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Significant Developments in American Industry and Accounting*

BY F. R. CARNEGIE STEELE

The origin of accounting was doubtless contemporaneous with the origin of commerce and credit, and it is well known that the double-entry principle that still remains the foundation of all modern bookkeeping was devised and practised successfully in Italy 500 or 600 years ago, approximately when the Venetian merchants, who then dominated the world of commerce, found it necessary to adopt the Arabic figures that we now use, in place of the cumbersome Roman system of numeration. In more recent times the most significant factor in the development of the science and practice of accounting was the industrial revolution in Europe, which, resulting from Watt's invention of the steam engine in 1769, marked the inauguration of the so-called "factory system," whereupon manufacturing processes, conducted mainly as domestic activities, were transferred to factories utilizing mechanical power and equipment and employing paid workers in large groups. Thus, with the growth of the factory system and the rapid expansion of various types of industry, the need for more elaborate and more precise forms of accounting than formerly were necessary became increasingly apparent, although such evolution of accounting was not rapid in the United States and for many years failed to keep pace with the country's remarkable industrial and commercial development.

RECENT INDUSTRIAL INNOVATIONS

Within the past twenty-five years, however, and more especially during the post-bellum period, highly significant changes have occurred in American industrial and commercial life. These have been accompanied by equally noteworthy developments and improvements in the science and practice of accounting, and by a widespread recognition of the paramount importance of accurate accounting methods, not only for those actually engaged in industrial and financial enterprises, but also for investors, customers, employees, the courts, the regulatory commissions, taxation authorities and the general public.

* Address delivered at the annual meeting of the Associated Industries of Massachusetts, Boston, October 20, 1926.

Significant Developments in American Industry and Accounting

Among comparatively recent industrial changes in America may be noted the inception and growth of entirely new industries of great magnitude, such as those producing calculating machines, motor cars, airplanes, moving pictures, radios, oil combustion heaters, electric refrigerators, etc., all of which have opened wholly unanticipated markets for their needs in raw materials, labor and equipment, and, in turn, have been compelled to find markets and marketing methods for their own products, superseding in some instances certain older industries such as those producing horse-drawn equipment, bicycles, phonographs, etc.

Another notable industrial development relates to mass production, a modern method by which great quantities of a single standardized article are manufactured through focussing upon a manufacturing project the principles of power, accuracy, economy, system, continuity and speed, so that there may be delivered in quantities a useful commodity of standard material, workmanship and design at minimum cost. The experience of the Ford Motor Company, a leader in this movement, has been that mass production precedes mass consumption and makes the latter possible by reducing costs, because where production is increased costs may be reduced, with accompanying decrease in selling price and increase in the number of people able to buy the product.

Most noteworthy of all is the striking change that is taking place in the attitude of employers and employees toward wages and conditions of labor, especially in the larger enterprises and in the larger trade unions, a change which plainly shows a definite trend towards partnership in profit through participation by labor in resulting gains, and towards better leadership in industry and commerce. The department of commerce maintains that under this new conception of industrial solidarity the very essence of great production is high wages and low prices, because production depends upon a widening range of consumption that is only to be obtained from the purchasing power of increased wages and increased standards of living. Upon this basis progressive employers are resorting to labor-saving machinery, to chemical and scientific research for better processes, to the elimination of waste and to better administrative methods, instead of resorting to wage reduction in times of stress, with the remarkable result that the output of American industry actually increased 60 per cent. between 1914 and 1923, while the number of wage-earners

increased only 27 per cent. during the same period. Moreover, the hours of labor are being steadily decreased.

MANAGEMENT PROBLEMS

The inauguration of new industries, the promotion of mass production, the advance in the wage scale, the exacting requirements of governmental departments, and the need for fuller utilization of manufacturing facilities in the face of increasing competition both at home and abroad, have brought as natural corollaries many new problems affecting the successful administration of our manufacturing plants and the profitable distribution of their products. Mass production has necessarily led to mass selling. In order to arouse public interest and create a consumer-demand for the products of industry, vast sums are spent upon new and ingenious forms of advertising, and, in meeting the demand thus stimulated, our entire credit system has been brought under an unprecedented strain through widespread resort to instalment sales, acceptance corporations, coöperative merchandising, etc., as means for facilitating the massed marketing of our products.

