

again clearly reflected in the literature on the subject. The popular matter has dropped out pretty completely and has been replaced by an already large and constantly growing number of articles dealing, on the one hand with concrete illustrations and explanations of the actual workings of the system or of parts of it, and on the other hand with frequently altogether healthy and well-intentioned, tho unfortunately¹ not always well-informed, attempts to appraise its true economic significance. The active and open opponents, failing to find proof of the fulfillment of their dire prophecies as to the ill effects on the workman and the heartlessness of it all, have largely been driven to a less outspoken if more insidious activity, unwittingly furnishing tremendous arguments for the extension of what they sought to kill through measures forced on misinformed legislators in a vain attempt to stop the inevitable.² And incidentally, those of the Taylor persuasion—upon witnessing the constant

¹I refer to the anti-stop watch and premium-payment riders to the Army Appropriation Bills. Before the Committee on Military Affairs on January 4, 1917, Brig. Gen. William Crozier, Chief of Ordnance, in discussing the Taylor System at the Watertown Arsenal submitted testimony in substance as follows: Hearings before the Committee on Military Affairs, Army Appropriation bill, 1918, pp. 955-964; see also Congressional Record for February 1, 1917, pp. 2654-60:—

After the Taylor System had been in operation at the Arsenal a year or more a comparison of identical jobs showed that the men on the average did 2.7 times as much work after its development as they did before. In the machine shop where most of these jobs were done, the average increase in output was 2.2. (See decrease for this department upon abolition of premium payment, below). The work was more carefully done, of a higher quality. There had been to date of testimony, January 4, 1917, some seven years after the system was inaugurated, no single instance in which a man had complained of overwork. The spirit and contentment of the men had never been so good as they were during the several years in which the system was in operation. For a number of years the average earning of premiums of the workmen, above the regular day wage which in itself was equal to that of other plants in the vicinity, was about 27 per cent of their pay.

By congressional action the use of the stop watch and the payment of premiums were abolished. A comparison of identical jobs done in many cases by the same workman both before and after this proviso went into effect shows in the worst case, that of a job done by the same man, that he took 4.2 times as long to do the work after premium payment was abolished; in other cases the ratios were 3.6, 3.0, 2.9, etc., with average ratio as follows:

Machine shop, 2.2 times as long when not on premium.

Foundry, 1.6 times as long when not on premium.

Smith shop, 2.1 times as long when not on premium.

Yard gang, 1.8 times as long when not on premium.

The atmosphere of industry and application which was previously so noticeable changed materially, there was much more loafing and the men had no desire to exert themselves after premium payment was abolished. The earnings of the men of course dropped back to regular day rate, and the cost of manufacture was considerably increased.

putting forth, by those either ignorant of or actually opposed to the Taylor System as such, of "new" and brilliant ideas in management, incorporated long since in the practices of that group—may be pardoned for an unseemly chuckle up their sleeves at the rapid and irresistible spread of the principles and methods for which they have long stood. Not only in current trade journals laying no claim to being scientific management disciples, but also in the practices of many managers, some of whom at least lay claim to being exactly the reverse, is this tendency most noticeable. Only upon coming in more or less close contact with numerous plants is that fact brought home so forcibly.

We may say, therefore, that the sensational and propagandist period is past, that the foisting of half-baked "efficiency" schemes on an unsuspecting and overeager public is rapidly passing (alho there are still, unfortunately, too many managers who give less attention to the selection of an industrial adviser than they give to the purchase of a new machine), and that the skeptical stage—the "my business is different" attitude—is gradually passing with the constant addition of new lines of industry to the list of scientifically managed plants,² and that we are now in a period of healthy growth accompanied by a much more sympathetic and truer understanding of the fundamental nature of the principles and problems involved. "Scientific management" has comfortably taken its place among the things which are here to stay.

