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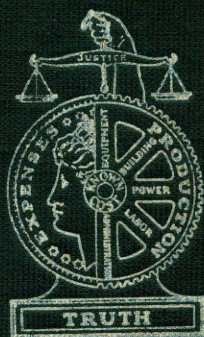
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FUNDAMENTALS OF
COST *and* **PROFIT**
CALCULATION

DENHAM



To the library of the
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the author

Robert S. Derham

Cleveland,
August 28,
1918.

FUNDAMENTALS OF
COST AND PROFIT
CALCULATION

A VIGOROUS DISCUSSION
OF THE VITAL ELEMENTS
OF BUSINESS

By

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*Manual of Cost Engineering and
Estimating, The Science of
Costfinding, Etc. Etc.*



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PREFACE

MR. BUSINESS MAN:

This book is written for *you*. It is intended to help you to throw the searchlight of analysis into those recesses of your business heretofore darkened by the cobwebbed traditions and formulas handed down from the age of the tallow candle, the ox cart and the quill pen.

The two most vital factors in business are *Cost* and *Profit*, but few there are who can, in any transaction, define the point where the elements of *Cost* cease to accumulate, and *Profit* becomes a reality.

It is extremely important, now more than at any other time in the history of America, that business men know the cost of doing business, the cost of manufacture, the cost of distribution, and the extent of the profits in the business.

Thousands of concerns not profitably conducted are forced to pay taxes on profits which do not exist, because unthinking and misinformed accountants have established incorrect methods of calculation. For the same reason others who should pay taxes will go free.

Every business should be profitably conducted. Every business should pay its fair

Preface

share into the treasury of the nation and state; but how shall there be certainty as to profitableness when the ancient methods of calculation in common use are misleading? How shall fairness and justice be upheld when costs and profit in modern business are calculated by methods which have been obsolete for generations?

We are confronted today, in a time of serious concern, with the deplorable facts that the accounting profession has clung too long to its ancient formulas; that it has offered no practical solution for many of the more important industrial and commercial problems; and that there is no evidence that it is now engaged in any recognizable effort to meet the needs of the hour.

The author offers no apology for breaking away from traditional methods. He is hampered by no "professional ethics" which forbid departure from so-called "standard accounting practice," thereby destroying initiative and balking progressive development, but discarding precedents, breaking the idols of "authorities" whose theories date back to other times when conditions were simpler than now, he places every problem of Cost under the test of logical analysis.

Preface

The crying need is for facts: the facts of cost, the facts of profits, not the camouflage of meaningless, mythical phrases such as cost accounting offers in "prime cost," "factory cost," "labor cost" and "gross profit," nor the Stygian mystery of that cesspool of ignorance "overhead expense."

Every element of expense is definite, in amount, in purpose and in benefit. The line between loss and profit in every transaction can be known within a fraction of one per cent. The profit on each sale and on the business as a whole can be accurately determined, if you know how.

But the ancient methods must be discarded. The uncertainty of "overhead" and "gross profit" must give way to the definiteness of practical Cost Engineering. Theories and formulas must be replaced by analysis and reason. There must be coordination between modern business and methods of calculation.

It is the purpose of the author to show insofar as the limitations of this popular-priced book will permit, what the elements of cost are, the correct rules for calculation, grouping and distribution of same, the correct methods of determining the cost of pro-

duction in factories and the cost of merchandising.

In view of the fact that practically all school textbooks teach incorrect methods of calculating profits, and not to exceed ten per cent of those whose duties include the making of selling prices know the correct method, a chapter on that subject will be included.

The aim will be to make each statement as clear as possible, to back up each recommendation with the reason for its presentation, and where truth and justice will be served by digression from the traditional methods in common use, to convince the reader that the difference is not only justifiable but worthy of acceptance.

Further, the author hopes to leave in the mind of every reader the impression that the information he has gained is not only worth the expense and time required to obtain it, but that it will in a practical manner serve as a basis for more successful business methods in the future, so that profits may be developed from hitherto unprofitable sources, and permanent good will established.

Sincerely,

THE AUTHOR.

CONTENTS

Preface	3
1. The Philosophy of Cost and Profit.....	9
2. Direct Expenses.....	19
3. Indirect Expenses.....	29
4. Economic Expenses.....	43
5. Determining Cost.....	59
6. Selling Prices and Profits.....	77
7. Making Cost and Profit Statements.....	95
8. The Terminology of Cost Engineering..	105
Index of Terminology.....	116
General Index.....	117

“One of the first things that a man has to learn in business is how little he can do by himself. When he finds that out he begins to look around for people to do what he can’t.”—Henry Ford.

CHAPTER ONE

THE PHILOSOPHY OF COST AND PROFIT

What is Cost?

We grow so accustomed to the use of common words that we rarely stop to consider their definitions. In fact we consult the dictionary, as a rule, only when we encounter some word that is new, or that is used in an unfamiliar sense. As a matter of fact there are many words in common use by persons who should know better, that are used without thought of their true meaning. One of these is "cost."

We hear the merchant speak of his "cost" when he has reference to the amount charged him in the invoice for the item, without regard to the other expenses which have been involved in carriage, warehousing, protecting and handling the goods.

We hear the manufacturer use the term "actual cost" when he has in mind only the elements of material and wages paid the workers who are directly engaged in the production of the item under consideration.

We hear the accountant glibly talk of "prime cost" when he has in mind the same elements, and of "overhead cost" when he refers to the other expenses involved in the operation of the factory and the distribution of its product.

It is possible to convey information clearly and definitely from one mind to another only when each speaks the same language and understands the meaning or definitions of the words used, therefore the author requests the reader to follow carefully the definitions presented herewith, that he may fully understand the viewpoints and methods presented.

The cost of an item of product is the sum of the expenses involved in its production and distribution up to the moment at which cost is determined.

This is the first fundamental principle of Cost Engineering.

Cost is the sum of certain expenses. Being a sum it must be a definite amount. Two methods, therefore, which produce different results in the effort to determine cost, cannot both be correct. Both may be wrong, or one may be right and the other wrong.

Expenses are the elements of cost. Part

of the expenses cannot be cost. Cost is nothing less than the sum of all of its elements. If a cent is omitted, or a cent included that is not involved in the production of the item under consideration, cost has not been determined correctly.

The expenses of a business, or of the operation of a factory, are definite, and limited. It is possible to so analyze these elements that each may be exactly known. The total is then easily ascertainable.

When the items of product of the factory differ in size or character it is necessary to know definitely the cost of each lot of like items produced. If one lot or item has been charged with expense which belongs on other product, an overcharge exists, not only destroying the accuracy of the result in connection with the item under consideration, but preventing correct determination of cost on the items which should have borne the amount thus overcharged. The sum of the costs on individual lots of product for a given period should equal the total of the expenses involved for the same period.

The problem presented by a factory which manufactures a single commodity, as cement, beer, etc., is simple compared with

the problem of cost determination in a factory where every lot is different from every other lot, as is the case in factories making goods to order upon specifications provided by the customers, as in the manufacture of metal parts, stampings, printing, etc.

Every individual expense item is definite (1) in amount, or it could not be recorded; (2) in purpose, otherwise it would not be authorized; and (3) in benefit, for it is to procure some definite thing, either a commodity or service, more desirable than the amount of money involved, that the expenditure is made.

Expenses may be classified into two primary groups: *Direct* expenses and *Indirect* expenses.

Expense items which have but one beneficiary, to which they are chargeable in total, without distribution, are direct expenses.

Expense items which have two or more beneficiaries, requiring distribution, are indirect expenses.

These divisions have long been recognized by cost accountants, but someone, generations ago, thoughtlessly assumed that more or less of the direct expenses might safely be used as a basis for charging the indirect expenses, and

later generations of accountants have, without question, accepted the formulae as authoritative. The slightest effort in the direction of analysis will prove that no expense is basic, and that such methods have no foundation in fact.

No accountant would think of adding together the direct items of material and direct wages on a hundred orders and distributing the total to the individual orders upon some arbitrary and unrelated basis, because, being direct expenses, he can make the charge to each without necessity for distribution. Yet, for many decades, since the introduction of labor-saving and automatic machinery, the standard practice of cost accounting has been to mass the unrelated indirect expenses into an "overhead" or "general expense" account and distribute the total upon a purely arbitrary and unrelated basis, as for example the direct labor expense, or the total of material and direct labor expenses.

As no expense item is basic, and no group of expenses is basic, such methods are purely arbitrary and have no relation to facts.

That men who are otherwise intelligent will advocate and follow such practices is prima facie evidence that the principle of ex-

pense distribution is unknown to them. Further, it is proof of the power of precedent to so enthrall its devotees that they will follow established routine long after progressive changes in correlated factors have made such methods ridiculous.

As the result of analysis it is found that every element of cost is related directly to certain definite processes or functions of the business; that where division of benefits require distribution of the expense item, the divided parts can be measured and proportions determined, so that in every case the charge can be made in such a manner that the proportions of expense charged will be identical with the proportions of benefits conferred.

Cost accounting recognizes no principle of expense distribution, but depends upon purely arbitrary methods. It uses the only method possible where an overhead expense account is created. The creation of such a mass of unrelated expenses in itself defeats the possibility of correct distribution because it combines elements requiring different kinds of units for expressing volume, whereas the practical distribution provided in cost engineering requires that all of the factors of a

group should be measurable by a common unit.

Correct expense distribution, then, is accomplished by considering each element in relation to the benefit conferred, combining the elements in groups only when the factors of the group consist of items providing identical proportions of benefits, all of which are measurable by a common unit.

In succeeding chapters the various classifications of expenses will be considered, the principle of expense distribution presented and explained, and methods of determining the cost of articles or items outlined.

Hazy as is the definition of cost to the average man, it is little if any less understood than the word "Profit."

Profit is that part of the "price" for which an article is sold which remains after the cost has been deducted.

Percentages of profit are correctly expressed only when they relate to the selling price as the base, or 100%.

The profits of a period are expressed in relation to turnover.

Statements, frequently seen in the public prints, which assert that 100% or 200%

profit, or other percentages above 100 were or can be made on the sale of goods, simply display the ignorance of the person responsible for the statement.

If an article costing one cent is sold for one dollar the profit percentage would be 99. It is inconceivable that 100% profit could be made on a transaction, for such a condition would exist only in case the goods sold cost nothing, and no expense, even that of time, was involved in the conduct of the business.

A very common but erroneous method of calculation is to compare the profits with the investment, expressing the relation by percentage.

Such errors and the consequent confusion are due to the fact that the accounting profession has no definite terminology. An effort to establish a correct terminology in connection with the science of Cost Engineering was made by the author several years ago in "A Catechism of Costfinding" now practically out of print. A similar effort is included in this book under "The Terminology of Cost Engineering."

No scheme of figuring profits can be considered practical which does not include in

cost every element chargeable either immediately or eventually as an expense item.

Profit is always the net increase in tangible assets due to the active transactions, or sales, of business. It has no relation to investment.

Interest on investment is not profit, but is the wage of financial energy. It is a form of fixed expense that has no relation to activity or the transactions of business.

Increased value of merchandise, due to fluctuations in price, is not a part of profits. The actual sale of the goods at a higher price, because of the market fluctuation, will undoubtedly yield a larger margin of profit, but the profit cannot exist until the sale is actually made:

The anticipation of profits, because of market changes or the carrying of goods in a warehouse at a valuation which is higher than their cost, and thereby anticipating profits, is never justifiable.

