Book Department

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The question of economic waste in production has been forced on our attention by the steady and rapid increase in prices and the consequent apparently growing costs of production. Financial panics and industrial depressions are not pleasant occurrences; they are as costly as great wars, but like wars they compel a nation to stop and take stock of its resources, its method of handling them, and the recent panic of 1907 has forced the question of economic waste upon our consideration. Every period of industrial depression whether due to abnormally high or low prices has brought some important business principle to the surface and the discussion of these principles has stamped certain ideas upon the nation so generally that each generation of business men may be said to have had its peculiar economic philosophy. A topical economic history might easily be written by using such well-known titles as the following which in their time served as terms for the general business philosophy of the day:—favorable trade balances, the industrial revolution, the growth of the joint stock and limited liability, unsecured paper money, land speculation, railway and canal speculation, overproduction, under-consumption, bimetallism, etc.

The shibboleth of our present business philosophy is "scientific management." The advantages to be derived from the adoption of scientific management have been compared with those which accrued to industry through the use of steam power and the mechanical inventions. If the bearing of the latter upon our economic progress during the last century is taken into consideration, then it must be realized what an enormous task is imposed upon the principle of scientific management if it is not to suffer by contrast. Yet it is by no less a standard that the exponents of this new science desire the final influence of their work to be measured. It is probably not too much to say that the principle of the division of labor as advocated by Adam Smith will have a new application and that its results will be as momentous in the saving of time and energy in the increased production of goods as did the first application of that method which separated the work of the laboring man into various employments but left the work of management remaining as a unit. The managerial function was dependent upon the capacity of some one man to control the many employments, whereas the application of steam power to production had resulted in a minute
division of labor so far as the laborer was concerned. The work of
directing the processes and overseeing the laborers still followed the
methods of the handicraft era of production. One master in the factory
was supposed to direct the efforts of many and varied lines of produc-
tion. But the labor and mechanical problems have become so enormously
complex and complicated that the gains in productive capacity due to the
technical division of labor are largely lost because there is not an equal
progress being made in the direction of specialized management and or-
ganization. The refinements of specialization are not supplemented by an
equally refined correlation of processes or activities.

Neither the laborer nor the inventor could remedy this defect. It
was a question of business organization. It lay outside the province of
their experience. The situation demanded a new kind of specialist. The
first kind to be developed was the "systematizer." He did good work
but his activities were generally confined to a very narrow field. His
knowledge consisted of information concerning office appliances, loose
leaf arrangements, filing systems and time clocks. His day was brief, for
business men soon learned that mechanical systems cannot overcome de-
fects of organization nor the improper and inefficient management of
men, methods and processes.

Perhaps if man's inventive power had been confined to mechanical
devices alone, the old order of things which depended upon a standard
machine and a specialized attendant might have continued much longer,
but the genius of Frederick Taylor brought a new element into the field
of production. He invented a standard tool steel. With a standard tool
another variable and indeterminate quantity was removed from the
production process. Therefore it was only a step to complete the cycle
of production and create a standardized operation and finally a standard
product, that is, having the raw product, the machine, the laborer and
the tool all standardized, it was comparatively easy to obtain a stand-
ardized operation and finally a standard product.

Mr. Taylor now devoted his attention to the problem of turning out a
product whose qualities and cost could be calculated in advance accord-
ing to certain definite and predetermined standards.

But the step from the old to the new order of things could not be
taken until there was a completely new alignment of managerial functions.
The old method depended for its direction upon the autocratic boss who
based his knowledge upon personal observation and upon facts better
for a history than for the guidance of a business policy. The new method
must work according to carefully estimated costs; i. e., standards, and the
supervision must be vested in a body of experts, each proficient in his
particular line. This new division of labor, therefore, consisted in break-
ing up the duties of management into several distinct functions and plac-
ing an expert in charge of each. With this accomplished, the logic of the
situation demanded that the administrative control of the shop be
exercised along democratic rather than monarchical lines. This means
the substitution of a representative system of government in the factory
for the old absolute and arbitrary methods of control.
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The committee system as developed by Mr. C. U. Carpenter is the most advanced example of this method of factory control. With the tendencies toward the direction of production by specialists and the adoption of democratic methods of control, conditions are ready for the application of the principles of scientific management—an ideal which seeks to ascertain and apply in every process the best attainable methods, practices, tools and machines. It assumes that there is but one best way and when found, all the operations, etc., which produced it must be standardized. Where the principles of scientific management have been applied, greatly increased efficiency of man, machines and tools has been attained.