Increasing pressure for new outlets for increasing production, and new complications resulting from hand-to-mouth buying, buyers' strikes, etc., have also evoked some new and startling economic doctrines. For example, W. T. Foster, Waddill Catchings and Garet Garrett have recently urged that since it is consumption and not abstinence that stimulates production, it is no longer necessary to conserve, or a duty to save, and their injunction is to consume to the utmost and to disregard thrift as an outworn custom. But thrift, and the well tried precepts of Poor Richard, may not be lightly disregarded, and the sounder and more general belief is that because underproduction creates scarcity and speculation, and overproduction results in losses, suspensions and unemployment, complete information as to productive capacity, volume of production, cost of production, stocks and styles of commodities and as to their current consumption in every industry, is vitally necessary if stable industry and stable profits, without undue margins and speculation, are to be secured.

Among the varied problems confronting business executives are also those incidental to a recent change in industrial leadership which has shifted from private ownership to corporate man-

agement, through the modern trend towards the corporate form of organization for business enterprises that now are owned by upwards of 15,000,000 stockholders who actually can exercise little authority over the management of their properties. Quite recently the stockholder's right to adequate information concerning his investment was discussed by Professor William Z. Ripley of Harvard University in a noteworthy article published in the *Atlantic Monthly* which has aroused widespread interest, where, in emphasizing the need for corporate publicity and sound accounting, he very pointedly said that American business affairs, in so far as they have assumed the corporate form, are still too largely carried on "in twilight," and he suggested that all corporations (except banks and common carriers) might be brought under the control of the federal trade commission, with special reference to matters of accounting.

THE PRIME IMPORTANCE OF ACCOUNTING

In the solution of all such problems of production, distribution and finance under modern operating conditions the prime importance of accounting as an essential agency in promoting and facilitating executive control and in developing public confidence in organized industry is becoming more and more widely recognized and its functions and spheres of usefulness are constantly increasing.

Only recently a committee of the Boston chamber of commerce, after conducting an analytical survey of an important but declining industry in New England, called attention to the need for better accounting and administrative procedure, and in presenting recommendations for adoption in that industry said: "Introduce modern cost accounting principles even in the smallest plants to properly determine both direct and indirect costs and aid in the fixing of sales prices; introduce budgeting methods; develop effective production control to facilitate deliveries and assure regularity of operation; adopt and develop standards of labor performance which would increase skilled labor, increase earnings of workers and lower production costs; adopt an open-minded attitude to change so as to overcome the stagnation due to tradition and to assure more effective methods of production and distribution."

Moreover, the United States department of commerce is actively promoting a national campaign for the elimination of in-

dustrial waste and the promotion of simplification and standardization in industry. Among the major objects of this campaign are the reduction of periodic waves of unemployment due to booms and slumps of the business cycle; improved statistical service as to production, distribution, stocks and prices of commodities as a contribution to the elimination of hazard in business and wasteful speculation; reduction of waste in manufacture and distribution through the establishment of grades, standards of quality, dimensions and performance and through the reduction of unnecessary varieties; the development of scientific industrial and economic research as the foundation for genuine labor-saving devices, better processes and sounder methods.

Again, the fabricated-production department of the chamber of commerce of the United States has recently stated that if there is one thing more than another which a manufacturer ought to know it is the cost of the products he is selling, for it would be hard to conceive of the head of a manufacturing business signing cheques for unspecified amounts in favor of those from whom he buys goods, yet that is exactly what he is doing when he sells his product and does not know its cost. Therefore, the department holds that one of the most valuable services to be rendered to the manufacturing interests of the country is in relation to the extension of cost accounting and in the installation of carefully designed methods of accounting control. The same organization has also reported that one-quarter of the effort, time and money expended in our factories is utterly lost, and that excess variety and lack of standardization represent one of the most outstanding wastes chargeable to management. Therefore, the chamber states that "competition, efficiency in production, scientific research and elimination of industrial waste all operate in the scaling down of costs and prices and are forces now more in evidence than ever before. As one outstanding means for this waste elimination, simplification and standardization continue to enlist the interest and active support of many of our far-seeing commodity producers." In this relation it may be noted that the national campaign for the elimination of industrial waste and the promotion of simplification and standardization in industry has not only aroused widespread interest in those important subjects, but has also vindicated the soundness of accounting principles long advocated by many accountants and practical men, more particularly in relation to the allocation of manufacturing burden

Significant Developments in American Industry and Accounting

(or overhead), the utilization of standard costs and the practice of budgeting as applied to business enterprises.

