of systematic and fundamental methods, in the solution of a great many complicated questions which the management of industry entails, few have succeeded to date. The possibility of being able to employ definite, standard functions of industrial management in all branches of industry has remained as good as unknown. Empirical initiative is still triumphant all along the line, and the methods of managing concerns even today border in most cases on the mediaeval.

We must not forget that the government, because of the critical condition of industry, has been very active in promoting economical production. However, economical production, which is everywhere sought for, is quite a different thing from economical management. Almost anything can be done with excellent machines, good tools, well-designed means of transportation, wage-saving time studies—a moderate amount of managerial mechanisms—but to combine all these elements in a predetermined, systematized method of operating, to inject forcefully and continually into the stream of directed energies that vigor, devotion and zeal of the general management which is so necessary for the best results—to this few outside of the Taylor school have given attention.

Nevertheless, it is infinitely more important to be able not only to use machines, tools, workmen, mechanical energy, heat, raw materials and the many other aids to production in the best and most economical way, but also to know and use means and methods of making the whole effective, of bringing them all into a well-timed and well-unified harmony. Let us not be mistaken. The perfection of the mechanical means, or even of the psychological ones, has progressed to a far greater degree than has the scientific utilization of these through a planned control from a central point to secure a well-timed coordination of the material, mechanical and psychical elements. To be sure there will remain in the final analysis a residue of bothersome details which can handicap management; nevertheless the general question "How can I manage a factory most advantageously?" absolutely demands its answer. It is so tremendously urgent that a few words outlining the solution are in order.

In brief, the whole matter is one of centralized direction, with everything carefully thought out in its details and emanating from a center which serves as a starting point for the movement of all elements in production. Nature shows us the best solution in the evolution of its living cells. In these the centralized nervous system embodies in the most perfect way the idea of centralized control, and it is too trite to say that the central nervous system of a living organism, of an organized unity, is the less developed the lower the stage of intelligence. Modern factories with large spaces, power plants and masses of workmen, directed by a handful of engineers and managers, make me think of prehistoric, gigantic living organisms which in an enormous body possessed only the brain of a bird. Perhaps the comparison is lame in favor of our monsters, for it is a humiliating fact to the specialist that in the plans for a new factory 95 per cent of the space is provided for physical labor and only a fractional part for the preparatory intellectual work, while to many architects and entrepreneurs the idea of a factory planning office seems still to be entirely unknown.

Unfortunately, as has already been stated, most managers lack the art of untangling the fine threads of direction and of bringing them together in a well knit whole. It is to be observed that the manager who might be inclined to expand his force of indirect workers, without having the right kind of organization and set-up, would come to grief. Undoubtedly, it is among the most difficult tasks of a factory management to ascertain the right internal organization, and it would be unfortunate for progress if everyone were allowed to choose and to employ those means which are in his opinion advisable. Here scientific management comes to our aid, to separate the fundamental sharply from the special, and therefore to establish the former, all difficulties notwithstanding. Scientific management shows us how it is possible to obtain a considerable increase in work and cheaper production with an enlarged indirect staff.

This centralization will have to be worked out in greater detail the more varied production is, as when it involves the manufacture of a diversified line. Conversely, if a small variety of product or if only a single type is to be produced, then the indirect element in production activities decreases until with only one type the total effort may be concentrated directly upon that, so that the overhead of indirect labor required by diversified production is no longer involved. Where the limits should be drawn here, whether a plant needs a planning room, an internal conveying system, gang work, these are questions which belong partly to the methods engineer, and partly to the mechanical engineer. In no case should industry allow itself the luxury of calling upon the purely mechanical engineer in matters of organization.

This is an indication of the out-of-date method with which plants attempt to build up their internal organization and procedure. It is superfluous to say that the development of management methods according to the principles of scientific management requires a considerable measure of experience in observation and practice and knowledge of men—qualities which that group of managers whose experience has been specialized in purely executive or engineering lines rarely possess in the necessary degree. To allow vanity or ambition to dictate that one must do everything oneself is a fault which avenges itself the more because a half-organized plant is worse than an unorganized one.

I have come to know many plant managers during the past few years but seldom have I come across one who would have been able to organize his factory himself according to the principles of scientific management. The opportunity to use one's experience in this profession has only recently arisen, so that we may regard with gratitude those firms which have undertaken to help in putting into practice the ideas discussed above.

It may be interesting to note the extent of the development of the application of scientific management in Germany. There now exist plants in chemical, miscellaneous electrical, textile and miscellaneous metal industries which are completely organized according to Taylor methods.

The number of employees today whose work is controlled by symbolized time cards is from 10,000 to 15,000, a number which is considerable under present conditions, since the German Taylor practitioners were not able to undertake this work until after the war. In their work they are leaning heavily on American experience as far as it may be ascertained. Because of the complexity of modern fabrication in Germany, the control of work in division of labor, and particularly the principle of scheduling work in orderly sequence of batches, have been highly developed independently of America. This has solved the problem of control of parts involving short time operations. This solution of the problem of orderly scheduling of work, together with other aspects of control in division of labor, has effected a substantial acceleration of the movement of materials, so that the early charge that Taylor methods might cause a confusion and congestion of materials has been effectively disproved.

In conclusion it may be said that scientific management in Germany can show real progress. The development proceeds slowly but steadily. At this time an increasing number of firms are engaged in developing it. The usefulness of the system has been proved all along the line. Advanced and technical schools have begun to include the subject in their curricula and to establish seminars and laboratories. A corporation for professional work in management engineering has been established in Berlin. It is to be expected that scientific management will be developed much more widely among German industries during the next few years.

IF THE savings from delegating managerial detail involve delegating no managerial discretion and demanding none of the managerial type of initiative on the part of the subordinate, they are a danger rather than a source of strength. If "economizing managerial ability" means getting on with a smaller percentage of it than before, it is well-nigh suicidal in the long run.

The concern may "economize" in that way, if it is willing to take the consequences, but can industry as a whole do so? This would mean either developing less than before of that grade of ability which can make decisions, or not using all that is developed, which would come to the same in the end. Either one would be equally preposterous as a goal toward which to direct a conscious social policy. Society cannot save by employing less of this grade of ability, but rather by developing more. And whatever is unavoidably necessary for society is good industrial policy. Management cannot afford to intrust executive work to those lacking executive ability, nor to delegate it in a way which deprives the managerial agent of all executive discretion and responsibility. (J. Maurice Clark, *The Economics of Overhead Costs*, p. 125.