

B. Inventory

The safest way to use money in manufacturing is an endeavor to follow a carefully worked out budget of quantity production for a fixed period. Any plan that is not built up on the knowledge of factory capacity encourages unsystematic manufacturing which has proven itself to be exceedingly wasteful in the use of capital. Much money has been frozen up in materials and equipment and only liquidated over long periods; in many instances it has eaten itself up in interest charges or become obsolete through changed conditions.

In industry there is much loss through waste of both raw and worked material, the latter causing much labor waste. The greater part of wastes such as these are chargeable to a near-sighted policy, or to put it straight, to the myopic greed of some managers. A long list of conditions that generate wastes of various kinds in manufacturing can be enumerated, but the one primary cause is the unwillingness of management to remove their blinders so that they may see in more than one direction. The demoralizing influence of the preventable waste in men, money, machines, material and management on the mind of the worker, honeycombs the entire organization, and this high cost of manufacture is perpetuated with the result that the public bears the expense.

C. Indirect Expense

It is the fear of too much indirect expense that causes executives to hesitate in setting up adequate control methods at the source where they should be. Because of this fear, they try to control by historical records taken from controlling accounts, always after the loss has been taken.

With a proper system of production control, a true picture of direct and indirect expense will be obtained and the ultimate and relative value of both will be shown. Without such a system it is not possible to appreciate the value of the indirect labor or to know whether there is enough or too much. The only sure thing is that it exists whether it shows or not. A true system of scientific production control uses the minimum amount of indirect labor to the maximum advantage, which is impossible without this control. If indirect labor can create more economical manufacture by extending expert service to direct labor, that will cause a greatly increased production. Then such expense is no longer chargeable to burden, but is a powerful economic factor in production.

D. Production

A production control department was developed in a large business in which the control of production had been left largely to the foremen of the production departments with the result of an unbalanced inventory, a long time turnover, and many other expensive wastes. By the introduction of a central control of production based upon a six months' schedule from the selling department the length of turnover has been reduced by several months with the certainty that it will be further shortened. Over a term of ten years the number of major unit assemblies of the product was from 650,000 to 750,000. After the control methods had been in operation seventeen months the number of these units in the flow were reduced to 358,500 and the turnover time of sixteen to eighteen months shortened to seven to nine months. With an average inventory of 740,000 major assemblies units in the stream, 2100 units a day were delivered from the factory to the sales department compared with 358,500 units in the stream and a delivery of 2275 units a day from the factory to the sales department. The 740,000 units in the flow required 4000 people, while the present flow of 358,500 necessitates a personnel of only 2500. By this method of control the inventory was liquidated—without loss—\$1,803,689.22 in 17 months, or at an average of \$106,100 a month and the carrying charges reduced \$9000 in interest per month.

E. Purchasing

By the tying-in of the purchasing with the production control department great reductions in the amount of direct and indirect materials carried in stock, such as raw materials, supplies, etc., were secured; whereas under the old system each department head purchased according to what he figured his own needs to be against the orders he received for production.

The materials and supplies inventory account was reduced in 17 months approximately \$5,000,000. This, of course, is included in the liquidation stated above.

The clerical force necessary to control the production had not been increased by this centralizing of the control. By the former decentralized control each department employed its own clerks and in many cases there was an excessive number of clerks.

F. Costs

While the indirect expense as a whole was not reduced very much, the direct costs were reduced considerably. Correct standards of production, based

upon time study, which were centralized under one head, were set up, thus avoiding differences that existed in rates for the same skill in the several different departments as well as setting a correct standard based upon scientific time study. By this method of production control many processes that were expensive were discovered and changes made which have broken down dams and allowed the production stream to flow unobstructed within much more economical limits.

G. Esprit de Corps

With the introduction of control methods the esprit de corps of the organization was greatly improved inasmuch as an increasing number are working with the purpose of economical production. Employees were given more even and steady employment. Credit could be given to those who deserved it since responsibility for each job was made definite and failures easily noticed. Employees can sense this fact immediately and beneficial results ensue.

The Achievements of Motion Psychology

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methods for measuring the elements of motion psychology, in other words, behavior.

This work is not, as is perhaps thought, the work of one person, one group or one country, although the devices were invented, perfected and first publicly demonstrated in America in 1912.⁴ This work has been going on both in psychological laboratories and industrial plants in America, Europe, Asia and Australia for several years, and South Africa has also made a beginning.

Investigations have not been divided arbitrarily into various parts, these being assigned to psychologists, physiologists, psychiatrists, managers, etc., but have rather consisted of putting the methods of measurement at the disposal of all those interested in the human sciences and correlating the data resulting from their investigation.

Many artificial distinctions such as that between adult psychology, psychology of children and the psychology of animals disappear in such investigations, as do the distinctions between the various schools of psychology and the various schools of

⁴Transactions of the American Society of Mechanical Engineers, paper No. 1378, discussions by John G. Aldrich and Robert T. Kent.

management. Facts are facts, and they should be presented in the errorless indisputable form of the photography of time, motions and the attending conditions, recorded simultaneously. Facts are quite distinct from interpretations of facts, and the insistence on The One Best Way to Do Work as the primary goal of investigations removes both personal prejudice and a temptation to that most subtle form of intellectual dishonesty, the use of facts to prove a theory when the most that they justify is the indication of a trend.

Some actual results in the field of industrial psychology during the past twenty years are:

1. The discovery of units in which to record the elements of behavior.
2. The invention of methods and devices for recording behavior in indisputable form.
3. The recognition of the wisdom of selecting the best man obtainable, in order to obtain behavior norms.
4. Errorless records of motions in three dimensions showing path, acceleration, retardation, times, relative times, distance, relative distance, speed, relative speed, direction and the relativity of simultaneity of the therbligs or elements of a cycle of motions.
5. The determination of The One Best Way to Do Work before it ever has been demonstrated, by synthesis of the best obtainable therbligs.
6. The recognition that all workers have three motion methods, (a) when in a hurry, (b) when working leisurely, (c) when teaching a beginner.
7. Records showing that fast motions and slow motions cannot be made in the same path.
8. Records of automaticity and its effects upon skill.
9. Records of effects upon automaticity and the resulting loss in output and increased fatigue of slight changes in one therblig or element of a cycle of motions.
10. Indisputable records of habit and of habit interference.
11. Records of decision, indecision, hesitation and fumbling, and the effects upon resulting motions.
12. The effect upon habit, motions and the transfer of skill, of tools designed and built to the shape of wear in use.
13. Records showing the correlation of calendar age with mental age.