No profit exists until the transaction has been carried forward at least to the point where the recorded charge for the item sold exceeds the total of the outlay for the item and the expenses of conducting the business.

Fundamentals of Cost and Profit Calculation

Gross profit is a myth. The term was originated and is used to designate a percentage applied to part of the elements of cost for the purpose of arriving at a supposedly profitable selling price in which neither the cost nor the amount of profit is definitely known. It is a makeshift term, practicable only as a means of avoiding an admission of ignorance of true cost.

Further discussion of "Profits" will be included in the chapter entitled "Selling Prices and Profits."

CHAPTER TWO

DIRECT EXPENSES

Direct Expenses are few in number, compared to Indirect Expenses, and present practically no problem to either the accountant or the Cost Engineer.

A direct expense item is one expended for the benefit of but one beneficiary.

It may be chargeable to an individual factory order, an individual manufacturing process, a class of product, or, in the case of an office or store, it may be chargeable to an order, a department or a class of merchandise.

A direct expense item is always chargeable in total to a single account or beneficiary. It never presents a problem in expense distribution because its benefit is never divided.

The major direct expense items are the material chargeable to a factory order and the amount of wages paid to workers engaged in production on individual factory orders.

The minor direct expenses are, repairs to machinery, which should be charged directly to the process for which the machine is required; the supplies required for processes;

indirect wages for service in connection with an individual process; the cost of replacing spoiled material or product; expense for sharpening tools, or replacing points and knives worn out or destroyed in the operation of processes; freight or cartage on shipments which require such expense in excess of the usual cost of delivery; advertising used in connection with special lines of product, etc.

Many items which are direct in relation to a process are indirect in relation to the factory order. In determining classifications the relationship must be considered.

Early in the history of the race each individual or family existed upon the product of its own energy, but when the advantages of specialization became apparent, men began specializing in the things that they could do best, and serving their neighbors, who in turn selected other special work, so that exchange of product took place, and there was developed what we now call "trade."

One man made shoes, another clothes, another built houses, thus originated the shoemakers, the tailors and the building trades. As the demand became greater than the individual worker could supply he took on as

helpers other individuals to whom he taught the "trade," and thus he became an employer.

Rivalry sprang up between the workmen, each striving to do his work more skillfully than his fellows. Since the quality of the output and speed of production depended largely upon the condition of the tools used, the careful workmen found it most practical to provide their own equipment, thus avoiding exchanges with careless workmen which might occur if the tools were owned by the employer, and the rights of usage common between them.

In those days there were no power-driven machine tools requiring heavy investment on the part of the employer. Neither power, repairs nor machine supplies were necessary. Consequently, the major items of expense were for materials and the wages of the workmen.

Product was comparatively uniform in character. No such factory organizations existed as are common today. It was both possible and practicable for the employer to determine a selling price by calculating the amount of the outlay for material and wages applying a percentage margin sufficient to

cover his few other factory expenses, his living, and a fair profit.

To make the employer's problem easier, the absence of transportation facilities in those days limited competition to his immediate locality. No salesmen were calling on his customers with similar goods at lower prices as is the case today. In fact, if his was the only shop in the neighborhood engaged in his particular line he had a virtual monopoly, and the price obtainable was limited only by the keenness of the demand and the ability of his customers to pay.

Changes in methods took place gradually. Labor-saving machines were introduced, making it possible for one man to produce many times as much product in a given time as formerly. Wage rates remained practically the same per day as before, and the employer assumed that he was getting several times as much product as previously with the same expense.

Expenses for power, repairs, supplies, etc., were charged to general expense, or overhead. Little or no consideration was given to depreciation, or interest on investment. Everything except material and direct wages was charged to overhead, the total of which was distrib-

Direct Expenses

uted to orders or lots on the basis of "prime cost," the total of material and direct wages involved.

Gradually manufacturers learned that the expenses of processes had no relation to the cost of the materials; that it cost no more to cut or sew goods costing \$6.00 per yard than to do the same work with goods that cost half as much. The cost of operating a stamping press was the same whether the material being formed was iron or brass. By many manufacturers, material was dropped from consideration as a basic item, and direct wages alone adopted as the basis of distribution.

The automatic machine has all but eliminated the wage factor on many processes. In many factories the variety of processes ranges from hand work, done in the original way with bench and hand tools, through varying processes involving high wage rates and small investments, low wage rates and large investment, to the extreme where one individual attends several machines. Yet the traditional practice of assuming that wages are basic remains the most commonly used method of distributing the indirect expenses.

In hundreds of instances throughout the country, both material and wages are so con-

sidered. Ridiculous though they are, practically all schools of cost accounting still teach these methods. Leading "authorities" on cost accounting, in current publications, cite them as having certain advantages, giving simplicity precedence over accuracy.

Let us test their merit:

The most important of the indirect expenses are for housing, or rent for the space used; equipment, involving depreciation, taxes, insurance, etc.; power, and administration.

Suppose that in a given factory two men are employed, one at a wage of 25 cents, and the other at 50 cents per hour.

If there is a relation between the amount of wages paid to the workman, and the other expenses, the amount of space used by the 50-cent man must be double that used by the 25-cent man. The same proportion should exist in the equipment investment, in the amount of power used, and it should require twice as much effort to supervise, and keep the records of the 50-cent man's time, as to do the same work for the 25-cent man.

The facts are, that as between the wages paid to the workers and the indirect expenses,

Direct Expenses

no such relation exists. Careful analyses made by competent and experienced cost engineers of the individual expense items involved in the operation of over six hundred factories have failed to disclose a single instance where any other expense was in the same proportion, or had any discernible relation to the amount of direct wages paid to the workers.

In fact it has been thoroughly demonstrated that there is no single expense item nor group of items which is basic, or that can be safely used as a basis for the distribution of another expense item, or group of expenses.

The author has been told many times by manufacturers that they had no problem of costfinding because they paid their workers by the "piece." Experience proves that the piecework wage system complicates, rather than simplifies, the work of the cost engineer.

The assumption of the majority of manufacturers who pay wages by pieces, is that because the material cost is the same, and the wages per piece the same, all like pieces cost the same, regardless of the speed or skill of the workers. Let us see.

Suppose two workers are engaged on the same kind of process, using the same equip-

ment, supplies, power, etc., and supervised by the same foreman. One, however, produces 100 pieces per day and receives as pay therefor \$1.50. The other produces 200 pieces per day and receives as pay \$3.00. Such cases are common in actual experience.

Assume also that the overhead percentage as determined by the cost accountant is 100% (a rate in common use regardless of the true proportion of the "overhead burden" to the total of the direct payroll). Adding 100% to the wages paid we find that the result makes it appear that the 100-piece lot cost \$3.00, the 200-piece lot cost \$6.00, and the per piece cost is the same in both lots. What are the facts?

The worker who earned \$1.50 required the same equipment investment as the other, used the same amount of space, the same amount of power, the same supervision. In fact all the elements were identical, except the wages; so that the actual difference in cost of the two lots was not \$3.00, as the accountant figured, but \$1.50. Assuming now that the total of the indirect expenses applied was correct, an equal division would show \$2.25 applicable to each. The cost of the 100-piece lot is now found to be \$3.75, and the 200-piece lot cost \$5.25, or \$2.62½ per hun-

dred. The product of the low wages is found to be the most expensive, while that of the employe receiving higher wages because of greater efficiency is nearly one-third less expensive per piece.

Experience and analysis prove that no expense is basic, that all efforts to use direct wages or other direct expenses as a means of apportioning the indirect expenses are misleading.

We find that while methods of manufacture have been constantly improved until mechanical processes have almost universally displaced manual methods, the accounting profession has failed to keep pace with the improvements. Its "authorities" are still advocating and teaching methods rendered obsolete by the introduction of the first labor-saving machine tool, and are becoming more and more inadequate and ridiculous with every progressive step in mechanical processes of production.

It is time that manufacturers everywhere learned to think for themselves, to discard obsolete and misleading methods, and demand others which, in the light of modern scientific analysis, can be depended upon to show the

true relation between cost and selling price in every transaction.

Direct expenses are not basic cost factors. They are simply expense factors which, having but a single beneficiary, require no act of distribution.

CHAPTER THREE

INDIRECT EXPENSES

In all the history of trade, commerce, and manufacture the indirect expenses of business present the problem hardest of solution.

A brief statement of the early history of this subject was included in the preceding chapter. Only that phase of the subject was covered, however, relating to the use of direct expenses as a basis of distribution.

In a comparatively few instances, an effort has been made in plants having a number of departments doing different kinds of work, to treat each department as though it were a separate factory. Thus in a factory manufacturing agricultural implements departmental divisions would be formed for foundry, forging, machine shop, woodwork, painting, etc.

An effort was made thereby to charge directly to the department as far as the accountant was able, such expenses as seemed to belong to each. The general expenses of the business were then charged throughout either upon the basis of the direct wage payroll of departments or as in a few cases, in the ratio of the totals of the expenses directly charged. The total of these so called "depart-

mental overheads" was distributed over the factory orders in proportion to the direct wages involved, or in proportion to the man hours of the workmen engaged directly upon the orders.

In simple factories, corresponding to the individual departments of the composite factory, the man hour basis is sometimes used by accountants.

Another method of distributing the indirect expenses in factories employing a variety of labor, as well as a wide range of investment in machinery for different processes, is the "machine hour rate" plan.

This plan takes into consideration more or less crudely the expenses involved on account of the different amounts of investment, the varying rates of depreciation, the power required, the floor area occupied, etc., and divides the total by the number of hours that the management estimates the machine should be operated normally during a given period, usually a year.

The rate, thus determined, is added to the direct wages of the workers on each process, and to the sum of them is added the expenses of administration on some arbitrary basis, usually the total of the "prime cost" of the order.

Early in the present century Mr. A. Hamilton Church, an engineer, in his book "Distribution of the Expense Burden," offered a progressive step by suggesting that a factory be divided into units, each of which performed a single type of operation. Each of these divisions was to be treated as though it was a separate factory, although under the same roof, and no dividing partitions existed.

Under his plan every division should be charged with its rent upon the basis of floor area. Depreciation, insurance on equipment, and taxes, should be charged upon the basis of investment, while power was to be charged on the basis of horsepower hours. An hourly rate was then determined by dividing the total by the actual productive hours. This immediately appealed to practical men as being a sound and logical method of handling these expenses.

Thus far Church solved the problem of expense distribution satisfactorily, but his work was incomplete for in the same book he admitted that the problem of distributing the administration expenses, or as he termed them, the "general establishment charges," baffled him. He vigorously attacked the traditional method of charging them on the basis of direct wages, and doubted the practicability of pro-

ductive hours as a universal basis, therefore admitting that he could offer no satisfactory rule for their distribution, he put the problem up to the reader, advising him to use his own judgment as to the method most practical for any individual case.

Church's effort should have recognition as the first radical step away from the traditional formulas of cost accounting, and in the direction of what is today known as Cost Engineering.

All the definite suggestions made by him conform to the fundamental principle of expense distribution, the very foundation of Cost Engineering. Had he gone a little farther, and analyzed his own methods, he would have found that in each case the expense was charged in proportion to the advantage it conferred on the benefited divisions, and that those proportions were always expressed in the term of measure denoting the relative volume of the units. For example, the item of rent being expended to secure usable floor area benefited each division in the proportion of the floor area used. Floor area is logically measured by using the square foot as a unit; therefore the relative number of square feet of area used indicated the relative amount of expense chargeable.

