

University of Mississippi
eGrove

Individual and Corporate Publications

Accounting Archive

1920

Value of cost accounting in commercial laboratories

William W. Caswell

Follow this and additional works at: https://egrove.olemiss.edu/acct_corp

Part of the [Accounting Commons](#), and the [Taxation Commons](#)

Recommended Citation

Caswell, William W., "Value of cost accounting in commercial laboratories" (1920). *Individual and Corporate Publications*. 114.
https://egrove.olemiss.edu/acct_corp/114

This Article is brought to you for free and open access by the Accounting Archive at eGrove. It has been accepted for inclusion in Individual and Corporate Publications by an authorized administrator of eGrove. For more information, please contact egrove@olemiss.edu.

[Reprinted from the Journal of Industrial and Engineering Chemistry,
Vol. 12, No. 1, page 79. January, 1920.]

The Value of Cost Accounting in Commercial Laboratories

By William W. Caswell

[Reprinted from the Journal of Industrial and Engineering Chemistry,
Vol. 12, No. 1, page 79. January, 1920.]

The Value of Cost Accounting in Commercial Laboratories

By William W. Caswell

THE VALUE OF COST ACCOUNTING IN COMMERCIAL LABORATORIES¹

By William W. Caswell

TREASURER, ARTHUR D. LITTLE, INC., CAMBRIDGE, MASS.

I truly appreciate the honor of being invited to present this paper before you to-day, and it is with diffidence that I approach the subject of cost accounting as applied to chemical laboratories, but I have found the knowledge of costs of the greatest value in every line of business with which I have been connected, and not by any means the least in a commercial laboratory.

Not so very long ago cost accounting was practically unknown, and in the business where it was not employed it was considered a frill and just so much red tape; in fact it was looked upon by the executive of the average corporation as one of the black arts, and most executives had as much knowledge of cost accounting as they had of quadratic equations. The men of sound business principles, however, and those forced by competition or through the nature of their business to make only a small margin of profit on a large output, soon realized the danger of treading an unknown way without a light to guide them. The haphazard methods of guess-work as to what is manufacturing cost may be all very well for a concern making only one article and that of the simplest variety, but take, for instance, the manufacture of automobiles with all the different parts both made and purchased, and the man who attempted to run such a business without an adequate knowledge of the costs would commit financial suicide.

We all look upon the government supervision of our incomes, both individual and corporate, as a necessary evil, but in reality it has not been an unmitigated evil, for this supervision which has been brought about by control of prices and the collection of taxes has taught a great many of us not only the value of keeping accurate accounts, but also the necessity of knowing exactly what our costs are in order to arrive with some degree of definiteness at our profits. Government statistics show that out of over 250,000 corporations in the United States less than half are making money and that only about 5 per cent have any accurate idea of what their costs are. This is a sad showing, and I venture to say that in the case of the 125,000 which are not making money the fault, in a great majority of cases, lies in their not knowing their costs.

Let me point out a few of the advantages of a cost system as applied to general business before taking up the advantages to the commercial laboratory.

¹ Presented before the 58th Meeting of the American Chemical Society, Philadelphia, Pa., September 4, 1919.

In the first place, and I cannot lay too much stress on this point, it makes for greater efficiency in that it enables the heads of the departments to keep in intimate touch with the minute details of their departments, and also enables the executives of a corporation to tell at a glance whether the departments themselves are functioning properly.

In the second place, if certain lines of work are not profitable the cost figures show the reason for the loss. It may be that the cost of manufacture is too great and can be reduced, or it may be that there is excessive waste in time or material; whatever the trouble is, it can readily be ascertained.

In the third place, cost accounting provides a periodical balance sheet which affords a comparison of the business in the different periods, and also shows whether the business as a whole is making steady progress.

And in the fourth place, a cost system necessitates a standardization of the activities of a business with standard methods of obtaining the required data, and makes this data easily available for all sorts of uses.

These few instances I think point out, or at least hint at, in a general way, some of the advantages of knowing the costs. I venture to say that those of you who are not using a cost system to-day would be only too glad of an opportunity to obtain a more intimate knowledge of your business if you had the chance. The advantages of a cost system are well known, not only to all accountants, but to all those executives who have studied accountancy, not with a view of compiling columns of figures, but of accurately reading and understanding what these figures show, and what they mean when applied to the business as a whole.