The fact that the recent investigation of the Interstate Commerce Commission has directed attention to its application in the operation of railroads is only an incident in the development of a process that will gain rapidly in other industries. However, the best collection of pertinent facts that are beyond the experience of any one man is that presented by Mr. Brandeis in his book on Scientific Management. The material is selected from the evidence obtained by the Interstate Commerce Commission at their investigation of the railroads' contention that it was necessary to raise their rates. This evidence is made up of the practical experience of men who have been pioneers in the gaining of greater efficiency through the application of scientific methods to industrial undertakings. Not a page is superfluous. Every sentence is charged with information of tremendous importance to the manager, the laborer and the consumer. A fair example as presented in Mr. Brandeis's examination of expert witnesses is found on page 36.

Mr. Brandeis: "Taking a man at an individual machine how much does he do under the new system as compared with what he did under the old system?"

Mr. Hathaway: "In general, it ranges anywhere from three to five times the work formerly done."

Mr. Brandeis: "Is that attributable in large part to his working harder?"

Mr. Hathaway: "He does not work any harder than he formerly did. He works more efficiently, however."

Mr. Brandeis: "And he works more efficiently, why?"

Mr. Hathaway: "Formerly, when we started a job, he had first to frequently hunt up the foreman to find out what he would do next; then he might have to hunt up his materials and get them to the machine. After that he had to decide how the job was to be done and look up his own tools for it. He had to grind his own tools and all of the things that we now do in the planning department for him he had to do for himself to a very large extent while his machine was standing idle. As it is now, the machine runs along on other work while we are making preparations for his job ahead. That is one reason. Another reason is that our machines are in better shape, we furnish the men with better tools and implements that are put into condition for us and kept in condition for him. Then we show him how to use it."

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This is the essence of Scientific management. A dollar a day laborer is given the advantage of the advice of a fifty dollar a day expert. 

Along with Mr. Brandeis's book should go Mr. Gantt's book on "Work, Wages and Profits." Mr. Brandeis is an advocate by adoption of the New Gospel of efficiency. Mr. Gantt is an advocate by inheritance. For twenty years he has been closely interested in advanced work in the field of labor management. Mr. Gantt is already well known through his advocacy of what is known as "Gantt Bonus System." His new book shows what methods he has followed in his scientific investigations and in attaining standardization, careful instruction and interconnected reward to both instructor or supervisor and workman. Mr. Gantt's work shows him to have a firm grasp of the scientific method. His association of effects with their causes is philosophic and not superficial. His method is well illustrated in Chapter VII on the Training of Workmen in Habits of Industry and Cooperation. Starting with the hypothesis that habits of industry are more valuable than knowledge or skill, he shows how the quality as well as quantity improves with the habit of industry. The methods of fixing these habits are described with practical examples as to the setting of the tasks and the standardization of the work. To the novice in this work Mr. Gantt's presentation of the obstacles to be met in the introduction of a bonus system into a plant will be of special interest. He also gives instructions on how to introduce the system in a new plant.

The whole book is replete with practical suggestions and represents the author's most mature thought on the subject of scientific management of labor. It is difficult to get business men immersed in the practical affairs of a busy life to write books, but when they do and write out of their own ripe experience as Mr. Gantt has done they put the world under a heavy obligation to them.

It is only when Mr. Gantt and other expounders of the science of industrial efficiency attempt to give their doctrine a philosophic setting in the broader field of economics that their reasoning is not conclusive. This is shown in the final chapter on "Prices and Profits, A New Light on the Cost of Living." "With the Increase in Prices," says Mr. Gantt, "comes increased cost of living—the combination of the high cost of living and the inefficiency of production is rapidly producing a condition of which no one can foretell the result. The one cure, the only one—is to increase the efficiency of the producer."

The mistake made here is in choosing the wrong line of approach to this economic setting. He has attempted to associate scientific management with production by means of price.

It is evident from the argument that the cause of high prices is high cost of production due to inefficiency and that the cause of high cost of living is due to high prices. Mr. Gantt sees the casual relations as they exist in the closed economic cycle of an individual's business operations, i.e., with increase of prices comes higher cost of living; with higher cost of living comes demand for higher wages; with higher wages comes higher cost of production. Then to maintain the same profit comes another increase of selling price and so the cycle completes itself.
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Greater efficiency in production may or may not be associated with a contemporaneous lowering of prices in general. A good example of cheapened costs not accompanied by lower prices is seen in the decade from 1896 to 1907. The progress of invention has been as active since 1896 as it was immediately before that date, but lower costs have not been attended by lower prices. The explanation of this seeming paradox is that price levels are dependent upon influences connected with the supply and demand for money and not upon costs of production. After 1896 the supply of gold influenced the direction of the price level more than the increased trade; i.e., the quantities of goods bought and sold which was stimulated by an increase in the supply of commodities.

