Journal of Accountancy

Volume 17 | Issue 1 Article 1

1-1914

Interrelation of Financial and Operating Data

Walter A. Staub

The Journal of Accountancy

Official Organ of the American
Association of Public Accountants

Vol. 17 JANUARY, 1914 No. 1

The Interrelation of Financial and Operating Data

By Walter A. Staub, C.P.A.

Not more than a generation ago, an "audit" frequently, if not usually, consisted of a comparison of vouchers, *i. e.*, receipts for moneys paid, with the record of payments as set forth on the credit side of a cash book and the verification of the cash balance at the end of the period under review. The correctness of the record of receipts as set forth on the debit side of the cash book was more often than not simply taken for granted. The report consisted either of a notation on the cash book at the closing date of the audit period reading, say, "Audited and found correct" and signed by the auditor, or it consisted of a very brief letter or certificate stating, for example, "I have audited the accounts of Blank for the year ended 31st December 18— and found them to be correct."

A survival of this form of audit is still to be found in the "audits" conducted by auditors appointed by the courts in estate cases—the audit in such cases consisting largely of an inquiry as to the items for which the executor, trustee or other fiduciary agent should account and the integrity of the account as regards the expenses claimed to have been paid or other disposition made of the funds of the estate. In such audits comparatively little consideration—in fact, it may be said ordinarily no consideration —is given to the degree of efficiency with which the trust has been administered.

Great advances have been made in the field of public accountancy in the past generation—yes, even in the last five years —and the professional accountant of today must have a broader

vision than his forerunner, and must be prepared to assume responsibilities which would make the practitioner of earlier days shudder. Business methods are different today from what they were before the telephone and typewriter had come into use, and so the public accountant of today can no longer be a mere checker of vouchers as in the early days. He must be able to visualize the operations of a business; that is, he must be able to see them in such a way that he may point out unfavorable tendencies, inefficient or improper management, and in general render constructive service.

To be sure, the accountant's responsibility, or what is expected of him, is not yet alike in all cases. Some business men who avail themselves of the accountant's services do not yet realize their scope or possibilities or are not prepared to accept services other than auditing in the narrower sense of the word. Even though this be true in some cases, however, every progressive accountant feels an ever increasing responsibility and realizes that the demand of the times is for greater efficiency and usefulness of service.

All that has so far been written will be generally admitted, and the question is: How can the accountant increase the value of his services and best measure up to what is already expected of him in many quarters and fit himself to meet the ever expanding requirements?

One way to do so is to take advantage of every opportunity to relate or connect the data appertaining to the physical side of his client's operations with the statements reflecting the financial aspect of the operations. This is by no means a new or novel plan, but it is not used by all accountants as fully as it might be and the value and importance of it are, perhaps, not realized by all accountants as much as they should be.

Need for Relating Financial and Operating Data

A well arranged statement of earnings and expenses serves a useful purpose and conveys more or less valuable information. It is difficult, however, for an interested party to determine from a study of a statement showing merely the amount of money earned, the amount of expenses incurred and the resulting profit or loss, how efficiently the operations of an enterprise have been

conducted. Furthermore, it is extremely difficult, and in many cases impossible, to compare the relative efficiency of two concerns in the same line of business when only their financial statements are available for comparison. When we leave the realm of strictly business undertakings and consider municipalities and institutions, the comparison merely of their financial statements is usually of little significance.

Now in many industries and in many governmental and institutional functions, a unit of production or service can be found for expressing the volume of production or service, which can be used to show the realization and cost per unit of production or service. In many factories the variety of product is such that it is not possible to fix on any one unit of production which can be made the basis for stating the volume of production or sales of even one department, not to mention the entire factory.

For instance, a machine shop doing a jobbing business or manufacturing only on orders according to the purchasers' designs, could not express its production or work done in terms of any one unit which would indicate the volume of production and consequently permit of ascertaining the cost per unit of output or of sale. The same thing is true of printing shops, furniture factories and many other manufacturing establishments which will readily come to the reader's mind. For such concerns, more or less detailed cost accounts are necessary in order to permit of the management's critically studying the operations. It is surprising, however, how many industries do lend themselves to the treatment indicated, *i. e.,* that the operations can be stated not only as to their financial results but also in a broad way as to the volume of either production or sales in terms of a given unit, from which data the realization and cost per unit can then be determined.