In like manner, since it is the dollars of investment which must be protected against loss through depreciation of machinery; and against fire by insurance; and against which taxes are levied; the dollars of investment in the various divisions indicate the proportions of depreciation, insurance and tax expenses chargeable to each.

In 1908, when the author developed and formulated the fundamental principle of expense distribution he had not heard of Mr. Church, nor of his book, but he had come into contact with the methods which he advocated, and they seemed so logical that he immediately analyzed them to determine the principle behind them.

Through long experience, and by careful analysis, it has been found that the principle, as formulated, applies to every known indirect expense, and is therefore accepted as fundamental. This principle and its method of application will be presented at length as the author proceeds.

An indirect expense item is one which, having two or more beneficiaries, requires distribution.

The reason that distribution of indirect expenses has baffled the accounting profession so long is that in the absence of knowledge of the

fundamental principles of expense, they persisted in grouping unrelated expenses into masses, thereby destroying the possibility of correct distribution.

Every expense item is originally definite in amount, purpose or object, and benefit. The difference between direct and indirect expenses is that whereas the direct expense item has a single beneficiary to which it may be charged in total, the indirect expense has two or more beneficiaries between which it must be distributed, or charged, in proportion to the benefits conferred.

The human mind cannot conceive of a divisible thing that cannot be measured by some unit of weight, measure or count. Therefore it follows that if the benefit conferred by a certain expense item is divisible, it is also measurable. Being measurable, the relative proportions are easily expressed and may be used as a guide for charging the money expended.

One of the weaknesses of the accountants' efforts seems to be a penchant for expressing all proportions in percentages. In the distribution of expenses of manufacture, percentages are not only unnecessary but cumbersome. Proportions and not percentages are important.

Indirect Expenses

While individual indirect expense items are easily distributed, economy of time and effort is desirable. Therefore it is advisable to group expenses for simultaneous distribution wherever such grouping is practicable.

Indirect expenses may be grouped for simultaneous distribution only when their benefits are measurable by a common unit, and their beneficiaries participate in identical ratios.

The inclusion of two or more unrelated indirect expense items in a single account or group, as "overhead," "burden," or "general expense," obscures the purposes of the expenditures and renders correct distribution impossible.

Lacking knowledge of the principles of expense grouping, accountants and others have charged part of the expenses individually according to the best information which they had, and combined the remainder in an overhead expense account for distribution upon some more or less arbitrary basis.

Thus it will be seen that *the extent of the overhead or burden account in any cost system reveals the extent to which the accountant is ignorant of the principles of expense grouping and expense distribution.*

Where these principles are understood and

intelligently applied, it will be found that there is not left a single undistributed item to apply arbitrarily. In fact, if there were a single instance in experience where the principle did not apply clearly, it would be positive proof that the statement of the principle was wrong. Then we would immediately have to search again for the fundamental truth which would cover every requirement.

For ten years the author has discussed this subject with thousands of manufacturers and supervised the application of these principles in hundreds of factories. Not a single instance has he found where these principles, and the others, which all together form the fundamental principles of Cost Engineering, did not fully measure up to all requirements.

This experience, and the excellent results attained through it, must convince the most skeptical that Cost Engineering actually accomplishes all that cost accounting aimed to do but failed; that Cost Engineering is a practical science, and that its principles are as fundamental, teachable and universal in application as the axioms of mathematics.

Fundamental principles are invariable. Rules may be made for applying the principles, but whenever the facts in any case are such that the strict application of the rule

will conflict with the principle, the principle must govern and the rule be changed to meet the condition. For example:

In a factory occupying a building by itself, or a part of a building where the type of construction is uniform throughout, the arrangement of equipment purely arbitrary with the management, and uniform temperature required throughout, the elements of rent and heat can be combined. The total of this group may then be distributed to the factory divisions upon the basis of floor area.

But if certain processes require a special type of construction, different from the rest, so that the arrangement is dependent upon such construction, or if the atmosphere of certain rooms must be maintained at different temperatures because of the requirements of the processes performed therein, then they cannot be combined. Such conditions cause the rule to conflict with the principle that the beneficiaries must participate in identical ratios.

Under such conditions the items of rent and heat should be distributed separately in order that due consideration may be given to the variation in requirements, and each division be charged with these elements in the exact ratio of benefits conferred.

Indirect expenses are of two types and may be classified as "immediate," and "ultimate," or economic.

Immediate indirect expenses are items usually appearing on the books, as a matter of record, immediately upon their being incurred.

These are represented by the following by no means complete list:

Rent, fuel, current or gas for lighting, power, insurance, supplies, salaries, repairs, taxes, telephone, telegraph, postage, wages, compensation insurance, etc.

Ultimate indirect expenses are items that are not usually considered and recorded at the time that they are incurred, but are very generally left for consideration at the end of the fiscal year, if at all.

Some managers hold that consideration of these items is optional with them, and they are all too frequently left entirely out of statements.

Some accountants, fearful that they will incur the displeasure of the client if they show that the business is not profitable, omit at least a part of the items, creating the impression that the business is more profitable than is really the case.

Indirect Expenses

Some managers, especially those who have no interest in a business beyond their "jobs," insist that important items be omitted, in order that the business may show a profitable result when no real profit exists.

Some accountants and many managers for selfish reasons assume that the inclusion of interest on investment is a mooted question, and argue against it because it is to their personal interest to do so.

The accounting profession as a rule holds out against the inclusion of interest except that paid for borrowed money. Within recent years, however, the number of accountants who admit the justice of interest charges on all of the investment has been on the increase.

One unfortunate phase of the situation is that the profession has made no noticeable effort to reach a just and final conclusion in this matter. If it was taken up for formal consideration, it is not likely that even though convinced of the justice of including interest charges, any considerable number of those who have held out against it would admit a change of viewpoint.

A typical instance of the attitude of the older generation of accountants is shown in the following incident in which the author was a principal participant: A manufacturer

who had given an order for the installation of a cost accounting system to an old friend who was a C. P. A. called upon the author to clear up some interesting points of difference between cost accounting and cost engineering methods. The C. P. A. was present, and admitted the soundness of every contention made, but would not yield the point that Cost Engineering as a whole was more practical and accurate than the so-called "standard accounting practice" represented in his system. He gave as his reason his belief that he could not afford to brave the criticisms of the profession should it become known that he had made a concession.

Such is the power of established precedent to hinder progressive development.

The manufacturer, keenly appreciating the value of the differences brought out in the discussion, and the narrowness of the accountant's viewpoint, placed his order at once for the installation of a Cost Engineering System to replace that only recently installed by the C. P. A.

A discussion of the author's reasons for advocating the inclusion of interest on all investment, and other "ultimate expenses," will be covered in the succeeding chapter, entitled "Economic Expenses."

CHAPTER FOUR

ECONOMIC EXPENSES

Comparatively few manufacturers and merchants realize as they should the important truth that assets naturally tend to shrink, while liabilities always tend to increase under indifference or neglect.

Wealth is not created by accident. It is created by the expenditure of energy. Some men may seem to, and a few actually do, grow rich without expending personal energy, but somewhere in the background unseen forces are at work involving the application of a form of energy.

Energy in industry is of three kinds: the personal energy of the individual or the organization; the mechanical energy or power applied to the mechanical equipment; and the financial energy, without which the personal energy and mechanical energy would be comparatively weak.

Finances are the lubricant of industry. Without them the wheels of trade and commerce must cease to turn. The proof of this is seen in the thousands of failures credited to "lack of capital." It is demonstrated on a large

scale in the deep valleys of trade charts marking periods of financial panic.

When the purse strings of the nation tighten, business slows down. At the points where the greatest strain occurs it stops, and failures occur in large numbers.

These three kinds of energy may be likened to the supports of a three-legged stool. Remove either the personal, the mechanical or the financial energy, and the structure of industry topples.

The expenses of personal energy are met in salaries and wages paid to workers. The expenses of mechanical energy are met in the expenditures for power equipment and operation, but the expenses of financial energy, the economic or "ultimate" expenses, being less understood, and slower in exacting the penalty for negligence, are most often neglected.

Economic expenses are the charges, or elements, of cost which must be included to preserve the economic balance, or equilibrium, of capital. They counterbalance depreciation, waste, shrinkage, and other losses due to the conditions and contingencies of business.

If they are neglected, no creditor persistently requests their payment and no attorney

calls attention to the fact that they are overdue, demanding immediate settlement, yet in the end they must be paid.

Because they are not payable with the current bills they are easily, and all too frequently, omitted entirely from the books and financial statements.

Some men call them "intangible expenses." Others jest about them, while still others act on the assumption that their recognition is purely optional and that they may be considered in prosperous years, and omitted in the lean years of business.

They are sometimes looked upon in the same light as voluntary contributions to charity. Reference to them is almost entirely omitted from the curriculums of commercial schools. Even the accounting profession has no "standard practice" with reference to them.

They, however, have been brought into their proper important position in Cost Engineering. For it is the business of the Cost Engineer to analyze and present the facts of business as they exist, not as the client would like to have them appear, or as expediency demands, in order that a financial statement may reflect credit upon the management.

Accounts payable to other creditors may be defaulted and no legal action follow; business may seem to prosper in spite of the neglect of these elements, but ultimate payment cannot be sidestepped. Time is the inexorable creditor, exacting payment in full or foreclosing.

Just as surely as the natural laws governing health cannot be infringed without the penalty of illness, violation of the natural law of compensation in finance will result in loss, if not in absolute failure.

Depreciation is not an expense.

Notwithstanding the fact that the accounting profession has generally advocated "charging off" at the end of the year "for depreciation" a certain amount from the assets of the business, depreciation is not an expense.

Depreciation is a contingency.

The custom in times past has been, and still is, to think of depreciation in relation to "wear and tear," the physical condition only being considered in calculations as to the life of equipment.

There are many causes of depreciation, but three appear more prominently than others.

They are obsolescence, inutility, and wear and tear. The least of these is wear and tear.

A machine may be in first-class physical condition and be actually a liability because it is out of date and its operation so unprofitable in competition with modern equipment as to create a loss.

A machine may be in perfect physical condition, and up to date, but if the demand for its product has ceased, so that it cannot be profitably utilized, it becomes a liability rather than an asset.

If the machine is actually worn out in service, and its product has been intelligently priced and sold, a reserve has been provided thereby for its replacement, and neither loss nor liability is created.

Depreciation is a contingency which the intelligent manager will foresee and provide for by creating a reserve for replacement (not by the makeshift of a depreciation account).

Replacement reserve is provided to take care of the probability that it will be necessary at the end of an estimated period to purchase a new machine to replace the old. Even though no machine is actually purchased, the reserve should be provided that the stockhold-

ers may have their money returned to them at the end of the term of usefulness of the machine. Capital must be protected against loss if financial equilibrium is to be maintained.

“Charging off” for depreciation is an impractical plan. It creates a constantly reducing basis for the charge, with the result of lengthening the period during which the charge must be continued to balance the original investment. Calculations show that a ten per cent per annum depreciation charge from reduced bases will actually require ninety-seven years to approximately balance the investment.

A ten per cent replacement reserve “*charge on*” included in the expenses of operation will provide the funds for replacement in ten years. The “charge on” is the correct method.

The term of years or period established as the probable efficient life of a machine is practically the only arbitrary factor in Cost Engineering.