ALLOCATION OF MANUFACTURING BURDEN

For many years industrial accountants have held that a most important development in cost accounting relates to procedure for separating the fluctuating expense due to idle factory capacity from normal manufacturing cost. Thus the true working cost of an article should be found irrespective of whether a factory is working at full capacity or is half idle, but such cost was not obtained under the old methods of distributing burden by means of percentages, because those percentages merely represented rough approximations and furnished misleading results. The importance of having idle factory capacity separated from normal cost is apparent in almost every department of accounting, but it has a special bearing on three of the most vital elements of success in business: (1) the determination of a non-fluctuating basis for estimating and settling sales prices on new lines of product; (2) the determination of a uniform basis for valuation of stock on hand and material in process, on the correctness of which the accuracy of the periodical balance-sheet absolutely depends, and (3) the determination of a normal manufacturing profit on the several lines of manufacture, so that their relative profitability can be distinguished.

Under the older cost methods overhead expenses were spread too thin in times of forced production and were massed too heavily in periods of slight production, giving in the former case costs artificially low and unfair to the management, and in the latter case costs artificially high and unfair to the consumer, and costs which the market could not sustain. To bring out with distinctness the importance of the relation between the cost and selling departments, and the necessity for distinguishing between idle and used factory capacity, there may be considered the case of a new plant with an inadequate volume of business, or any plant which from some cause has an insufficient volume and no prospect of an immediate remedy. Here the loading of the expenses of the whole plant upon the inadequate output would produce excessive cost figures tending to discourage a selling department or to arouse a suspicion that competitors were selling below cost, whereas a strict separation of all expense of unused capacity would result in competitive prices and would create the

confidence in which larger sales at lower prices could be made, until little or no idle capacity remained and a reasonable profit could be obtained.

Under modern cost procedure overhead expenses are absorbed and distributed through burden centers, or machine rates, upon the basis of a normal year (careful distinction being maintained between the avoidable cost and the unavoidable cost of unused capacity), a basis which does not imply, however, that actual overhead costs are compromised or abandoned, because actual expense must be currently compared with estimated expense, and any differences revealed will disclose to an executive inefficiencies that must be eliminated, advances or decreases in cost not anticipated, or costs artificially low or high because of abnormal or subnormal production. Of somewhat similar import is the proper treatment of selling expense and administrative expense in many highly seasonal businesses, where sales volume fluctuates widely from month to month while salesmen are paid large commissions on orders taken, rather than on shipments made. Here, if disbursements for selling expense and for administrative expense are charged off as disbursed from month to month, it is apparent that those months in which shipments are heavy may show abnormal profits while for other months of diminished shipments losses may be incorrectly recorded. In order that the monthly operating accounts of the plant may not misstate actual results under such conditions, accurately planned methods for distributing these expenses over the entire year must be adopted, and for this purpose it is often advantageous to disregard sales (either of the current year or of a preceding period), as a basis for distributing selling and administrative expense, and to adopt as the basis for distribution a composite computation wherein orders taken, shipments made and unfilled orders on hand are all brought into account.

THE UTILIZATION OF STANDARD COSTS

In harmony with the modern method of allocating manufacturing burden another accounting development advocated by industrial accountants, the utilization of standard (or predetermined) costs, has recently been approved by the sponsors of the national campaign for the elimination of industrial waste and the promotion of simplification and standardization in industry, as a further recognition of the principle that whenever a factory

is operated below capacity, increased production can be accomplished at a decreasing cost per unit of output, through relative reduction in expense. Obviously, the use of current costs (without regard to volume of production) results in showing abnormally high costs in periods of subnormal production and unusually low costs in periods of abnormal production, yet sales prices vary in exactly the opposite direction so that costs are low when high selling prices can be maintained, but are high when selling prices must be low in order that sales may be effected.

The job-cost system or system of detailed costs that was formerly favored has proved to be unnecessarily cumbersome, costly and only partly effective, with the result that many progressive manufacturers have abandoned it and are adopting the standard-cost principle, which has been developed to meet the need for more constructive cost information than was available under the older form. The newer plan places emphasis upon vulnerable points in factory operation where failure to reach the standards set will result in loss or inadequate profit, and it discloses this information by drawing attention to significant exceptions showing any marked deviation from the standards established. Under this method, which gives effect to procedure recommended by the chamber of commerce of the United States, an executive currently supervises the operation of his plant through comparison of actual results with predetermined standards, constant comparison being made between actual results and standards, and variations from standards being brought currently to his attention. Standard costs, being flexible, may be recomputed from time to time to reflect new conditions, but they must be susceptible of analysis into elementary standards, so as to reflect truly the efficiency of operation. Thus, the constituent elements entering into the total cost of an article should be so developed in detail that each element of standard cost has a significance in relation to the functional cost of operation of the plant. For example, standard unit costs for labor operations should be established, against which actual labor costs, accumulated by operations, should be compared, in order to gain a clear view of the efficiency of the management; so the best practice takes into consideration (for purposes of verification), not only the new method, but also some of the essential features of the old job-cost method shorn of all redundant procedure.