Industrial Units of Production

Among the industries whose operations are susceptible of such treatment, may be mentioned the following:

Industries	*Units of Production*
Mining:	
Coal	Ton coal
Iron	" iron
Precious metals	Pound metal
Quarries	Ton stone
Lumber camps or saw mills	Thousand feet logs or lumber
Coke ovens	Ton coke
Cement mills	Barrel cement
Foundries	Pound iron, brass or other castings; or ton of cast iron pipe
Rolling mills	Ton or pound of bar iron, shapes or rails
Blast furnaces	Ton pig iron
Flour mills	Barrel flour
Linseed plants	Gallon oil
Tanneries	Dozen skins (kid) or square foot hide (calf or kid)
Automobile factories	Machine (where only one type is made)
Spinning mills	Pound yarn
Knitting mills	Dozen garments
Textile mills	Yard cloth, ribbon, etc.
Creameries	Pound butter

In some businesses there is but one final unit, as in coke manufacturing, where the unit is the ton of coke produced. In others, for instance knitting, there may be a general unit, such as dozen of stockings or underwear, but different sizes thereof. Consequently care must be exercised, when dealing with a concern of the latter class, in using the total quantity of production, as unit costs are in such cases really averages of a number of varying units and the proportion of large and small sizes in the total output may vary from one fiscal period to another.

Even in such cases, however, it is often found that there is considerable uniformity from one period to another. For instance, underwear is usually sold with a given assortment of small, medium and large sizes in a given quantity. The accountant's experience and judgment must indicate to him just how far it is safe to make use of a general or average unit of production in a business where one absolutely uniform unit does not obtain.

The fact that in some factories which have a standard unit of production, such as yard of cloth or dozen of underwear, there are many different grades or qualities of articles produced

must also not be overlooked. This may be the case to such an extent that it would not be safe to base any conclusions on totals of units which are uniform as to quantity but not as to quality. On the other hand the volume of production and sales is valuable information, even though the averages which would be obtained by dividing such quantities into the corresponding money amounts might be of little value or even misleading. This is another case for the accountant to bring his good judgment and past experience to bear in deciding how far to go in making use of such data.

The unit of production may vary with the successive processes in a manufacturing operation for which there is one final unit. As an example may be cited the manufacture of cement. Here the final unit is the barrel of cement made and the figures showing the total number of barrels produced and sold respectively, the cost per barrel made and the realization per barrel sold during a given period are in themselves sufficient to give quite an insight into the operations of a cement company, especially if they are considered by one having some familiarity with the market conditions which obtained during the period under review.

Much valuable information is obtained, however, if the volume of each of the operations preceding the ultimate production of cement is ascertained and correlated with the cost chargeable to each operation. This would involve ascertaining the following data:

Operations	*Production Units*	*Operation Costs*
Quarrying	Tons cement rock and limestone*	Total quarrying cost
Grinding	Tons ground rock	Total rock grinding cost
Clinkering	Barrels clinker	Total clinkering cost
Grinding clinker	" cement	Total clinker grinding cost

The quantities of rock (ground and unground) and clinker on hand at beginning and end of the period must be dealt with in carrying forward from each operation in the manufacturing process to the succeeding operation the quantity of rock or clinker used and the cost thereof. This offers no particular difficulty.

* If the company does not have its own limestone quarries, the quantity and cost of purchased limestone is best dealt with separate from the quarrying of cement rock.

With this data, the cost per unit in each of the several distinct operations can be easily calculated. The costs in each operation can be analyzed still further, but the data already indicated would of itself be sufficient to permit of valuable comparisons of the operations of one period with those of another, or with the operations of other plants in the same industry.

In making such comparisons, however, it is necessary to compare both volume of operations and unit costs. The volume has a large bearing on the unit cost and an increase in unit cost may be entirely due to a falling off in volume of operations. On the other hand, a unit cost which is about the same or falls slightly from one period to another should perhaps show much greater decreases because of greatly increased volume of operations with correspondingly increased opportunity for utilizing the possibilities of effective organization and system and thinner spreading of the "overhead."