Reference has been made here only to depreciation of the machinery values. Practically all assets depreciate, and provision must be made for maintaining economic equi-

librium to avoid losses. The more important items are:

Depreciation of buildings.

Depreciation of equipment.

Depreciation of raw material stocks.

Depreciation of merchandise and finished product stocks.

Waste from cutting materials.

Spoilage due to the hazard of operations, and inefficiency of workmen.

Losses from bad accounts and the expenses of collections.

Depreciation of good will. In cases where good will has been purchased outright, a reserve should be provided which will balance the investment within the period where the influence of the purchased good will is likely to be exhausted.

Patents should be carefully appraised, and provision made for royalties to be charged against product, which will yield their value, in addition to normal profits, within the period of protection.

Interest on Investment is a subject on which there has been almost endless discussion

for want of proper consideration of fundamental principles.

Interest on investment is a form of wages for energy employed by the business and must be provided for before profit exists.

The expenses of fuel, supplies, and maintenance, pay for the mechanical energy employed by the business.

The wages and salaries paid to individuals pay for the personal energy of workers employed by the business.

Interest on investment is simply the wages of the money employed by the business.

Just as there can be no profit until after the expenses of operation, and of personal service, have been paid, there can be no profit until after the wages of the invested capital are paid.

There are many valid arguments in favor of interest on investment being charged as an element of operating cost, rather than considering it as a part of profits. For example:

Assume that a man has \$50,000 invested in safe securities yielding the usual legal rate of interest (or wage) of six cents per dollar per year.

This man is holding a good salaried position which pays \$5,000 per year for his per-

sonal energy, and has in addition the annual income of \$3,000 earned by his investment.

He decides to engage in business that his money may earn for him a larger return under his personal management.

He draws his money from the security of investment and reinvests it in a business enterprise solely in the hope of increasing his income.

He fixes his salary at the old figure of \$5,000 for his personal service, and does his best. At the end of the year he finds that the net earnings of the business amount to only \$1,500 or three per cent of his investment. Has he made a profit of \$1,500?

He has not. His business venture has created a net loss of half of the normal and legal wages of his financial energy. He has lost \$1,500 as surely as though in his old position he had been unable to draw more than \$3,500 of his \$5,000 salary.

Suppose that during the next year he does \$100,000 in business and his net earnings aside from his salary amount to \$4,000. What profit has he made?

He has made a profit of one per cent. The legal wages of the money invested is six per

cent, or \$3,000. His profit this year from his business venture amounts to \$1,000 on a turnover of \$100,000, which is one per cent.

Interest and profit should never be confused, because interest is considered in relation to investment, while profit is properly considered only in relation to sales or turnover.

Accountants sometimes contend that if it is desirable to consider interest on investment separately from profits, it may be done at the end of the year, by setting aside from the profits an amount equal to the legal interest, calling the remainder "net profit."

In view of the fact that the majority of modern factories make goods up to the specifications of the customer, with a price quoted in advance of making, it is necessary to make estimates.

No estimate is complete that does not take into consideration every element of expense that will immediately or eventually be considered in the cost. Otherwise, how could the manufacturer regulate the matter of profit? He must include in his quotations, in addition to the estimated cost, an amount which will provide for the anticipated percentage of profit.

Profit is related to turnover, and not to investment; while interest is related to investment and not turnover, the two items cannot be included in a single percentage.

Much of the confusion of thought in these matters is due to the fact that neither public nor commercial schools teach practical methods of calculating cost and profit.

Before leaving this subject, let us take another example in which we will use the same individual and the same capital as in the preceding illustrations.

In this instance the investor requires the use of \$100,000, while his personal capital is but \$50,000. He borrows \$50,000 at six per cent, which he invests jointly with his own.

(Our accountant friends, who deny the man who uses his own capital the right to charge interest on it as a part of the cost of doing business, never question the payment of interest on borrowed money as a legitimate expense.)

At the end of the year the business shows a good margin of profit, after paying the interest on the borrowed money.

Is there any difference in the status of the borrowed money employed in the business,

and the money which is owned by the manager? Absolutely not.

If he succeeds in earning enough to pay back the borrowed money should he then furnish the product or goods to his customers cheaper because it is his money that is invested, rather than borrowed money? Such a theory is as ridiculous as the claim occasionally advanced that a concern has no rental expense because it owns the building it occupies.

Fundamentally, all industrial activities are conducted with private capital. Every enterprise, corporate, public or private, must secure its financial energy from private savings, the result of ability, energy and thrift on the part of individuals.

Stocks, bonds and notes are simply forms of loans. The actual ownership of the capital does not change. The bond or stock certificate is simply evidence that the individual owns a certain amount of money that is used in the enterprise which has arranged for the issuance of the form of document received as evidence of the loan.

That rate of wages (interest) is lower as the form of security advances. Government

bonds, the safest form of loans, pays the lowest rate, because the risk is smallest.

Commercial loans command a higher rate because the risk involved is greater. Commercial paper is practically guaranteed by the common stockholders of the concern issuing it, to the extent of the stock investment.

The holders of common stock in an enterprise take the greatest risk, because all other forms of loans come first. Therefore, since they take the greater risk of loss in unprofitable years they are entitled to the larger return of the profitable years.

The chief difference between a common stock certificate and a bond or note is that the former provides no specified rate of wage or term of contract.

However, cost, the point between loss and profit, must in justice be determined by a method of calculation which will place every dollar employed in the business upon an equal footing. Cost must include interest on the invested capital at the normal rate, the rate that the business must pay for loans made by those who do not assume the same risk that the stockholder takes.

Bookkeepers and accountants are accustomed to charging as expense only the inter-

est paid on borrowed money. The Cost Engineer holds that interest should be charged on every dollar employed in the business, regardless of ownership.

The ordinary classifications on which interest should be charged include the investment in:

Real estate used for the business.

Buildings used for the business.

Equipment, factory, office, store, etc.

Raw stocks carried to facilitate economical production.

Investment in work in process.

Merchandise carried to facilitate quick service to customers.

Finished product or merchandise carried for customers' accounts.

Accounts receivable.

Cash in bank for use of the business.

These items cannot be added together and a blanket charge made of the mass. Each must be considered in relation to its employment in service to the customers, so that the man who buys the product of hand tools will not pay the interest on investment in expensive machine equipment.

Good Will is another item that seems, heretofore, to have escaped the consideration of thinking men. The term, as commonly used, seems to refer to the force of habit in causing people with purchasing power to continue to patronize a concern after it has changed ownership.

This type of so-called "good will" is of doubtful value. Notwithstanding the fact that the man who has a store or other business for sale dilates largely on the value of the good will that is included in the offer, it is rare indeed that the new owner profits much by reason of "force of habit."

Genuine good will is rarely transferable in total. The man who gains by it is the man who joins an organization which has already established a valuable good will. Complete change of ownership, publicly announced, carries with it little good will.

The term is sometimes applied to a legitimate form of intangible investment, and in such cases has real value if the business is to be continued under the new management without radical changes in character or policy.

Practically no business can be established without going through an unprofitable period. Often it requires a year or more to get the

business up to a point where its tangible assets equal the amount of investment.

The time of the persons who promote the organization, arrange for the preparation of the building, and manage the affairs prior to the date when business actually begins, requires a form of investment that does not show in the inventories. The expense of advertising, printed supplies, and other unsalable necessities adds to this investment.

These items should all be a matter of record, and provision made for refunding to the treasury all such items before profit is considered. If the business changes hands before such refunding takes place, due consideration should be given to such of these amounts as have not been refunded.

Genuine good will, however, is another matter. It is the very foundation of permanent business. Not one man in ten can define it.

Good will is the margin of service delivered to the customers beyond what they are asked to pay for.

If you sell an article to a customer at a price which leaves him with the impression that he paid all or more than it was worth you

create no good will. But if you deliver an article to a customer at the moment that he needs it, and it is made so well that he never has reason to make a complaint about it, and the price is such that he feels that he got a square deal, you have delivered a margin of service which will come back to you in future business and recommendations of your service to others.

Good will is transitory in its nature. Bad management can destroy it. Neglect of the interests of the customers causes it to dissolve like vapor.

Where good will is actually purchased a reasonable estimate of the "period of influence" should be made and a reserve provided for and established, that within the estimated period will refund to the treasury the amount paid for it.

In the chapter on "Determining Cost" an outline will be submitted to cover as far as is practicable all the items of "Economic or Ultimate" expenses and the methods by which they are to be included in cost.

Round numbers are the cloak of ignorance; definite figures form the basis of action.

Two and two make four—authorities do not differ. Mathematics do not compromise.

A few cents in a cost figure, in a job estimate, in a profit percentage, mark the line between solvency and bankruptcy—success and failure.

Build your system and your facts to give you not the approximate, the probable, the perhaps—but the precise, the actual, the definite.

Be exact.—“System.”

CHAPTER FIVE

DETERMINING COST

There was a time in the history of American industries when exact information about cost of production was of very little importance. That day has long since passed and will never return.

At the moment when this is written the American business man is confronted with conditions and requirements, made acute by war, demanding immediate and accurate facts about the vital elements of his business.

Unfortunately, the opportunities, the am-
pleness of time, and the normal conditions of
business, which were his in the past, and
which afforded the most practicable basis for
gaining information, were neglected. He
stands today as unprepared from the economic
standpoint as was our country, from the mili-
tary standpoint, the day the Lusitania was tor-
pedoed.

He has no choice but to get into action.
He must meet the needs of the hour. Every
helpful idea serves to lessen the weakness of
his position and hasten the time when he can
adequately fulfill the demands made upon
him.

Business in times past has been conducted in a wasteful manner by rule of thumb methods. American business men have presented the most remarkable examples of rapid fortune building, but the methods have been hazardous. While some have climbed the ladders of riches quickly, thousands have fallen by the wayside, until statistics show in normal times a greater percentage of commercial and industrial failures in this country than in any other country in the world.

The American business man is a lover of the game. He is apparently always ready to take a chance. But the time has come when he can no longer take chances. The requirements of the nation are such that he must have at his finger tips, for immediate reference, more complete and accurate records than he ever dreamed that he would need.

He may, in the past, have been willing to plunge, and for a time conduct his business without profit. Today he needs profit that he may not only survive but assist in the support of his Government in its fight for the liberty without which his life and the lives of those he loves would be blighted.

One of the greatest hindrances with which he has to contend in his effort to meet the

emergency of the hour, is the deplorable fact that the terminology of business is cluttered with meaningless terms and phrases. Definite information is difficult of conveyance because each individual places his own interpretation upon the words that he hears or reads. There is no established terminology.

Another hindrance is that methods of procedure are as chaotic and uncertain as the words and phrases by which the effort of transmitting information is rendered ineffective.

The business man is not the only one who is embarrassed and baffled by the fact that business has neither terminology, principles nor practical outlines of procedure, to determine the cost or profit in any transaction of business.

The Government officials upon whom has been placed the task of collecting and analyzing the essential information are in little, if any, better position.

The crying need of the time is for definite statements of the principles of cost and profit, for practical methods of applying those principles to business so that the problems may be solved within the least possible time and in such a manner that there shall remain no op-

portunity for misunderstanding or controversy.

As a result of many years study of the problems of Cost Engineering the author has formulated a schedule of fundamental principles of the science of Cost Engineering which he presents herewith.