With regard to the establishment of standard unit costs for materials and with regard to the stock accounts for materials, it may be noted that in the past the commonly accepted method of recording consumption of materials at original cost has tended to obscure the results accomplished and has failed to provide the correlation which many authorities believe should be maintained between purchasing on the one hand and manufacturing and selling on the other hand. So if manufacturing is to be placed on a truly competitive basis it should not be unduly charged with a loss or credited with a gain that has resulted solely from disadvantageous or advantageous purchasing, but should be on an equal footing with competing industries operating under open market conditions. Therefore, it is believed that the utilization of standard costs for materials used, computed approximately at replacement value, in place of purchase cost, may also serve to determine the efficiency of a purchasing department, for if a comparison should show that the actual charge for material consumed was higher than the replacement charge, it would indicate that purchasing had been indiscreet or untimely, and this fact ought to be disclosed and ought not to be submerged in the general accounting results.

BUDGETARY CONTROL

A further development in the art of management relates to budgetary control. For many years some organizations have roughly estimated in advance their probable volume of business, probable costs and operating profit, but only recently has such procedure been recognized as practicable in the conduct of an industrial enterprise. Yet budgeting, as a means of forecasting the course of a business with some degree of accuracy through careful analysis of past performance and full consideration of future trends and possibilities, is manifestly a logical development of cost finding, to be intelligently formulated for the purpose of predicting future conditions and planning future policies, and for the purpose of gaining a supercontrol and coördination over all the activities of a business.

In calling attention to the importance of budgetary control as a means of promoting simplification and standardization in industry, the United States chamber of commerce has recently rendered a noteworthy service and has explained that budgetary control may merely mean a multiplication of useless forms, the only effect of which is to hamper and impede production and sales,

Significant Developments in American Industry and Accounting

or it may mean the wise conduct of business and the subordination of pleasant dreams to actualities, for a budget must be predicated at least upon a knowledge of what a plant can do, what are reasonable sales expectancies, and what financial resources are required and available for the sales and production programmes. The budget as applied to industrial enterprises contemplates the setting up of standards of performance that are expected of the business as a whole, as well as of the several departments and, as the periods covered by the budget elapse, there appear in review the actual results contrasted with such standards, and thus the degree of success or failure in meeting such pre-established goals is consistently revealed.

Extensive research and analysis are requisite before the foundation of effective budgetary control can be established. Markets, both domestic and foreign, must be carefully surveyed in establishing sales quota; production and engineering studies must be made as to the time required to produce goods and as to their cost; the purchasing programme must be intelligently planned with regard to required deliveries of materials; overhead expenses must be thoroughly analyzed and allocated to production units or departments, and working-capital requirements must be carefully computed. Budgetary control shows the executive what sales may be expected in ensuing months, so as to assist him and his sales department in directing sales effort, since the sales quota established by the budget sets a definite mark for attainment. It also establishes production quota, based on the estimated sales, as the result of which the factory manager may plan production well in advance, specifying the amount and kinds of material that will be needed. It forecasts the size and kind of working forces that must be provided; the amount of overhead that will be expended; the requirements in machines and equipment, and it is of great value to the purchasing agent and to the financial executive in gauging working-capital requirements. An executive equipped with a carefully prepared budget, coördinated with a cost system, can obtain a monthly profit-and-loss statement compared with the estimated results predicted in the budget; a monthly balance-sheet showing the actual assets and liabilities compared with their anticipated condition; a monthly comparison of costs of products against standard or budgetary costs, and a monthly comparison of operating costs and of overhead expenses with their standard or budgetary allowances.

CONTROL OF WASTE AND DEFECTIVE WORK

In industrial life the new conditions that have led to the adoption of labor-saving methods, simplified practice, mass production, standard costs and budgetary control have also led to further utilization of the resources of accounting as an aid to management, with the result that modern accounting is constantly aiming at a closer insight into the actual operation of industrial and commercial organizations and is allying itself with the technical departments engaged in the work of research and direction, in order, first, to shape systems of accounts in the closest conformity with the essential character of the operations, and, second, to give the technical and administrative departments the best means of gauging the money values of actual results. For purposes of administrative control in the conduct of all productive operations, the study of the cause of shrinkage, or loss, or waste of materials in the processes of their conversion from the raw state to the finished products is of the highest importance. Such losses, of course, may be entirely physical, visible and separated, as are all kinds of cutting losses, and then they are subject to some kind of physical measurement. They may be minimized through improvement in design of product, through care in avoiding spoiled units of production, through efficiency in the purchase, care and issue of materials, and through seeing that materials are not allowed to become obsolete; but their occurrence and their incidence should always be clearly defined in a well planned system of accounting. On the other hand, they may be either physical or chemical and not visible, as in the case of materials lost in solution, evaporation or chemical processes and thus may call for laboratory investigation if they are to be analyzed and their causes identified. Accounting ordinarily can determine the quantities of such wastes and can show their fluctuations so as to indicate general efficiencies and net results, but in such cases it is through the work of the chemist in conjunction with process accounts that certain causes and their operation can be traced and connected with money values and with their ultimate effect upon profits.