It is perhaps a little early to attempt to judge of many of the economic problems raised by scientific management—the smoke of battle is yet a little too pungent, and we are not yet sufficiently removed from its beginning to enable us to get a true perspective of the movement as a whole. Whereas in the past, however, it has been necessary to speculate as to its *probable* effects on this or that phase of the problems presented, and even tho we may still justifiably concern ourselves in this manner with the numerous as yet unsolved questions, we can now, nevertheless, get a much clearer perspective than has been possible heretofore and perhaps more profitably focus our attention on the *positive* aspects and accomplishments in certain directions, realizing that it is no longer

²Cf. C. B. Thompson, "Scientific Management in Practice," Quarterly Journal of Economics, February, 1915, p. 262, in which eighty-three different industries are listed since which time there has been a noticeable increase in the number.

theory but facts with which we are dealing. If the writer succeed in crystallizing a few of the accounts on the debit side of our balance sheet by bringing together some of the concrete economic losses already eliminated or alleviated by scientific management, it may perhaps make easier our minds as to the state of the science as a whole.

In considering the effects of scientific management from the standpoint of its positive contributions to industry we may take up first the mechanical phase—the more purely impersonal aspects—divorced so far as possible from considerations of its direct effect on the individual, leaving the human factor as the last and most important topic. The two are to a certain extent interactive, yet sufficiently distinct to warrant separate treatment.

II. THE MECHANICAL OR IMPERSONAL ASPECTS

A. INCREASED PRODUCTION

Turning first then to the effects of scientific management on industry as such, as exemplified by those establishments directly affected by it, by far the most striking single fact is the *increase in production* it has effected with the same equipment and personnel. This has occurred in many cases to such an extent as to be almost unbelievable. Ten, twenty, thirty per cent increases are the rule, and an output twice or even three times as great as had formerly been secured is not uncommon. And these results have not been uniformly secured, as might be supposed, from plants that were near the lower level of efficiency before the development of the system was started. On the contrary, in many cases the standard of production was comparatively high, and I know of one case where the production was increased over 60 per cent in a plant which from every standpoint was previously generally considered to be absolutely the most efficient of its kind in the country. The desire for increased production is often, indeed, one of the minor causes for the management's determination to have scientific management—too often the output is greater than ever before and yet the firm through other causes is losing money, or conditions are unsatisfactory in other respects.¹ But in just that same plant when scientific management is developed, the output is almost sure to increase—incidentally as it were.

Increase in production has been the cry of economists for centuries, and for centuries they have had

¹Witness a recent demand on the part of workmen in one large shop for the initiation of time study as a means of more accurate rate-setting.

their cry answered—at least partially. For it is the exception where, take any industry you will, with the *constant substitution of new and improved labor saving machinery and equipment* the output has not been very largely increased over what it formerly was. Our industrial highway is strewn with the corpses of those individuals who would not or could not keep abreast of these improvements.

Such increases, however, alho they may enable the individual to survive, may not and often do not wholly satisfy economic demands. They are brought about by the *substitution* of new machines for those already in use, oftentimes long before the latter have earned their keep. I heard of a case where recently in one department, new machines costing thousands of dollars and having been in use less than one year, were scrapped to make way for new and supposedly superior machines.

The increase in production brought about through scientific management, however, is of a fundamentally different nature. True, the scientific manager does not tolerate obviously antiquated machinery, but he does not tolerate inefficient machinery of any kind, and it is just here that his real economic contribution comes in. With him it is not a case primarily of increase in production through new machines; it is first and foremost a case of increase through *getting the most out of existing equipment* and personnel. Only after present means are brought to their highest productiveness may the question as to whether new equipment is justifiable be satisfactorily determined. With the present mania for new equipment, we may well inquire whether, in very many cases, these changes do not impose an added rather than a lessened burden on the consumer. If a proper charge for such rapid obsolescence as well as a regular charge for depreciation were figured into the expected cost resulting from the contemplated "improvement," and particularly if this expected cost were compared not with present costs with existing equipment, but with what those costs *should be*, it is safe to say that many new machines would go unbought, that many firms would avoid bankruptcy, and that the owners as well as the buying public would profit thereby. It is just here that the line between the two kinds of increases may be sharply drawn, which brings us to the consideration of the financial aspect of the question.

B. DECREASED COST

For all practical purposes the consumptive capacity of mankind as a whole may be considered to be un-