So much for the general aspect of cost accounting. The question now arises as to how, even if we wish, we can apply this practice to a laboratory, for it can be justly said that you are talking about manufactures and we do not manufacture anything. We have no raw materials which enter into our business; we have no machines on which to figure a machine hour rate; in fact we have no elements in our business to which cost accounting is applicable, but you have, and the fundamentals of cost accounting apply equally as well to the chemist as to the manufacturer. Of course no one system of cost accounting can be laid down to cover all business activities. It is not possible to apply a certain system bodily to any one business group, nor is it possible to take a system and apply it to more than one laboratory without some changes which are essential to the individual business, but the general principles apply to all.

The basic elements of cost are three in number: prime cost, direct expense, and indirect expense. I have found it a great help in any cost system to keep these three great divisions clearly in mind. They of course can be subdivided in various ways, but we should never lose sight of the main divisions. The prime cost is made up of raw materials and direct labor only. Now

in a commercial laboratory we have no raw material to deal with; therefore, let us eliminate it from the cost system, which leaves for the prime cost only direct labor; chemicals and apparatus form the direct expense, and overhead or burden the indirect expense. Now certainly with these three elements of prime cost, direct expense and indirect expense, we have something upon which to work, and we can build from this firm foundation a cost system which can be applied directly to any individual laboratory, no matter how large nor how small.

In a commercial laboratory where the work is being done for outside clients, what you are really seeking is the cost of your services, that is, the cost of the salaries of the chemists who are working in the laboratory. Thus the prime cost, or the man's time, plus the direct expense of chemicals and apparatus is the direct cost of the work. To this direct cost must be added indirect expense, such as rent, depreciation, taxes, insurance, light, heat, etc., and also the indirect cost of management and supervision, which may be classed as overhead, in order to arrive at the total cost. Once the total cost of the work is ascertained, the next step is the percentage of profit which is reasonable for the work done, and the final figure is the charge to the client, or selling price.

This latter point, namely, the making of prices, is a very important one. We all have a certain scale of prices at which we take work, but whether we are making a profit on these prices, only a laboratory with a cost system can tell. Some may be too low and our profit as a whole comes from other work; for instance, if we are doing coal and B. t. u. analyses for \$5 and water for \$35, we may find that we are charging too little for coal and too much for the water analyses, and that a charge of from \$10 to \$12 on coal is necessary for us to make a reasonable profit and that we can make the same percentage on the water at \$25. Besides, with a cost system we then have an actual foundation for our prices and are not merely "following the crowd." A well-rounded price list which provides a recognized margin of profit on all work is bound, in the long run, to make more profit for the concern than large profits on some classes of work, to make up for losses on others taken at too low a figure.

Let us outline for a moment the work of a large laboratory, such as Arthur D. Little, Inc., with which I am familiar. We have coal, water, steel, oils, ores, paints, metals, cements, in fact everything, coming in for analysis. There are manufacturers who are having trouble with their processes as installed and who want them straightened out. There are concerns which want an entirely new process for making some article; individuals who wish to have us construct paper mills, distillation plants, or to change their present plants over to other lines of business. In fact, research problems of the largest magnitude are often put to us on the one hand, while on the other we have those requiring merely the common sense treatment which can be easily handled by correspondence. You can

readily see what would happen if the prices for such divergent lines of investigation were to be fixed by guess-work and how important it is in a laboratory of this size to have an accurate idea of the cost of the work upon which one can readily and easily base one's prices.

So these diversified lines lead to a natural division of the work into departments. There is the analytical department, to which all analytical work is assigned, the engineering department for designing and construction work, the research department for research problems, a paper and pulp department, textile department, food laboratory, cement laboratory, and other divisions, if the volume of business warrants. Once a division in the work has been made, the inquiry naturally arises, is such and such a department paying a profit, and to find out you must know accurately the cost of such a department. The same necessity for knowing costs applies to the small laboratory, for the main divisions of a large laboratory can be subdivided to a size comparable with the smallest.

At this point I wish to warn you of the great danger of too elaborate a cost system. The tail may very easily wag the dog, and a system be installed which requires too many clerks to keep it up and which furnishes a lot of useless figures.

Beware of red tape! No system of ascertaining costs should be left to an accountant alone to install. The executive is the person who knows what figures are of value to him and it is the men in charge of the organization who should tell the accountant what they wish to learn from the costs. Start with the very simplest system of collecting costs; it can always be elaborated upon, but the elaborate system if installed at the start will in all probability break down of its own weight and cause discouragement and fault finding.