LABOR-*SAVING* AND MECHANICAL DEVICES IN ACCOUNTING WORK

There is probably no form of accounting that could not be conducted with absolute correctness by means of the old-fashioned set of three simple books (cashbook, journal and ledger), but such accounting by the old method would require one hundred bookkeepers where ten now suffice. Since accounting itself is nothing

but a device discovered and elaborated by human experience for the purpose of conserving business energy, the increasing volume and complexity of business transactions under modern conditions of intensified production have naturally led to various forms of simplified practice and to the development of many ingenious devices by which the clerical labor of dealing with large masses of figures and elaborate computations is greatly reduced. Through one noteworthy advance in this direction, books and accounting records are now planned so that modern bookkeeping is largely conducted in summarized form, giving totals under controlling captions, in order to avoid the unnecessary labor of detailed ledger postings. Other recent inventions of great utility in lessening clerical expense include manifold devices for both handwritten and typewritten records, by one of which, for example, records of shipping, billing and journalizing, which formerly were effected as separate operations, can now be produced simultaneously; loose-leaf records, card records and filing devices, applied especially to factory accounting, and various forms of calculating and tabulating machines through which involved computations can be made in a few seconds and by purely mechanical means that otherwise would require tedious and laborious figuring. Some of these combine calculating with typewriting mechanism in various ways with a great saving of time and effort, while certain statistical machines analyze, combine and tabulate with remarkable speed and certainty any required number of groupings of original facts concerning almost any class of transaction, and these are especially useful in cost calculations and sales statistics.

GRAPHIC CHARTS AND STATISTICS FOR PURPOSES OF
ADMINISTRATIVE CONTROL

A graphic chart bears the same relation to figures that illustration bears to language: each detail in the picture is in its allotted place and in its exact relation and proportion to all other details of the picture. For demonstrating facts in a quantitative way, for recording facts in great variety and for computation whereby many mathematical processes can be performed without labor, a graphic chart is the best instrument that has yet been evolved, and it is being extensively adopted as a standard method for the promotion of greater efficiency in executive control. In presenting operating statistics through a graphic chart (a subject very clearly treated in recent publications by Codex Book Co., Inc., of

New York, notably in Savage's *Graphic Analysis for Executives* and Haskell's *Graphic Charts in Business*), a complete mental picture of all the facts expressed in the figures is visualized and conveyed without mental effort and without slighting important factors, and analysis of the results so presented is greatly facilitated. Unusual features are made apparent at once, and by the height and depth of the peaks and valleys variations in magnitude may be readily discerned and corrected. Charts furnish a continuous story of a business, produced through the process of connecting by a line the results for each period to the results for the preceding period, and they effectively demonstrate the essential principle of comparative measurement. Another significant feature of charts is that they bring out prominently any departure of a business from normal, since the salient facts are boldly set forth as the plotted line or curve is displayed beyond the normal field whenever results are abnormal.

Since the aim or purpose of all accounting reports, including those relating to costs, is to present the significant points of the story of the operations of the business in a manner to conserve the time of the busy executive, charts affording unique facilities for detecting defects in operation provide the readiest means for reporting unit costs, aggregate costs, production (by processes or departments) and sales and profits. With regard to budgetary control, the various estimates, embracing sales, cost of sales, expenses, production, estimated cash receipts and estimated expenditures, must be prepared with adequate recognition of the interrelation of the various activities and of all the factors affecting them. Budget control charts not only enable an executive to determine the soundness of a budget before approving it, but they offer a continuing comparison between estimated, actual, and required results, and through them there may be presented in chart form a current analysis of the budget estimates in detailed comparison with actual results from period to period.

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In thus briefly reviewing the character and scope of some of the principal resources of modern accounting, it becomes evident that through their systematic utilization the salient features of operation in any industrial organization can be currently and concisely set forth for the information of an executive, in such a form that no vital aspect of the things which are transpiring shall be obscured or overlooked.