This tendency toward higher price levels is likely to be seen for some time in the future. It is therefore not a good policy to offer the reward of lower prices as an inducement for the adoption of scientific management. The steady increase in the money supply may easily outweigh any tendencies which scientific management may have upon more efficient production, increased trade and therefore lower price levels dependent upon the last. The real benefits which would come to society through the saving of the great waste due to inefficient management may be lost sight of in an attempt to show that these gains may be reckoned in terms of prices.

As Mr. Gantt's book emphasizes the necessity of instruction and expert guidance in gaining more efficient work from both workmen and machines, so Mr. Hamilton Church lays stress upon the necessity for obtaining a thorough knowledge of the primary cost producing elements which enter into a manufacturer's business. First, he separates the capitalistic function from the productive function of the owner. Second, he divides the capitalistic or, as he calls it, the "property holding" function into those of land owner, landlord of buildings, supplier of power and similar functions. Third, the manufacturing function is divided into general and localized functions. Among the general factors which belong to the manufacturer as a whole are those pertaining to the organizing function. Those factors which can be definitely allocated to some individual machine, floor space; i.e., some "production center" are insurance, interest, depreciation on capital, average cost of maintaining and repairing, etc.

Like all classifications not based upon a rigid analysis the economic functions of an individual enterpriser, Mr. Church's division serves better as a working basis for obtaining a grouping of data for practical purposes than it serves as an example of scientific classification. Only one inconsistency need be pointed out in order to substantiate this.

Mr. Church would separate the property owning function when associated with land or buildings from the manufacturing function, but under the latter he includes the ownership of the machines, tools, etc. Such a classification usually serves a very practical purpose, but it is not based on a real distinction as to function. The manufacturer as a producer in the economic sense is no more dependent upon his function as a property holder of machines than he is upon the holding of land or buildings. All are "separable" (i.e., other men may own and rent these factors to the
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manufacturer) from the main productive function of the manufacturer. The difference is simply one of degree and not of kind.

The purpose of this classification is to determine clearly the source of each element of cost so that any fluctuation in expense can be immediately traced and definitely located. Again by resolving the productive processes into their component factors there is offered a basis for the determination of standards. It is this feature of the productive factors that brings their consideration into line with the principles of organization and scientific management.

Without doubt Mr. Church has laid down the correct principles for the obtaining of cost data—i.e., the elimination of as many of the indeterminate elements as possible—the reduction of the “overhead” to its lowest terms. Furthermore in his attempt to express the cost of the various “services” in terms of the time of the operation of the tool he has given a method which comes nearer to presenting a complete understanding as well as a means of control of the process of manufacture, than any heretofore given. It may be said in brief that his whole organization system depends upon tracing all the various productive factors until they converge “at the point of the tool;” while his cost system depends upon the allocation of the “burden” which accompanies the productive factors. No matter how much the cost accountant may disagree with the author as to the practicability of determining actual costs in such minute detail, nevertheless, he must acknowledge the author’s criticism of the “Averaging” method as unscientific and as affording a cheap way out of a practical difficulty to be just. The chapters on apportioning indirect expense, control accounts, costs and the Financial Books should be read by every accountant.

INDUSTRIAL PLANTS, THEIR ARRANGEMENT AND CONSTRUCTION, by Charles Day. Published by The Engineering Magazine, N. Y. City, 1911. Price, $2.00.

The majority of industrial engineers have devoted their energies to the solving of the problem of wastes due to inefficient factory operation. Mr. Day has adopted as his specialty the study of losses due to poor plant location and construction.

The engineer who can point to a wobbly tool needs to use little argument to convince the manager that he is suffering losses. The engineer who discovers losses due to poor location in respect to power supply or improper sanitary conditions has a different proposition to demonstrate. Cause and effect are not so closely associated or at least not so objectively demonstrable. The subtle wastes due to lost power either in the engine or the laborer are more difficult to trace, but are just as important in determining the margin of profits. The business world is to be congratulated that a man of Mr. Day’s proved ability has projected the methods of scientific management into the field of industrial construction, a province hitherto little studied. His book is a record of the methods employed in the construction and reconstruction of some of the most successful factories in the United States. The author has applied
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the principles he advocates in the construction of his book. The chapters in the first part deal with the building of a manufacturing plant. Every step is given its proper place and proportion. Although much detail is necessarily employed, the reader is aided by the use of novel and interesting diagrams which guide him easily through technicalities and methods which appear involved when dependent upon words alone for their description.