These principles and the rules of application covered in the various phases of the subject, as discussed in this book, together with the effort at establishing a definite terminology of Cost and Profit calculation, are offered in all seriousness as a nucleus upon which may be builded a recognized science of Industrial and Commercial Procedure.

In presenting the following schedule of fundamental principles of Cost Engineering (Denham Methods) each normal statement of principle is accompanied by a brief explanatory statement which it is hoped will make the principle more readily understood.

I. The cost of an item of product is the sum of the expenses involved in its production and distribution up to the moment at which cost is determined.

(Cost is the price at which the item may be sold without either loss or gain to the seller.)

2. *Every cost element (expense item) is definite in amount and purpose, or object, and anticipates a beneficial equivalent in service or commodity.*

(Expenses having a single beneficiary are "direct" expenses; those having two or more beneficiaries are "indirect," and require distribution.)

3. *Indirect expenses may be grouped for simultaneous distribution only when their benefits are measurable by a common unit, and their beneficiaries participate in identical ratios.*

(The inclusion of two or more unrelated indirect expense items in a single account or group, as "overhead," "burden," or "general expense," obscures the purposes of the expenditures and renders correct distribution impossible.)

4. *In the distribution of indirect expenses, singly or grouped, the proportions of benefit conferred indicate the proportions of the expense, or expense group total, chargeable to beneficiaries.*

(Rules may be established for the distribution of certain common indirect expenses, as e. g. Rent, on the basis of used floor area, but exceptions to the rules may be found in every

factory. Whenever a rule and its principle are in conflict the principle must govern.)

5. Operating units, or machines, may be grouped and the cost per hour averaged only when their principal expense factors are in approximately uniform ratios, and the output of such character that the work may be interchanged between the units, or machines, of the group.

(Although two or more machines have practically uniform proportions of the chief expense elements, as rent, investment, power, wages and supervision, if the character of the output differs so that work is not interchangeable, one may be operated continuously and the other spasmodically. Under such conditions injustice would result from averaging cost of productive hours.)

6. Contingent expenses, such as repairs, shrinkage, normal waste and loss on by-products, constitute legitimate charges against production.

(The causes of such expenses and losses serve to indicate the objectives of the individual charges.)

The foregoing principles have been in practical use for the past ten years by an organization of Cost Engineers, and have been

tested in hundreds of instances, so that the reader need not feel that he is offered anything experimental.

Cost Engineering is a practical science. It is as simple and direct as mathematics. However, it cannot be learned in a moment as a formula may be. It requires conscientious effort to study it until one can become proficient in its application.

The author does not wish to convey the impression that the reader of this book can immediately install a Cost Engineering system in his factory or store upon the information contained herein. The subject is too deep for that.

Treatises on various subjects broaden our horizon, and give us a better grasp on the art of living. Study of the principles of chemistry give us a better understanding of chemical actions and reactions, but only the few who specialize in the subject and take measures to get actual experience become chemists.

Not every man who studies Cost Engineering will become a Cost Engineer, but all who will try to assimilate the principles and rules of practice will be better business men because of the information that the effort provides.

Few manufacturers realize the number or variety of the expenses of their business. No list that could be published would be either complete or cover exactly the conditions of any factory.

The following list of the more common items of expense is offered simply as suggestive of the various kinds of expenses and expense groups which must be considered in any effort to determine cost of production, or the cost of doing business.

- Advertising
- Advertising Postage
- Automobile Expense
- Bad Accounts
- Belting
- Belt Lacing
- Bookkeeping
- Costkeeping
- Clerical Help
- Discounts to Customers
- Deductions for Errors, etc.
- Donations
- Dues, Business Organizations
- Drivers' Wages
- Electric Current for Lighting
- Electric Current for Power
- Errand Boys
- Express Charges

Determining Cost

Foreladies' Wages
Foremen's Wages
Freight
Fuel
Gas for Lights
Gas for Heating
Helpers' Wages
Inventory Clerk
Insurance on Buildings
Insurance on Equipment
Insurance on Raw Stock
Insurance on Work in Process
Insurance on Finished Stock
Insurance Liability
Insurance, Boiler
Interest on Real Estate Investment
Interest on Building Investment
Interest on Equipment Investment
Interest on Raw Stock
Interest on Work in Process
Interest on Finished Stocks
Interest on Accounts Receivable
Interest on Cash in Bank
Lubricating Oil
Manager's Salary
Other Officers' Salaries
Officers' Traveling Expenses
Postage—Commercial
Porters' Wages

Rent
Repairs to Building
Repairs to Equipment
Replacement Reserve for Building
Replacement Reserve for Equipment
Salesmen's Salaries
Salesmen's Commissions
Salesmen's Traveling Expenses
Shrinkage of Merchandise Stocks
Signs
Soap
Spoiled Work
Superintendent's Salary
Stenographers
Stockkeepers' Wages
Storage
Supplies for Factory Operations
Supplies for Factory Office
Supplies for Commercial Office
Supplies for Sales Office
Telephones, City
Telephones, Interior
Telephones, Long Distance Messages
Telegrams
Taxes, Income
Taxes, Corporation
Taxes, Realty
Taxes, Personal Property
Taxes on Profits

Towels
Waste, Cotton
Waste Paper Baling
Watchman
Watchman's Clock Supplies
Water Rent
Workmen's Wages

Modern Business is complicated, and to be successfully conducted requires system. System is the carefully planned and finished highway upon which management may speed to the goal of profitable endeavor.

Smart alecks are fond of making a jest of system, but successful men know that they are essential to economy of operation. A few are unable to draw a distinction between system and red tape.

System requires routine, but red tape is the extreme in which the effort of systematizing has shot over the mark and adopted or created routine that is either without purpose or is unprofitable. The author of the routine, working from formula rather than guided by fundamental principles, is unable to eliminate nonessentials, and establishes useless operations, thereby defeating the purpose for which he is striving. Men of narrow vision, assuming that the application of these formulas rep-

resents system, condemn all efforts of establishing systems except those of their own devising.

Practical systems must be built upon sound fundamentals. Neither theories, formulas, nor personal opinions will suffice.

It is not the purpose of this book to offer any special form of system, but rather to present the fundamentals of Cost and Profit calculation in such a manner that the reader may work out his own problems with a better understanding because of the information herein offered.

In establishing any cost system it is essential that an effort must be made to simplify the work as far as possible, keeping in mind the factors of accuracy, comprehensiveness and practicability.

It is a rule in Cost Engineering practice to place accuracy in the first place among the requisites of a system. However, there is a degree of accuracy beyond which it is not practical to go. The limit is watched by keeping in mind the further rule that "When the cost of the effort approximates the value of the result it is unprofitable to go further." In other words, all effort must yield a profit to be desirable.

“Practical accuracy” is defined as a degree of accuracy to go beyond which affects neither the selling price of the product nor the profits. Anything not affecting the profits is neutral and may be done or omitted according to the judgment of the Engineer as to the importance of the result.

Simplicity is facilitated by grouping expenses for distribution.

The simplest possible form of grouping is that which conforms to the third principle in the schedule. The indirect expenses in the following list have been grouped as nearly as possible according to that principle. However, in any factory the conditions may require changes from the plan presented herewith.

Building Expenses:

Rent, or, Replacement reserve and insurance on building, and interest and taxes on investment in building and realty.

Heat

Janitor Service

Building Repairs

Equipment Expenses:

Replacement Reserve

Interest on Investment

Insurance on Equipment

Taxes on Equipment

Power Expenses:

Total of Equipment Expense on power equipment

Total of Building Expense chargeable to power

Repairs

Wages, Supplies, etc., for power department, including fuel

Current (if purchased from central station)

Light and Toilet Expenses:

Current or Gas for Lighting

Lamps, Cords, Tips, Globes, etc.

Water for Lavatories, Soap, Towels, etc.

Factory Administration Expenses:

General Superintendent

Factory Clerks

Factory Office Expenses

Factory Phones, Telegraph and Postage

Factory Stationery and Office Supplies

Porters and Elevator Operators

Commercial Administration Expenses:

Executive Salaries

Office Salaries, except factory and sales

Telephones and Postage

Stationery and Office Supplies

Determining Cost

Bad Accounts and Collection Expenses
Discounts and Deduction to Customers
Federal and Corporation Taxes
Interest on Work in Process
Interest on Accounts Receivable
Insurance on Work in Process
Craft Organization Dues and Traveling
Expenses

Selling Expenses:

Sales Manager
Sales Office Salaries
Salesmen's Salaries and Commissions
Sales Traveling Expense
Sales Phones and Telegraph
Stationery and Supplies
Advertising and Postage
Samples and Sample-making
Donations
Local Organization Dues, etc.
Finished Stockroom Expense (condi-
tional)

Packing and Local Delivery:

Rent, Packing and Shipping Dept.
Equipment Expense, P. & S. Dept.
Supplies, P. & S. Dept.
Trucks, Stables, etc.
Wages

Stock or Merchandise Departments: (Raw and Finished should be considered separately)

Rent

Equipment Expense

Insurance on Mdse. Carried

Interest on Investment in Stocks

Taxes

Shrinkage

Light, etc.

Commercial (purchasing, etc.)

Transportation

Supplies

Selling Expenses

Wages

When attempting to distribute expenses the reader should keep in mind the fact that each division is chargeable only with such expenses or proportion of expenses as have actually been involved in the production of the output of the division so charged.

The common bases of distribution follow:

Building Expenses—Area of used space

Equipment Expenses—Replacement value of equipment

Power Expenses—Horsepower hours

Light and Toilet Expenses—Personal hours, or payroll hours

Factory Administration Expenses —
Chargeable hours

Commercial Administration Expenses
—Extended values at cost

Selling Expenses—Extended values at
cost, when sold

Packing and Local Delivery—To be
determined by circumstances

Raw Stock Expenses—Frequently ap-
plied on basis of cost of material but
requires special attention

Finished Stock Expenses—Applied by
percentage to stock carried for custom-
ers, or through selling expense, accord-
ing to conditions

Foremen's Wages—Payroll hours of
divisions supervised by each

Generally speaking, the use of the thing purchased will indicate the proportions chargeable to divisions. This is not always just.

When all the expenses of the factory and its business departments have been properly analyzed, grouped and distributed in proportion to the benefit conferred by each, the cost per hour of each process is determined. This is done by dividing the total of the divisional

expense by the number of chargeable or revenue producing hours that have been charged to the factory orders during the period covered by the expenses considered.

All product of factories consists of combinations of materials and the time of the necessary formative processes.

Materials are to be charged to factory orders at cost, which includes not only the purchase price as shown on the invoices, but all expenses of warehousing, protecting and handling, not omitting interest on investment.

The cost of materials plus the cost of processes as determined by Cost Engineering constitutes the cost of the order. All expenses being included in the process hour rates, nothing is to be added except net profit.

In factories where product is made for stock, and sold later, the selling expense should not be included in the process hour rates, but should be applied to the order when sold. In such instances the expenses of warehousing the finished product should be applied with the selling expenses.

CHAPTER SIX

SELLING PRICES AND PROFITS

The object of all commercial and industrial activity is profit. In fact it might be said that the object of all human effort is profit. The first statement refers to the reward of industry, money; while the second refers to various types of reward, such as the comforts of life, the good will and friendship of neighbors, and self-respect as well as financial reward. This chapter deals with the reward of industry and commerce-profit, as expressed in terms of money.