One very helpful feature of a statement which combines financial and operating data and unit realizations and costs is that it makes it possible to determine how far an increase or decrease in profits is due to a rise or fall in prices of goods sold and how far to a decreased or increased manufacturing cost. This a purely financial statement cannot show. The sales of product may show a decrease in a given period as compared with the preceding period, yet there may have been an increase in the quantity of sales but a big drop in the prices realized. With both the quantity of sales and the average unit realization ascertained, the bearing of each of the several factors is plainly seen.

In addition to giving a better picture, as it were, of the operations than a financial statement alone can do, a combination of operating and financial data, wherever it is feasible to effect it, also has considerable value from an auditing standpoint.

In this connection it is interesting to consider for a moment the famous Kingston Cotton Mill case * which has so often been mentioned in discussions on inventories and the auditor's responsibility regarding them. In this case the padding of the inventories was continued over a period of years to bolster up decreasing profits. During the entire period in which the falsifi-

---

* The essential facts in this case will be found in the court's opinion in MONTGOMERY'S *Auditing, Theory and Practice,* pp. 577-579.

cation was practised, the company's accounts were being regularly audited.

An old saying has it that "hindsight is easier than foresight" and it is not wise to criticise too harshly the practitioners of twenty years ago who had not the light which we enjoy today. Yet it may safely be said that had the auditor in this case not rested content with accepting the manager's certificate to the correctness of the inventory and preparing a profit and loss account on a currency basis only, but had carefully considered the available operating data, or—as it might also be put—had constructed a profit and loss account dealing with the *quantities* of yarn and cotton on hand at beginning and end of each period, and of cotton purchased and yarn sold during the period, and making allowance for the usual loss of weight in manufacturing, the fraud would surely have been discovered. The quantity of cotton and yarn in the inventory would so far have exceeded the quantity called for by the foregoing calculation, that the discrepancy would have invited searching investigation.

Another use of operating data by the auditor, somewhat analogous to that just described, is the use of it as a basis for determining approximately the profits which should have been realized from a given volume of operations. For instance, in the linseed business, there is a more or less definite relation between the market price of flaxseed and the market price of linseed oil which is extracted from flaxseed. If a linseed manufacturer eliminates the speculative element from his business by "covering" sales of oil with purchases of flaxseed options, the profit to be realized may be figured by multiplying the number of bushels of seed which were put through the process by the expected rate of profit per bushel of seed. Of course, it will not work out exactly, and disturbing factors other than fluctuations in the price of seed (the raw material) and of oil and linseed cake (the products) at times may be encountered, but the very fact of reckoning with these factors and determining their effect will be a satisfaction in stating the operations and may result in placing valuable information before the client.

Public Utility Units of Service

The operations of most public service corporations lend them-

selves very readily to the correlating of their physical and financial aspects in a combined statement. It is in this field, too, that probably the widest use has been made of this method. The most generally used service units, as they may in the case of such operations be called, are as follows:

Utilities	*Units of Service*
Railroads	Ton mile (freight); passenger mile
Electric railways	Car mile; car hour; passenger
Electric light and power	K. W. hour
Gas companies	1,000 cubic feet gas
Water companies	1,000 gallons water

The telephone companies form about the only class for which it is difficult to find a satisfactory service unit. If only the city exchange business had to be considered, the problem would be easily solved, as the number of calls made would be a natural and satisfactory basis for stating the volume of operations and for determining the revenue and operating cost per unit of service (the individual call). The long distance service, however, introduces a complicating factor, as the total number of calls in one period, resulting from the combining of local and long distance calls indiscriminately, is very likely to be noncomparable with a like total for another period and particularly for another district. When the revenue and the operating expenses of strictly local business can be completely segregated from those appertaining to long distance business, the calls made can be very satisfactorily used as a basis for stating volume of operations and unit cost of operation and unit revenue.

