

A banker recently said—"Yes, it is important to have a correct appraisal of your property, but how about your management? After all," he said, "it is your management, and not your plant and product that we are investing our depositors' money in, for without good management, these are in themselves not productive."

Up to this time investigations have not amounted to all that they should, because there has been no way of evaluating causes and responsibilities in definite figures. To say that the efficiency of something is "about" sixty per cent, while looking wise and mysterious after a hop-skip-and-jump through a plant, is guessing, and guessing is unscientific, and therefore has no place in an engineer's method of working.

To tell me that I am not looking well, when I never felt better, is going to make no impression on me at all, but a definite evaluation showing blood pressure 170, pulse 92 and temperature 101, is bound to force me to take medicine and perhaps go to bed, whether I like it or not.

The great American game, practiced considerably in industry, of "passing the buck," will cease when we can through some form of analysis and evaluation, localize causes of waste in a decided and definite way, and then place responsibility where it properly belongs. You will never kill off "it isn't so" and "I don't believe it," until some such plan is furnished.

For these reasons, an intelligent survey through a proper questionnaire and evaluation sheet should appeal to industrial managers, leaders of workers and financial executives. If it did nothing else, it would call attention to all of the essential elements of a business, many of which are so many times overlooked. Any intensive study of a business in a scientific way, as the basis for a mathematical appraisal, would turn up so many opportunities for improvement as to make such a survey most valuable and result producing.

My feeling is that now that the start has been made, the time will come when the "industrial audit" based on a perfected analysis and evaluation mechanism along the lines suggested, will be as much a part of our industrial activities as the "financial audit" is today.

In closing let me say that the Taylor Society is to be congratulated for taking the initiative in analyzing the questionnaire and evaluation sheet of the Committee on the Elimination of Waste in Industry, as the basis for further research and development. The work begun should go forward, because industry sadly needs a basis for more intelligent and comprehensive surveys, something it must have if we are ever going to convince

owners, bankers, executives and workers concerning the nature and extent of wastes and their part in the responsibility for wastes.

A joint committee is now at work on Management Terminology, another is just starting work on Standardizing Graphic Presentation. The Waste Report says—"The assays of waste show first, the need of definite and quantitative industrial information on a multitude of points." Is not this the time to begin a joint society work, on perfecting the mechanism of analysis and evaluation which was given to the industrial world by the Waste Committee? Could not it be a work which would go down in the annals of American Engineering, as comparable to Mr. Taylor's "Art of Cutting Metals," by taking the "bunk," the mystery and the false doctrines and practices out of that most recent of developments—industrial management?

DISCUSSION

BOYD FISHER:¹ If eighteen of the leading management engineers were to summarize their conclusions about waste in industry as they had observed it throughout their own experience, they could probably give a pretty accurate estimate of what that waste amounts to. Percentages are misleading, and usually not in point; but if they cared to say just what per cent of possible production were wasted, they might even be correct on that figure. Certainly none would care to dispute the weight of their combined authority. And, as for what portion of the waste is due to management and what portion to labor, one might reasonably assert that management engineers are in position to know.

The eighteen engineers for whom Mr. Knoeppel speaks are of highest standing. No other eighteen could be assembled whom we should consider better qualified to report on waste in industry. The mere fact of their working together on a joint enterprise and agreeing on a single report is unparalleled. Had they made their report on the basis of their own authority it would be listened to with respect, because they would have seemed to speak out of their years of experience.

Instead, they chose to report out of their several weeks of research. They ask the public to accept their report, not as a *statement of their opinions*—which would have been valuable—but as a *scientifically determined body of fact*, which it is not. The time was

¹ Lockwood, Green & Company, Boston.

too short and the sample too small to permit of a real test of industry, if a disinterested, objective investigation were to be the basis of report. Their personal authority cannot make up any portion of the deficiency in method of execution, because if we appeal to mathematics, we have to let the mathematics supply their own prestige.

And unfortunately, while claiming mathematical demonstration—even to the point of percentage figures—our engineers have substituted the results of subjective logic. Mr. Knoeppel has spread before us a set of questions which were used to test waste in industry. Not one of them is in itself a measure of actual output against a known standard of possible output. Neither a standard nor an actual figure is referred to. The questions relate to methods of management, which are presumed, in the minds of the investigators, to yield certain results. If a given plant followed approved methods it was assumed to be efficient. If not, it was presumed to be wasteful in whatever degree it suited the examiner to set down.

I doubt if we can accept this as scientific. A necessary basis of fact, a necessary step of proof, seems to be lacking. And as for asking the general public to accept it, I am sure that it is too much to expect. Personally I hold to the point of view of the questions asked. But as yet they represent minority opinion, precisely because they are abreast of the times. Business in general does not habitually act upon the basis of these standards, and will not consent to have its results prejudiced by those in advance.

I accept the standards of management set up by the Committee on Elimination of Waste, and have confidence that industrial statistics, if properly ascertained, would justify their standards. But I believe that they have been too eager to accept as cold facts, what is only a restatement, in terms of figures, of their own opinions. If the public, upon closer study of the report, comes to this point of view of it, those who reject the Committee's standards will have a weapon of attack forced into their hands. They will be able to offer the refutation of the Committee's claims as justification of their own conservative position.

The Committee set out to investigate waste. The method of inquiry, however, gives one the impression that they aimed rather to find support for certain doctrines of management. They may not really have so confused their aims, but I fear that they did run into the danger of causing a reaction against modern methods of management.

H. S. PERSON:¹ Mr. Fisher went to the heart of the problem when he expressed the opinion that the methods of the Committee's investigation were not scientific. He had in mind, I imagine, the methods of objective science—of the chemical, physics or engineering laboratory. I am sure the Committee would agree with him. To have employed the methods of objective science would have required a careful recording of classified results of management in each plant as now managed; and then a reorganization and new management of each plant in accordance with methods of least waste, with a recording of comparable classified results of such management; and finally a comparison of the two records and the drawing of conclusions. Such a procedure would have been in the nature of the case impracticable—not only in six months, but in six or sixty years.

In fact, I cannot recall that the Committee anywhere claims that the method employed is strictly scientific. In the report itself we read (p. 118); "it is evident that a considerable element of judgment enters into our relative evaluations . . . until these judgments can be tested and rectified in the light of later experience, too much reliance should not be placed upon the absolute accuracy of the several evaluations."

We feel that the chief value of this field report evaluation sheet is to be found not in the results of this investigation, but in that it constitutes an important *beginning* out of which will be perfected a very powerful and very valuable instrument for investigation." And in Mr. Knoeppel's paper this evening the statement is clearly made that the study of the Committee is considered an assay, not a survey; and Mr. Knoeppel's explanation of method is a frank statement that the evaluation is an evaluation according to "ear-marks"—according to judgments.

I wonder, however, whether the Committee did not bring to bear upon the problem a method of investigation which utilized the methods of objective science indirectly; and whether such indirect utilization of a method which in the nature of the case could not be utilized directly, was not the great constructive achievement of the Committee in method of investigation.

The findings of the Committee represent the estimates and judgments of a group of assayers, which on its face appears to be the opposite of the scientific method; but those estimates and judgments were in accordance with standards of appraisal which had been derived

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