The legitimate reward of business is profit. In fact, commercial activity that is unprofitable is not business; it is folly. The man who is responsible for unprofitable conditions of business is a menace to the community and to the state. He places in jeopardy the capital and income of the stockholder who has entrusted to him the profitable use of his money; he destroys the basis of credit and adds to the risk of the creditor whose confidence he abuses; he injures the business of his competitor who is striving to conduct his business on sound principles; he weakens the support of

the family that loves and depends upon him; he injures his Government by curtailing its sources of revenue and nullifying its efforts for welfare and prosperity of its people; but most of all, he injures himself.

The fabric of humanity is so closely and delicately interwoven that the failure of one individual to recognize his responsibilities affects adversely the welfare of hundreds and often thousands of his fellows.

Business must yield profits or failures will result.

All business is buying and selling.

The merchant buys goods and resells them in the same form, but because he adds an element of service he is entitled to a profit.

The manufacturer buys materials in one form, changes it to another which his customers desire, adding also the element of service, and is entitled to profit.

Neither would put forth the effort to serve his fellows were it not for his anticipation of the reward, or profit.

Profit is the amount by which the selling price of a sold item exceeds its cost.

This definition of profit covers several important points: (a) the determination of cost,

so that there may be certainty that the selling price is higher; (b) determination of a selling price that will at once yield a profit and not be so high that prospective customers will refuse to buy; (c) the fact that the item must be sold before there can be a profit.

It is an unfortunate fact that nine-tenths of the men engaged in business do not know how to determine correctly either the cost or the selling price of the goods they sell. The reader may doubt this but his skepticism will not change the facts. He may be one of those who are using wrong methods without knowing it.

The author has stated elsewhere that neither the public schools nor the commercial schools, generally, teach these subjects correctly. Fortunately, there are a few exceptions. If this book shall have the effect of waking up a few more it will have accomplished enough to warrant its authorship and publication.

The best dictionaries offer definitions of cost and profit which are in accord with traditional methods but not practical for modern business.

In thus antagonizing the so-called authorities of schools and reference books the author

does not wish to be understood as setting himself up as a higher authority. He presents his claims to the confidence of his readers solely upon the basis of their practicability for use with modern business methods.

These are not matters in which a common agreement can govern.

The school teachers, college professors and compilers of dictionaries may be eminently capable from the standpoint of classical education, but the author and the business men of the day are dealing in the facts of trade as they are, and as they are unknown to the eminent authorities who prepare text-books and dictionaries.

When the compiler of the dictionary presents the definition of cost as "the price paid for an item" it is evident that he has in mind as the price the consumer pays for the article, the price he paid for his last suit of clothes or for a book.

When the educator refers to the dictionary and finds the definition just quoted, his mind instantly accepts the statement as true because his own experience is identical with that of the lexicographer who wrote the definition.

However, when the merchant or the manufacturer has occasion to use the term "cost" it means something entirely different. It means, not the purchase price alone, but the purchase price plus all of the expenses involved in manufacture and distribution up to the moment at which the cost is determined.

Much has been said in previous chapters about determining the cost of production in a practical manner, and the weakness of the old methods or traditions of cost accounting. This chapter is intended to cover those elements of business having to do with the distribution of the product after it is made and the cost of manufacture determined—with "Selling Prices and Profits."

Merchandising, like manufacturing, is a simple proposition if but one class of merchandise is handled, but in the department store where each class of goods is separated from other classes by the limitations of departments there is large opportunity for the profitable application of Cost Engineering.

Sales are the source of revenue of business. In merchandising, as in manufacturing, Cost of Selling must necessarily be a charge against sales. No expense can be charged against in-

active stocks of goods. Every expense must be provided for from revenue. Goods that do not move are a liability.

In the simple store, selling a single class of goods, the cost of selling absorbs a part of the margin, the remainder of which constitutes profit.

Margin is the difference between the purchase price and the selling price and consists of the cost of selling and the profit. Margin is sometimes erroneously miscalled "gross profit," but since the nature of profit is such that it is always net, the latter term is misleading.

Under the text-book theory a margin, or "gross profit," can be added to the purchase price of the item to determine the price at which it must be sold to yield a profit of the desired percentage.

The same text-books that teach that profit is a percentage in addition to cost (the assumption being that purchase price represents the base or cost), teach that commission paid for making the sale (a part of the selling expense) is to be considered as a percentage of the selling price.

These teachings are inconsistent and impractical, not only from the standpoint of modern methods, but there never was a time when they were practical. The effect of modern conditions has not increased their impracticability, but it has greatly increased the danger to the welfare of business men of continuing their use.

The accountants long ago should have insisted upon their correction. The only reason apparent for their not doing so is the fact that the nature of accounting, being purely routine, does not develop the reasoning faculties and deadens the creative faculties. The accountant must have no imagination. His business is to record history.

Standard practices of accounting have the same relation to the transactions of business that the crafts of undertaking and monument erecting have to the human race—they bury them and preserve their memory by records.

Accounting might be quickened into a thing which would serve to create profits if the devotees were not so bound to traditional “standard practices” and used their mentalities instead of leaning upon the so-called authorities.

Modern business is done on narrow margins. The facts of Cost and Profit must be known. Traditional theories at variance with the facts are dangerous and will not serve.

The modern store, of the better class, is a complicated affair. It involves the sale of many kinds of merchandise, each having a different rate or percentage of turnover. Each requires a different amount of space, special equipment, and, in many lines, specially trained and experienced salesmen.

Payment for the service of salesmen may be made either by salary or commission, sometimes both. In some instances the employer pays the expenses of the salesmen. In other instances the salesman must pay his expenses out of his earnings. The departmental clerk within the store may have no item corresponding to the traveling expense of the outside salesman, but he may receive, as part of his compensation, a bonus calculated upon any one of numerous bases recently devised and inaugurated.

In addition to the compensation of individuals the expenses of rental, fixtures, supplies and administration correspond very nearly to those of the manufacturer.

With margins narrowed by either the keenness of intelligent competition, or the blunders of ignorant competitors, the importance of extra cost knowledge enlarges to serious proportions.

The future of trade and commerce demands that efforts be made at the earliest moment to get into practice a code of procedure and a terminology easily comprehended and practical in use.

As little change from present usages as is necessary in such a movement to attain the result is desirable. This may be accomplished if interest can be aroused to the extent necessary to accelerate action. It may take a decade to attain the result but the longer the start is postponed the farther into the future is pushed the time of attainment. How shall it be done?

Contrary to traditional formula and practice, Cost Engineering proves that the operation of the department store and the composite factory are identical in principle.

The costs of each department or division are determined by very similar processes. When the cost is known it remains to determine the selling prices and the amount of profit desired or obtained.

First—All percentages used in connection with the handling and sale of product and merchandise should relate to the same base. The only logical base developed by analysis of the facts is the selling price in the individual sale, and the total of sales, in the periodical calculation.

Selling price, the base, is always represented by 100 per cent.

The following items must be recognized as related to selling price, or sales, as the base:

Expenses of selling of every nature must be calculated as percentages of the base—selling price, not purchase price.

Profit must always be calculated as a percentage of the base—selling price, not purchase price.

The more intelligent and advanced business men are doing this at present, but their number is less than ten per cent of the whole.

Many concerns have adopted a fixed percentage which they add to the purchase price of goods to be sold, as a means of determining the price at which they are to be sold, regardless of classification of the items or the amount of the turnover developed. They take a chance on profits and do not know what rate

of profit is made on the whole of the turnover until the end of the period or year. They never know the rate of profit actually made on the individual item or classification.

Notwithstanding that calculations for the purpose of making selling prices of individual items are usually made with the purchase price as the base, the profits of a definite period are almost universally based upon the volume of sales. For example: A concern having sales amounting to \$100,000 for the year, finding that they had developed net profits amounting to \$10,000, would unhesitatingly aver that they had made a profit of ten per cent.

As an example of the confusion of bases on the part of business men the author will cite an actual incident that came under his personal observation:

While discussing this subject with a department manager in a store consisting of several departments the statement was made that it cost twenty-eight cents of expense on every dollar of goods sold during the previous year.

The manager was asked how he determined the selling price on an article. He replied that he took the purchase price and added twenty-eight per cent to it to get the

Fundamentals of Cost and Profit Calculation

cost, and then added an additional percentage to the total for profit.

He was then requested to determine at what price he would sell an article, the invoice price of which was \$6.20, if the desired profit was ten per cent. His calculation showed the following:

Purchase price of item	\$ 6.20
Expense of doing business 28%	
of \$6.20	1.74
Total cost, including ex-	
penses	7.94
Add 10% of total for profit80
Selling price	\$ 8.74

The author knew, and called attention to the fact that the store was being operated under a receivership, prima facie evidence that there was something wrong with its business methods.

He then briefly demonstrated to the manager the correct method of determining the cost and selling price that will yield a certain profit on the sale, as follows:

Selling Prices and Profits

Selling price represented by.....	100%
Expense of doing business	28%
Profit percentage desired	10%
Total of percentage other than purchase price	38%

Percentage representing pur- chase price	62%
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The invoice price of the item was \$6.20. This amount divided by 62 gives one per cent of the selling price or \$.10, which multiplied by 100 produces 100 per cent, or the selling price, in this instance \$10.00. In practice the selling price is found by moving the decimal point two spaces to the right, thus changing \$.10 to \$10.

28 per cent of \$10.00 allows \$2.80 for expenses.

The profit being 10 per cent is \$1.00.

The cost of sale is \$9.00.

According to the old plan the price was incorrectly determined and the article sold for less than cost. This in itself accounts for the receivership.

Round figures were used for purposes of illustration. Had the invoice or purchase price been \$7.53, that amount divided by 62

would have yielded \$.1231, or a selling price of \$12.31. The result in any case may be proven by calculating the given percentages of the total.

With the principles of Cost Engineering applied to determine the amount of expenses chargeable to each class of sales, it will be found that when the expenses of the department are considered in relation to the amount of turnover of that class of sales, a different percentage of cost will be found for each.

The rate of profit should differ on different classes of goods. It is ridiculous to assume that one rate of expense and profit will be practical for a great variety of lines of goods.

In any case, the percentage of expense and the percentage of profit added together and deducted from 100 will show the percentage of the selling price represented by the purchase price. The purchase price divided by the number per cent which represents it will yield one per cent of the selling price. This multiplied by 100 determines the selling price.

When the departmental or "line" percentage has been established for a period, all that is necessary in determining the selling price of

any item is to divide its purchase price by the percentage and set the decimal two points to the right.

There have been published from time to time schedules of percentages which could be added to cost to produce certain percentages of profit on the sales. For example:

To make a profit of 25 per cent add $33\frac{1}{3}$ per cent to cost.

To make a profit of 20 per cent add 25 per cent to cost.

To make a profit of $16\frac{2}{3}$ per cent add 20 per cent to cost.

Although the basic principle of this type of schedule is correct because the percentage of profit is related to the selling price, it makes no provision for the expense of doing business, is necessarily limited to the percentages included, and uses the cost, frequently an unknown quantity, as a basis.

The following incident will serve to show the result of using different bases for percentages and the confusion likely to occur where correct methods are not understood.

One of the principals in this business spent several years serving as bookkeeper for another concern which had "failed for lack of capital."

Fundamentals of Cost and Profit Calculation

The author was told that the business was one of the most profitable in the industry which it represented. In fact they boasted a 25 per cent profit, which was extremely unusual for that class of manufacture. To prove that this was true they stated that they had paid a 25 per cent dividend a month previous to the date of the interview.