In the case of some utilities, the operations must be divided into two or more sections and a distinct service unit used for each. In the case of railroads, for instance, the revenue and operating cost of freight and passenger service must be segregated if the units of ton mile and passenger mile are to be employed. As to the revenue this is readily done, but as to the operating expenses this is not so simple, as many of the expenditures are for the common benefit of both classes of service. The maintenance of way and general expenses are pertinent illustrations.

When it is borne in mind, however, that in determining manufacturing costs, a very considerable portion of the factory expenses must be apportioned among the various articles manufactured on a more or less arbitrary basis, there is really no

reason why in the case of railroads and similar utilities expenses which apply alike to several different classes of service should not be apportioned among the several services in a way that careful observation and study indicate to be as fair as possible. Unless such a separation or apportionment is at least attempted, the cost of performing each different class of service is not even approximately known, and with the ever increasing regulation of rates charged by public utilities this is surely most important.

Of course, the units shown are by no means all that can be employed. Different units may be applied to various groups of operating expenses, as, for instance, the cost of maintenance per mile of track and in turn the number and cost of ties per mile of track and so on.

Governmental and Institutional Units of Service

It might at first glance be thought that expenditures for various kinds of governmental service or functions would hardly yield themselves to the kind of treatment which has been advocated for the stating of industrial and public service operations. It is true that for some kinds of services it is most difficult to find a satisfactory unit of service; on the other hand it is also true that careful study and analysis show that such units can be found for expressing the quantity of various kinds of service and for stating the cost per unit of service more often than might be thought.

In the case of water works, gas plants and similar utilities, the same service units would naturally be used as by public service corporations. In the case of garbage disposal, for instance, the tons removed would express the amount of service; of street cleaning and street maintenance, the square yards of street area cared for; of police and fire service, the population served or square miles covered, or both; of inspections of various kinds, the number of inspections of each kind made.

For schools the cost per pupil and for hospitals and asylums the cost per patient are good units. Effective use of such unit costs can be made by comparing the cost not only in one city with that in another, but also by comparing say, the cost per pupil at one school in a city with the cost at other schools of the same grade in the same city.

Some years ago the writer's firm, in reporting on the accounting methods of one of the large cities of the country, recommended that the classification of the city's expenditures by activities, functions or operations

be developed into a complete cost system by extending it to provide also for the complementary records or statistics of the quantity of work performed or service rendered. Thus sufficient data would be available for determining not only the total cost of a certain kind of service such as street cleaning, but also the length and area of streets cleaned and the cost per square yard. * * * The importance of developing the city's accounting system along the lines indicated is especially emphasized when it is remembered that the ultimate test which may be applied to determine whether or not a business enterprise is successful cannot be used to determine the efficiency of the conduct of a municipality's financial affairs. Business administration in the ultimate analysis has in view the earning of profits, and the accounts, if intelligently stated, will show how far this end has been achieved. On the other hand governmental administration is not concerned, directly at least, with earning profits but with rendering services to the community which presumably are to be paid for at cost by the community by means of taxes or special assessments. Hence it is that comparatively slight changes for the better or worse in the results of the administration of *business* enterprises are automatically brought to the attention of an ordinarily observant management by the fluctuation in net profits for succeeding periods of operation, while the cost of exercising governmental functions or performing public services may gradually increase in greater proportion than the growth of population or other causes warrant without the fact being noticeable excepting to the unusually vigilant. Even if expenditures do not increase, the service rendered may not represent full value for the expenditure made and yet the fact not be so obtrusive as to attract the attention of the average taxpayer.

Actual or potential competition tends to compel the manufacturer or merchant to give adequate value for the money received from his customers. This spur to efficient service is almost entirely wanting in governmental administration. There is no competitor offering to furnish a better article or more efficient service for the same expenditure. It is only in the case of municipalities operating such enterprises as lighting or water supply plants that a private corporation sometimes assumes the role of the competitor by offering to operate the plant more efficiently, and to the greater financial benefit of the city or the consumers or both, than the city appears to be able to do.