The book, we believe, is the first permanent record of the principles and practice of scientific works in design and construction. The following chapter headings indicate the general character of its contents: General Classification of the Work; Determination of Specific Requirements; Selection of the Site and Definition of Building and Equipment Features; Detailed Plans and Specifications; Construction Work and Installation of Equipment; Period of Occupation and Commencement of Operation; Routing, A Prime Factor in Layout; Metal Working Plants; Machine Shops and Their Specific Requirements; Modern Industrial Plants; Value of an Engineering Organization and Construction Service.

In closing this notice of Mr. Day’s valuable book we might add that it is just as suitable for the accountant’s library as it is for the engineer’s. Perhaps it is more important that accountants read this book.


A business man in choosing his books upon scientific management would do well not to overlook Mr. Perrigo’s work on Construction, Equipment and Management as applied to the Modern Machine Shop. It complements in an admirable manner the works already named above. Part One shows the principles of construction as applied to machine shops of a manufacturing plant. What Mr. Day has done for the general subject of construction, Mr. Perrigo has done for the specialized field of The Shop. With this in view the author has discussed in a clear and forcible manner the practical problems connected with the best design, arrangement and construction of a plant for the manufacture of a medium sized class of machinery. With this object in view the author has included many engravings showing the general plan for suitable buildings of a size, form and capacity for the usual work, arranged in a compact form of modern construction and supplied with all necessary conveniences for readily and economically handling the material and product. The book as a whole contains 208 engravings, designs and drawings especially prepared by the author.

Part Two, which treats of Machine Shop Equipment, is not as its title implies a dry and technical enumeration of appliances. Its scope is broader. Each important piece of equipment is not only completely described but its setting as a necessary part of a business organization is given. It is this that supports the reader’s interest, since the machine’s
usefulness is judged by its effect upon the firm’s commercial efficiency. It is not only the machine or tool as such that he describes, but it is the equipment as a profit producing factor in the business.

Part Three, Machine Shop Management, arouses the reader’s curiosity to know in what manner its treatment will square with those modern ideas advanced by Mr. Brandeis, Mr. Going, Mr. Gantt, Mr. Church and Mr. Day. The reader is not left long in doubt, for the first paragraph shows the author to be abreast of all modern ideas which may help the machine shop achieve its highest efficiency. "There is no truer illustration of the statement," says Mr. Perrigo, "that ‘old things have passed away and all things have become new,’ than is shown by the modern methods of the management of the manufacturing enterprises of the present day. The days of the one-man engagement have passed away and in their stead have come the management by a system of divided and properly distributed responsibility, whereby the real head of the establishment takes up only the consideration of the larger, broader, and more comprehensive questions of importance in management, leaving to his able assistants the questions of the next grade of importance, and in their special spheres, while they, in turn, divide the next grade of lesser responsibilities with their assistants, the foremen, and so on down through the several grades of less importance to the operators or workmen.”

It is not surprising, then, to discover further that the problem of apportioning the fixed charges is solved somewhat after the methods of “production centres” and a “supplementary rate” advocated also by Mr. Church, although the author here does not attempt to discharge so many different and independent “incidences” of expense into the one element of “Machine Rate” as is done by Mr. Church. Mr. Perrigo keeps to the older classification of fixed charges. This chapter on costs and the following one on the tool and stock room will prove to be exceedingly suggestive to the accountant since not only the general principles of arrangement are treated of but many forms are printed showing how the records are made and kept in accordance with the author’s system of development.

The Journal is glad to note the recent appointment of Mr. William Plender, of the firm of Deloitte, Plender, Griffiths & Co., London, England, President of the Society of Chartered Accountants of England, to a very important committee recently appointed to ascertain and consider, among other things, the existing financial relations between Ireland and the other component parts of the United Kingdom. Among the other members of the committee are Sir Henry Primrose, ex-Chairman of the Inland Revenue; Chairman of the Committee, The Most Rev. Denis Kelly, Bishop of Ross, and Lord Pirrie.

This recognition of the Accounting Profession in England will be of interest to accountants everywhere.