April, 1926, p. 55.

successful by pursuing lines of least resistance which do not include scientific management.

In contrast to mass production, scientific management had its origin in and is to be found today chiefly in small and medium sized plants making variable items, or standard items variable as to detailed characteristics, on multiple purpose machines which require human regulation and attention as work varies. While mass production makes its gains almost entirely by the economies of a ceaseless flow of material through specialized machines, scientific management makes its gains chiefly by eliminating the wastes of misapplied human effort, misused materials, and lack of co-ordination of efforts where variability is present. Both mass production and scientific management use equipment which is scientifically designed; but scientific management is a management which is itself scientifically designed. Management is necessarily a matter of study and design in plants making variable products in varying volume on variable machines, for in such plants numerous wastes or maladjustments are possible.

In the United States there is great variety as to size<sup>13</sup> of plants, nature of the processing—continuous, intermittent or variable—and as to the kind and quality of management. The numerical proportion of large mass production establishments is small, but the proportion of workers which they

<sup>13</sup>The literature of management has so featured interesting cases of mass production that many students in other countries than the United States have received the impression that American industry is made up of "Fords." The following data will be enlightening. Of establishments having an annual product of more than \$5000 the distribution in 1925 was as follows (Statistical Abstract of the United States, 1925):

Classes by Value of Product	Per cent of Establishments	Per cent of Workers	Per cent of Total Product
\$1000000 and over*	5.6	56.8	67.6
\$500000 to \$1000000	5.2	13.5	11.0
\$100000 to \$500000	22.5	20.0	15.3
\$20000 to \$100000	36.8	7.9	5.2
\$5000 to \$20000	29.8	1.9	1.0

And from the United States Census of 1919—

Classes by Number of Wage Earners	Per cent of Establishments	Per cent of Workers
1 to 5 wage earners	56.2	3.3
6 to 20 wage earners	22.2	6.8
21 to 50 wage earners	10.0	8.9
51 to 100 wage earners	4.9	9.6
101 to 250 wage earners	3.9	17.3
251 to 500 wage earners	1.4	13.7
501 to 1000 wage earners	.6	13.2
Over 1000 wage earners*	.4	26.2

\*The enterprises which an American would classify as particularly representative of mass production are to be found in the upper strata of those classes identified by an asterisk.