The great benefit of cost accounting to the executive is derived from the knowledge of how to make use of the figures when once they are collected, and to learn the lesson which they teach. Of course it takes some time to collect the necessary data in a laboratory, to be able to say with certainty that this determination or that requires so many hours, but if over a period of a year we have let us say, one thousand coal analyses and these analyses have been made by three or four men, your figures at the end of the year will give you a pretty good working average for the length of time necessary to make one analysis, and knowing this, one can very easily estimate the average cost of such work and can set the price accordingly. Having arrived at the average time for such analyses, if there comes any wide variation in the cost it immediately attracts attention and the cause for such deviation is at once looked into and corrected.

Leaving the executive and the importance of cost accounting to him for a moment, let us look at the individual chemist who is working at the bench to see of what benefit a cost system is to him.

That cost accounting makes for efficiency there can be no doubt. The individual takes a pride in the quick accomplishment of his work, or if he does not take a pride in it, he knows that his short-comings will be called to the attention of the head of his department.

I have been cautioned not to go into the details of cost accounting in this paper and therefore will not take up the method of collecting the necessary data and applying it to a particular job. Suffice it to say that each chemist in a laboratory works regularly a certain number of hours, and our unit then is the salary cost per hour of each man plus the direct expenses, plus a figure which represents his proportion of the indirect expenses for that hour. Each man turns in a time slip every day showing the number of hours he spent on a case and from this slip the cost figures are made up.

One might imagine from this that the individual chemist has no further interest in the cost system, and that once he has made out his time slips, provided they are only average ones, he can get by and hears nothing more from it. If it took a certain man a short time to make an analysis he gets no praise; if it took him a longer time he is blamed. If cost accounting or a cost system only goes as far as this, it has failed miserably in one of its chief functions. The time spent by each man every day is of course recorded and the time and cost for each case is made out, giving the heads of the laboratories the costs they require, but here comes the application of cost accounting to the individual. As it is necessary to record his time against the case on which he is working, a record of the entire time of the individual is kept, irrespective of what case he may be working on. At the end of the accounting period this individual record shows whether a man has done efficient work or not, and in each case of good work, that man is not only rewarded by praise from the head of his department, but also, in many instances, by a cash bonus, both of which tend to show the individual that his work is appreciated.

I may be pardoned if I go into the details of the cost system for just a moment to bring out this fundamental application of cost accounting to the man at the bench more clearly, and give an example of what I mean. Suppose a man is getting a salary of \$1 an hour, or \$8 a day, and the proportion of the overhead of that department is another dollar an hour for each man working in it. It would therefore cost the company \$2 an hour for every hour of that man's time. Let us also suppose that a certain analysis takes on an average four hours (the length of time having been ascertained from figures compiled over a year or more, and hundreds of similar analyses). We know, therefore, that it will cost \$8 to make such an analysis and have determined upon a profit of 25 per cent of the cost as our selling price. This will make the charge to the client for this analysis \$10. Now each man's individual record is kept as a profit and loss in dollars and cents on his sheet for each and every case he works on, and his value to the company

is shown by the totals of these profit and loss columns at the close of each period. Therefore, if a man completes the analysis mentioned above in the average time of four hours, his individual record will show a profit of \$2 on that case. Should he, however, take five hours to do the work which an average man can do in four, his record shows no profit. If, on the other hand, he can complete the analysis in three hours, his profit will be \$4. If good work such as this last instance continues, and this man at the bench is earning more for the company by his skill and efficiency than the average, he certainly is entitled to a raise in salary or a cash bonus, besides recognition from his head of the department. In this way you can plainly see the details of cost accounting immediately become of vital interest to the man at the bench and, as I said before, not only lead to pride in his work but to increased efficiency.

To return to the executive,—be sure to draw a distinction between mere details and the information you are trying to acquire. The figures, the totals, and the costs themselves are only incidentals; it is what these figures and costs show that is important. That is, it is the summarized costs which point the trend of the business and it is necessary to have these in order that the information may be available. One can dig into them as deeply as one wishes if one wants to get at the details. A properly organized cost accounting system is a well of information from which can be drawn the conclusions necessary for controlling the entire policies of the business. An executive without a cost system is like a ship without a rudder. He may strike the right course, but the chances are very much against him, and if his competitor has a system of costs he can steer by compass and can forecast with certainty where he will arrive.

If, in this brief paper, I have succeeded in arousing your interest sufficiently to make each one ask himself whether he could improve his business by installing a system of cost accounting, why I have accomplished all, for there is only one way to find out and that is by installing such a system, and I say without reservation that once the proper system is installed, the next question you will ask yourself will be, "How did I get along all this time without it?"