There is another very important distinction between business enterprises and municipalities which has a decided bearing on the expenditures of moneys in connection with their administration. In the case of business undertakings their revenue is limited to the return from their expenditures, and extravagant or unnecessary expenditures are not offset by a corresponding return of income. There is thus an inherent necessity for keeping expenditures within the bounds of the income which they may reasonably be expected to produce. On the other hand, municipal expenditures are not, in the main, expected to produce direct revenue and the rate of taxation may be indefinitely increased to provide the funds for making extravagant or unwise expenditures.

It is obvious that detailed information, not only as to the cost but the quantity of service rendered, must be had before the taxpayer, or those representing him, are in a position to commend or criticise intelligently the administration of the city's activities.

Soon after the report, from which the foregoing extract is

quoted, was made public by the commission for which it was prepared, DR. WILLIAM F. WILLOUGHBY, assistant director of the census, read a paper on *The Correlation of Financial and Physical Statistics of Cities* before an annual meeting of the National Municipal League. The bureau of the census in its published statistics of cities has for some years been comparing the unit cost for certain kinds of municipal service in various cities.

In the city before referred to, a complete cost system has since been installed for the board of education. The expenses, classified as to tuition, supplies, building maintenance, etc., are kept separate for each of the schools in the city, there being considerably over a hundred schools in all, and costs per pupil are worked out for the various classes of expenses. The comparison of the costs at the various schools and of the expenses for maintenance of buildings and of equipment at the different schools yields information of great administrative value.

In conclusion, it may not be amiss to quote from another public report on unit costs as related to municipal service which also applies to some extent to the consideration and comparison of unit costs shown for the operations of industries and public utilities.

> Unit costs are of great value for administrative and other purposes, but they are only one of several factors which have to be taken into consideration in determining whether or not a city's activities are being efficiently conducted. A low unit cost is not in itself conclusive evidence that real economy is being exercised in conducting the affairs of a city or institution. For instance, the cost per capita of operating the city homes and hospitals might be very low as compared with similar institutions elsewhere and at first glance it would seem that they were being operated on a remarkably economical and efficient basis. As a matter of fact, however, the low cost might be secured by supplying insufficient food—or of an inferior quality—to the inmates, or by having too small a staff of doctors and attendants, or again perhaps by "skinning" the maintenance of the buildings and other equipment, *i. e.*, by failing to spend the amount required to maintain the equipment in the best of condition and in keeping with the most modern standards. This being so, it is desirable that unit costs shall be obtained not only for the operation as a whole, but for the component parts thereof. *E. g.*, the cost of conducting homes and hospitals should be shown not only in total per capita, but also the per capita for such leading items as salaries of attendants, subsistence, clothing, house furnishings, repairs, etc.
>
> Furthermore, in conjunction with the ascertaining of unit costs as a basis for intelligent criticism of the conduct of the city's affairs, it will always be necessary to make observations at close range of the manner in which work such as that at the city institutions is being carried on, whether it is in accordance with the best practice or whether methods are antiquated and behind the times. Methods of caring for the unfortunate,

particularly the insane, have undergone radical changes in recent years, and the design of the buildings and the auxiliary equipment required for the housing and treatment of the patients have likewise been vastly improved.

We would not have it inferred from the foregoing paragraphs that unit costs and comparisons between different localities have little or no practical value. Of necessity the conditions obtaining in each case must be learned, but the conduct of municipal activities tends toward an average percentage of efficiency the country over, and a notable divergence from the average cost indicates a necessity for ascertaining whether a high cost is due to a high standard of service performed or whether it is due simply to extravagant or inefficient management; and, on the other hand, whether an unusually low cost be due to higher efficiency than the average or to a lower standard, *i. e.*, poorer quality of service. As a general rule, it may be said that the comparison of the cost of conducting the activities of one city with costs of like activities elsewhere will indicate to a very considerable extent, even if not conclusively, the degree of efficiency of management in the city under consideration. Certainly if it costs less to perform the same service elsewhere it behooves a city to ascertain whether the quality of the service being performed elsewhere is equal to its own, and, if so, whether it is not feasible to reduce the cost of its own service. On the other hand an abnormally low cost compared with that in other localities may well raise the question whether the community is performing the full measure of its obligations to its own citizens.