In discussion the author was given the following data in connection with the business:

Capital Stock	\$100,000
Sales	360,000
Material used	99,590
Profits	27,280

Their plan of making prices was as follows:

Compute the cost of material used and add 33-1/3 per cent.

Compute the cost of manufacturing processes and add 33-1/3 per cent.

The total of these two items was the selling price, and should yield a profit of 25 per cent on the sale.

The fact that they were able to pay a 25 per cent dividend satisfied them that they had succeeded in making 25 per cent profit for the year. It had not been noticed that while they

calculated 25 per cent on sales they had succeeded in making only 25 per cent on the capitalization. They confused the percentage of dividends on capital with the profits on sales.

When asked if they had included depreciation in their calculations they stated that they had charged off their customary 5 per cent. Interest on investment had not entered into their calculations of cost or income. They admitted the justice of an 8 per cent reserve for replacement, to offset the depreciation on plant. Taking an additional 3 per cent for depreciation, and allowing 6 per cent of total investment as interest expense, their profits dwindled to \$18,940, or slightly over 5 per cent of the sales.

It was easily shown that the addition of one-third to the cost of the \$99,590 of materials used should have yielded \$33,177 net profit on materials alone. The actual net profit being \$18,940, it was evident that the factory had been operated at a loss absorbing \$14,237 of the profit which should have accrued on the materials.

In closing this chapter it is advisable to present a resumé of the more salient points of the relationship of the various financial items encountered in connection with the calculation of Costs, Selling Prices and Profits.

(a) **Manufacturing Expenses:** On account of the extreme variation in the amounts of various items required by the different processes, no distribution by percentage is possible. Each item must be charged proportionately to its use, or its benefit to the individual process, as expressed in units by which the item itself, or its use, is measured.

(b) **Merchandising Expenses:** Advertising, selling commissions, rent of storerooms, and all other expenses in connection with the sale of the manufactured goods, or materials, or articles bought for resale, may be charged by percentage of selling price, it being understood that where the proportions of such expenses differ to any considerable degree on different classes of merchandise, each class shall be charged with such rate as will cause the sales of that class to carry their just proportion of the expenses involved.

(c) Interest and earnings always to be considered at a rate per cent per annum of the amount invested.

(d) Dividends are to be considered at a rate per cent of capital stock entitled to participate.

(e) Profits are always to be considered at a rate per cent of the amount of sales.

CHAPTER SEVEN

MAKING COST AND PROFIT STATEMENTS

The Cost and Profit Statement is the pulse of the business, the index of its vitality.

The executives of the healthy business have no difficulty in the preparation, and no embarrassment to anticipate in the presentation, of such statements.

The business that is weak at the heart is the one in which the making of Cost and Profit Statements give cause for uneasiness and fear.

Statements are required for three purposes: (a) that the management may be kept in touch with the vital factors of the business; (b) as a basis of credit; and (c) for purposes of taxation.

Unfortunately, there are people who fail to realize that nothing is ultimately profitable except the truth. They are sorely puzzled in their efforts to make one statement serve all purposes with results to their liking.

If the profits do not show up well, the statement reflects upon the ability of the management. If they show up in the statement

better than the facts warrant, it means that the concern will be likely to both deplete its working capital by declaring excessive dividends and pay taxes to the Government of fictitious earnings. If camouflage is used with the banker he may, and likely will, see through it to the detriment of credits.

The honest manager will not try to fool either himself or his directors, because if the profits are not what they should be their best interests are served by knowing it so that the conditions may be corrected.

The Government wishes to be fair, and will demand only its share, but will punish efforts to evade just taxation wherever it finds them.

The banker is inclined to be more generous with the man who presents an honest statement showing small assets than with him whose statement, although showing large assets, bears the earmarks of "doctoring."

In the long run statements at different times can be and frequently are compared. Dishonesty cannot long be consistent.

It is a misfortune that there are managers, boards of directors, and even accountants who will stoop to dishonesty in making statements.

Corporations have been known to pay dividends regularly up to the period wherein a receiver took charge of their affairs to secure the interests of the creditors.

Such conditions indicate that there is something fundamentally wrong with methods of preparing statements. It should not be possible for men to present information in forms seemingly truthful, while as a matter of fact they are widely at variance with the truth.

The author would be unfair if he created the impression that all erroneous statements were dishonest.

Many of them are made by men who sincerely wish to present the truth about their business, but they do not know how. They either have been taught or have simply absorbed traditional methods.

Many statements made up by public accountants are seriously erroneous, because the accountant either does not know the facts, does not know how to get the facts, or does not know how to present the facts.

Another thing responsible for erroneous statements where honest effort has been made to present correct information is the uncertain terminology of business.

How shall a man, be he accountant, business man, or law maker, present information correctly when he must do so in words that are commonly used without knowledge of their true meaning?

Take the word "capital" for example. The average business man uses it in at least two senses. Unless he qualifies it the hearer cannot tell whether he uses it in the sense of capital stock, a liability, or capital investment, an asset.

How many of the readers of this book can correctly define "earnings," "income" and "profits?" These words are commonly used interchangeably, yet each has a distinct meaning and should never be used in the same sense.

The author has yet to find a man who can tell positively whether the new war tax on "profits" is actually levied against "earnings," "income" or "profits." It is evident that the men who framed the law did not understand the terminology of business.

At the present moment there is reason to be generous in our criticisms. When the accounting profession has no definite terminology whereby the various factors of business can be designated, how shall we blame either the business man or the law maker? Our

generosity, however, should not extend beyond the immediate present. There will be little excuse for ignorance a year hence.

The mutual interests of both the Government and business will be served by a better understanding of commercial and industrial terminology, and a more careful usage of the terms.

Whether or not the terminology suggested in the last chapter of this book is adopted is of no moment, if a better suggestion can be offered and accepted. A personal element should not be permitted to appear in the matter.

The welfare of the country is being hampered today by innumerable discussions, misunderstandings, and differences of opinion as to the interpretations of certain laws and rulings. The need for better terminology is also apparent in the confusion found in conventions and other meetings of business men, because they do not speak the same language of business.

The need of better terminology and definite fundamentals was recognized by, and evident in, the earnest effort of Mr. Edward N. Hurley, while chairman of the Federal Trade Commission, to persuade Associations of Manufacturers to adopt uniform systems of Cost Calculation. His efforts were intended

to promote an understandable language of business, but his use of the word "system" was interpreted by many as referring to some specific form of records. This misunderstanding nullified much of his effort. What Mr. Hurley desired was not uniformity of mechanism but uniformity in principles of calculation and presentation, so that the business men of the country and the Government could all understand each other and present confusion be eliminated.

The fundamentals required for making Cost and Profit Statements are:

1. Definite knowledge of what is cost, and how it is determined.
2. Definite knowledge of receipts.
3. Definite knowledge of what constitutes income.
4. Definite knowledge of what constitutes earnings.
5. Definite knowledge of what is profit, and how it is determined.
6. Definite knowledge of what constitutes assets.
7. Definite knowledge of what are liquid assets.
8. Definite knowledge of liabilities.

9. Appreciation of the necessity for reserves to take care of replacements, shrinkage, etc., as a means of protecting the invested capital.

Any man not fully informed on these subjects, or that does not know how to obtain the information, is not competent to make up a Cost and Profit Statement.

The fact that practically all the present information is based upon the use of traditional theories, impractical for application to modern conditions, renders the problem of making Cost and Profit Statements very difficult.

Competent Cost Engineers, having many years experience in the installation of Cost Engineering Systems, are unanimous in their statement that of the hundreds of factory organizations they have served, not one had, in their accounting systems, provided for all items of expense.

That being the case, it is safe to assume that because of the traditions of accounting practice, and not through any intent to misrepresent facts, practically every financial statement is more or less incorrect.

But a small percentage of factories have cost systems designed upon modern analytical

or Cost Engineering principles. The remainder either have no cost system, or use what purports to be a cost system, based upon the impractical formulas discussed in the earlier chapters of this book. Such systems frequently vary from accuracy as much as twenty and sometimes thirty per cent.

How shall a man be able to develop a practical or true statement of earnings or profits if he does not know how to correctly determine the cost of production or the cost of doing business?

How shall he render true statements if he does not know how to distinguish between receipts and income? Or if he confuses the terms "income," "earnings," and "profits?"

Nine-tenths of the men in business do not know how to determine a selling price that will yield a certain percentage of profit after providing for the cost of doing business. How then shall they be able to make correct statements covering thousands of transactions with varying proportions of cost and profit?

Bankers are familiar with the fact that a large percentage of business men are ignorant as to what constitutes the assets and liabilities of a business. Nor can they readily distinguish the characteristics, important to the

banker, which cause some assets to be classed as "liquid."

To a large majority of manufacturers the idea that reserves should be set up in cash seems unimportant. They have been accustomed to handling depreciation, if at all, through the profit and loss account. In a few instances a reserve account is carried, but the actual money it represents is used in the business as working capital.

Rarely is it possible for concerns using their reserves to avail themselves of the cash to purchase new equipment to replace the old.

Where cash reserves are actually carried there is a feeling of confidence engendered similar to that of the man who realizes that he has a good bank account, as contrasted to the example of the man who is continually working on his last dollar. He is free to make plans for betterments knowing that he will not have to worry about the financial side of the problem. His desire to hold that feeling of independence keeps him at the same time from foolishly overequipping his plant.

Doing business on a sound basis gives a man confidence in himself, gives him a clear head for progressive plans, makes it unnecessary for him to resort to misrepresentations

and subterfuges in his Cost and Profit Reports.

The live business man of the hour will study modern methods, discard traditions, do business on a basis of known cost and profit, study the elements of business so that he can have intelligible records for his own use in directing his own affairs, to furnish the banker with the requisite information to sustain his credit, and to give the Government a frank but correct statement of his earnings.

He will attain such a degree of prosperity that he will gladly pay his share of the burden of tax and still have enough for his own requirements.

Ignorance spells weakness. Knowledge is power.

CHAPTER EIGHT

THE TERMINOLOGY OF COST ENGINEERING

The reader has found in the preceding chapters a number of references to the deplorable fact that Commerce and Industry have no definite and recognized terminology.

Several words are frequently used in the same sense, while again the same word is used in several senses. The result is a confusion of terms not only preventing practical transfer of information between individuals who should understand each other but unquestionably causing a serious loss of money.

The term "Profit," for example, is frequently confused with earnings, income, margin, and dividends, yet each of these words has a different meaning.

An effort has been made in preparing this suggested terminology to apply to each word the definition that seemed best adapted to convey the information desired. Practicability has been given preference over the common definitions of the dictionaries. For example the word "profit" is defined by the Century Dictionary as the difference between the first

cost or purchase price and the price for which the article is resold. No account is taken of the expenses of selling, therefore such a definition, while meeting the popular conception of profit, is not practical for use in the light of modern analysis.

At the moment of writing, the business men of the United States are laboring with a serious condition due to confusion of terms. Taxes on incomes and profits make it important that the persons affected by the taxation understand fully just what the laws mean.

The amount of discussion and the differences of opinion expressed, makes it very evident that grave misunderstandings exist, and demonstrate the imperative need of a definite terminology.

The words and phrases are not alphabetically in the appended list but so arranged that the definitions of those generally confused with each other may be the more readily compared. The list is not offered as a complete terminology but contains the words most commonly misused. The author anticipates a more exhaustive treatment of this subject at some future time.

