

of the economists. They had mapped out on transparent paper the location of the industry, showing the directions in which it was moving and the opinions and actualities which were governing its choice of location. A map of the same area, giving land values, was also made. By placing the transparent map over this diagram of land values it was evident to the joint group that the industry was occupying the most expensive land in New York. It is inconceivable that the industry did not know it was located on expensive land, but apparently it had not been sufficiently aware of that fact. When it was put before the group graphically the reaction was: "If we had known this twenty years ago we could have saved the industry thousands of dollars." Awareness of simple facts, easy to acquire by means of economic research, and of the wide implications of these facts, is essential to business today.

Dr. Person has named research, standards, control and co-operation as the essential elements of scientific management. I think that the preceding speakers have left a large burden on my shoulders in the way they have dodged the word "control." Mr. Bliven began all of his schemes for the organization of the world with the verb "must." I should like to know what that categorical imperative means.

What source of control can the scientific management movement in the United States depend upon in working out its problems? We are told that certain obstructive laws in this country prevent the getting together of industries in a plan of action. Yet there are evidences that by various devices prices, wages, production and markets are, in a measure, controlled. Force can take all sorts of subtle forms other than military organization. The question is what kind of control do we in the United States propose to exercise? I believe the control which is given as one of the principles of scientific management is well described by a remark of Mr. Taylor's, "There is one master in the workshop and that is knowledge."

Business in the United States is challenged to see whether the functional groups of finance, production, distribution and labor can be controlled by facts instead of by a short-sighted contest of group interests. It is control by knowledge that we in the United States want, because something tells us that there is a basic law of human relations involved; that economic life cannot be permanently dominated by only one set of interests; that

it is possible to gather facts upon which to develop an industry which really serves society and attains stability by serving needs revealed by knowledge.

It has been good this evening to hear an industrial leader talk of service to society as the objective of industry. If a woman had said it, she might have been thought sentimental and forgetful of the importance of profit. Yet business leaders are now saying that industry has developed to a point where only the most economical and most effective service can keep the wheels in motion. The aim of effective service must be worked out all along the line. Having concentrated upon production in these past decades, we are forced by the present depression to look at the wastes of distribution. We must see to it that the ultimate consumer is served, that he has the buying power to purchase so that there will be balance in economic life, not in a static sense, but in the sense of a progressive raising of the standards of living as industry raises its productive capacity.

We in this country have fascinating problems, and the people in this audience can tomorrow take steps toward solving them. We have the problems of the basic industries of power and coal. In the need for markets we have the problem of distributing income to the end that standards of living may be maintained. This is the social task which Mr. Kellogg has been emphasizing. The complete stoppage of income among large groups of wage-earners so ties up economic machinery that it is very difficult to start it again in a depression.

I turned this evening to Copley's "Life of Taylor." On the flyleaf are words which come with a new prophetic meaning. They are from Taylor's "On the Art of Cutting Metals" and read as follows: "We are now but on the threshold of the coming era of true co-operation. The time is fast going by for the great personal or individual achievement of any one man standing alone and without the help of those around him." The sensible course is to face this new opportunity for co-operation into which we must put a true economic meaning. Force has no place in the new era. The moving power of scientific management is co-operation in procedures and practices, conforming to standards developed by research. The question which challenges scientific management in the United States is whether American industry can accept knowledge, and not force, as its control.

Quality

A Management Which Reconciles High Standards of Quality With Mass-Production Requirements

By CARL W. GATES

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ON MANY occasions, we have heard this old adage, "We certainly got our money's worth out of that purchase." Usually the intent of that thought could be interpreted in this fashion. The quality of the article was of such a high standard that the service received per dollar expended was beyond the expectations of the purchaser. The purchaser reacts most favorably to such an experience, and it causes him to consider very seriously the buying of other material from this same source. He usually becomes what we call a "steady" customer in the event of similar results from subsequent purchases. In other words, he will probably look to this supplier to fill his requirements whenever possible and often without regard to the fact that a competing supplier quotes a lower price.

Now, in my interpretation of this oft-repeated statement, I have used the term "the quality of the article purchased." A definition of this phrase, which appeals to me as most fitting, is "those characteristics of an article that determine for the purchaser the reliability and durability of the article."

You will notice that in these remarks I have referred continually to the purchaser as the judge of quality. This, I think, everyone approves, and it therefore becomes necessary to build quality into a product to create the desire within a customer to return to the same supplier for his future requirements. You see that this thought can be applied to the inexpensive article as well as to the more costly.

How are we, as manufacturers, either large or small, to know that quality is being built into our product, and who is responsible for its presence at all times at the proper level?

¹Papers presented before a meeting of the Taylor Society, New York, December 3, 1930.

Let us imagine, for a moment, that we are about to begin the manufacture of a new article. For sometime past, we have been experimenting with models and know exactly what quality requirements must be met. We have already satisfied ourselves that if an article having this quality is produced at a reasonable cost there will be a demand for it.

We start the manufacture of this article on a small scale and carefully select a few operators for this work. They might be obtained either by transferring from some of our other work men who are familiar with the methods of manufacture that are to be employed or by using those men who have carried on some of the experimental work in connection with the development of this article.

Manufacture is now under way. We spend most of our time in the shop observing the detailed parts as they are being made, watching the assembly of the first few units, and experimenting with them to see how well they meet our expectations as to performance. We have discussions with the operators in regard to improvements in manufacture and ways and means of overcoming manufacturing difficulties. We seek their suggestions as to how some of these difficulties may be overcome. The operator who is making details is called in to observe a defect in the assembly operation caused by the dimensional variations in a detail he is making. Together the solution is worked out.

Soon each of the men working on the various steps in the manufacture of this article is as familiar with the results desired as we are ourselves. The men have a full appreciation of the weaknesses to be guarded against and demonstrate a keen interest in eliminating these weaknesses by careful, accurate workmanship.

What about an independent inspection of our product before it is put upon the market? The