Receipts—The total of money or negotiable items representing money received dur-

ing a period, without regard to either expenses, earnings or profit.

Income—The remaining receipts after deducting the cost of sales and all other expenses and reserves required by the business. It may be in the form of profits, interest on investments, royalties, rentals, investments made within the period, etc. In the case of an individual it may also include salary, commissions, dividends, etc. Income should not include estimated increase in value of property or increase in the market value of goods held in stock. It relates only to receipts and may include items received which were the earnings or profits of previous periods.

Earnings—Total increase of assets due to the activities and investments of the business or individual whether received or not. Earnings become a part of income only when the money or its negotiable equivalent is actually received. Earnings are related to investment.

Profit of Time Period—The amount by which the total sales of the period exceeds the total cost (not purchase price) of the items sold. Profit is always net, the percentage being correctly expressed only when it relates to the total sales of the period as the base, or one hundred per cent.

Profit on Transactions—The amount by which the selling price of a sold item exceeds its cost. Percentage of profits is correctly expressed only when it relates to the selling price as the base, or one hundred per cent. Profit differs from margin in that it is all net gain.

Margin—The percentage by which the selling price exceeds the purchase price without relation to either the cost of doing business or the percentage of profit in the item. It is expressed properly when the purchase price is used as the base or one hundred per cent. Never should it be added to the purchase price as a means of determining the selling price. Erroneously called “gross profit.”

Gross Profit—A term used where neither the cost nor the percentage of profit is known, to designate the margin between purchase price and selling price of merchandise. It is frequently employed by persons ignorant of correct methods, as a means of determining a selling price. Such usage is frequently productive of losses where profits were intended.

Selling Price—The price which a customer is expected to pay or does pay for an item sold. In all calculations of profit percentages the selling price represents the base or one hundred per cent.

Turnover—The total of the sales of a designated period, usually a year. Used principally for the purpose of expressing the relation of the total sales of a period to the investment used in the business. When the sales of the period are equal to the investment, the turnover is said to be 100 per cent. If they are five times the investment, the turnover is 500 per cent, etc.

Investment—The amount of money employed in a business without relation either to the assets or the ownership of the money. It includes investment in realty and buildings used, in equipment, merchandise stocks, work in process, if a factory; accounts receivable, reserves, and cash in bank for normal requirements of the business.

Interest on Investment—The wages of the money employed in the business. It is a part of income but not profit. Being included in cost of production, and a part of the selling price of product, it must be deducted from receipts before profit can be ascertained. As a part of income it must be included in income statements.

Capital Stock—The amount of the issued certificates of stock of a corporation calculated

at par. Capital stock has no relation to investment.

Net Worth—The remainder after deducting all liabilities from the total of assets. Has no relation to investment.

Assets—The property of a person or corporation representing investment immediately or eventually convertible into money for the purpose of meeting liabilities.

Liquid Assets—Items of assets readily convertible into cash, such as securities, accounts receivable, etc.

Surplus—The undivided profits of the business. Surplus is sometimes employed in the business as capital, and sometimes carried as a safeguard against embarrassment because of losses at unprofitable seasons.

Dividends—The payment made to stockholders in disbursing the earnings of the business or such part of the earnings as the directors of the corporation decide is to be used for dividends. They are paid to stockholders in the ratios of stock held by them.

Wages—The remuneration of employes whose pay is calculated at a rate per hour, day or week. Wage earners forfeit pay for time absent or not used in the service of the employer, but are paid for overtime.

Salary—The remuneration of employes whose pay is calculated per month or year. Salaried employes do not forfeit pay for holidays, or other absences, including vacations, but are not paid for overtime. Salaried employes are sometimes paid by the week. In cases of willful absence purely for the benefit of the employe, the employer may elect whether any or no payment is to be made for the period of absence.

Commissions—The remuneration of salesmen, when they are compensated in the ratio of sales of goods or product.

Cost—The sum of the expenses involved in the production and distribution of an item up to the moment at which cost is ascertained.

Invoice Price—The price shown on the invoice without regard to discounts, or expenses of handling and selling, which must be included in ascertaining cost.

Expense—Any element of cost. The term is sometimes misused as the title of an account. Properly used it should always be preceded by a descriptive title, as building expense, wage expense.

Direct Expense—An element of cost having but one beneficiary to which alone it is chargeable in total.

Indirect Expense—An element of cost having two or more beneficiaries among which it must be distributed.

Major Direct Expenses—Usually the items of material and wages which may be charged directly to a factory order.

Minor Direct Expenses—Direct expense items, such as repairs, supplies, etc.

Immediate Expense—An item which becomes a recognized liability as soon as incurred and paid in the regular course of business, as rent, insurance, etc.

Ultimate Expense—An item of expense necessarily considered in cost because it must ultimately be paid although there is not likely to be an insistent demand at a definite date, as replacement reserve to counterbalance depreciation, interest on investment, etc.

Economic Expense—Items or charges made to cover the normal losses of business that the equilibrium of capital may be maintained, such as charges required to cover shrinkage of stocks, waste in cutting, spoilage, depreciation of equipment, good will, bad debts, etc.

Expense Distribution—The act of determining the amount of benefit obtained from

an indirect expenditure, by the several beneficiaries, and charging each with that proportion of the expense item represented by its proportion of benefit derived.

Process Cost—The result found by dividing the total of expenses involved in a process, over a given period, by the number of salable units produced. Usually expressed as Process Hour Rate.

Cost of Production—The cost of making an item of product without consideration of the expenses of distribution or sale. Cost of production is the total of Material Cost and Process Costs involved.

Estimate—An opinion or guess as to the cost or probable cost of an item already manufactured or to be manufactured. Usually made by some authorized person presumed to be informed as to processes and their cost and competent to make the estimate.

Quotation—The amount of an offer or bid to furnish specified items at a specified price.

Selling Expense—All items of expense incurred for the purpose of making or increasing the sales of goods or product.

Cost of Sales—The total cost of the merchandise or product sold in a designated per-

iod, including all expense elements in connection therewith. The total of all item costs for the period.

Replacement Reserve—A cash reserve provided by including in the cost of production of all items a charge calculated to equal the depreciation of equipment. Included in the charge for product it becomes a part of receipts, when payment is received, and should be deducted before profit is calculated.

Depreciation—Deterioration or shrinkage in values for any reason. Commonly used with reference to wear and tear on machinery or other equipment. All assets except cash are subject to more or less depreciation. The chief causes of depreciation are obsolescence, inutility, wear and tear, neglect, etc.

Shrinkage—Commonly used with reference to the losses or depreciation in merchandise stocks, caused by the elements, handling, theft and carelessness.

Principle—A principle is a fundamental truth—a comprehensive law or doctrine from which others are derived, or on which others are founded. A general truth—an elementary proposition. There can be no exceptions to the application of a fundamental principle.

Rule—A rule is a law supposedly but not necessarily having as its basis a principle. A rule, unlike a principle, is subject to change under certain conditions.

Unit—A unit is one of the parts of a divisible thing and may be expressed by any term denoting weight, measure, or count, according to the nature of the thing to which it is applied.

Good Will—A trade-attracting influence in favor of a concern resulting from the policy of delivering to each customer or client, in addition to the requirements of his order, an element of unexpected courtesy or service which has the effect of not only causing a desire to patronize the concern again but to tell others about it.

System—A plan or routine intended for the purpose of, and actually having the effect of, economizing effort.

Red Tape—A plan or system, or part of a plan or system, requiring for its operation either unnecessary effort, or unprofitable effort. If the cost of the effort equals or exceeds the value of the result it is unprofitable and consequently "red tape."

INDEX OF TERMINOLOGY

Assets	110	Investment	109
Assets, Liquid	110	Investment, Interest on.....	109
Capital Stock	109	Invoice Price	111
Commissions	111	Liquid Assets	110
Cost	111	Margin	108
Cost of Production	113	Net Worth	110
Cost of Sales	113	Price, Selling	108
Cost, Process	113	Price, Invoice	111
Depreciation	114	Principle	114
Direct Expense	111	Process Cost	113
Direct Expense, Major.....	112	Production, Cost of	113
Direct Expense, Minor.....	112	Profit, Gross	108
Distribution of Expense.....	112	Profit of Time Period.....	107
Dividends	110	Profit on Transactions.....	108
Earnings	107	Quotation	113
Economic Expense	112	Receipts	106
Estimate	113	Red Tape	115
Expense	111	Replacement Reserve	114
Expense, Direct	111	Reserve, Replacement	114
Expense, Distribution	112	Rule	115
Expense, Economic	112	Salary	111
Expense, Immediate	112	Sales, Cost of	113
Expense, Indirect	112	Selling Expense	113
Expense, Major Direct.....	112	Selling Price	108
Expense, Minor Direct.....	112	Shrinkage	114
Expense, Selling	113	Surplus	110
Expense, Ultimate	112	System	115
Good Will	115	Tape, Red	115
Gross Profit	108	Turnover	109
Income	107	Ultimate Expense	112
Immediate Expense	112	Unit	115
Indirect Expense	112	Wages	110
Interest on Investment	109		

GENERAL INDEX

	PAGES
Accuracy, Practical, defined.....	71
Accuracy, prime requisite in cost system.....	70
Assets, tendency to shrinkage.....	41
Bases of Expense Distribution.....	74
Capital, source of.....	52
Contents	7
Contingent Expense, fundamental principle of.....	64
Cost, defined	10
Cost, erroneous usage of term.....	9
Cost, fundamental principle of.....	62
Cost Accounting, origin of.....	29
Cost Engineering, proof of practicability.....	36
Cost Engineering, a practical science.....	65
Cost and Profit Statements, fundamentals required.....	100
Depreciation, causes of.....	44
Depreciation, "charging off" impractical.....	46
Depreciation, items for consideration.....	47
Dictionaries, some definitions impractical.....	79
Direct Expense, defined.....	19
Economic Expenses, definition.....	42
Effort, the rewards for.....	77
Energy, three kinds in industries.....	41
Estimate, when complete	50
Expense, Contingent, principle of.....	64
Expense, fundamental principle of.....	63
Expense Distribution, Bases of.....	74
Expense Distribution, Church methods.....	31
Expense Distribution, fundamental principle of.....	63
Expense Distribution, makeshift methods of.....	30
Expense Grouping, examples of.....	71
Expense Grouping, fundamental principle of.....	63
Expenses, Definite and Limited	11
Expenses, Economic, defined.....	42
Expenses, Immediate, examples of.....	38
Expenses, list of.....	66
Expenses, primary grouping of.....	12
Expenses, related to Functions of Business.....	14
Expenses, Ultimate, examples of.....	38
Expenses, when possible to group.....	15
Factory and Store identical in principle.....	85
Finances, importance to industries.....	41
Good Will, defined.....	56

Fundamentals of Cost and Profit Calculation

	PAGES
Good Will, depreciation of.....	47
Good Will, discussion of.....	55
Gross Profit, a myth.....	18
Immediate Expenses, examples of.....	38
Indirect Expense, defined.....	33
Interest on Investment, arguments for.....	48
Interest on Investment, defined.....	48
Interest on Investment not part of profit.....	17
Interest Rates, related to risk.....	52
Investment, classification of.....	54
Labor-saving Machines, confusion caused by.....	22
Margin, definition of.....	82
Material Cost, what is included.....	76
Material Expense not related to Operating.....	23
Overhead account defeats correct efforts.....	14
Overhead Account, measure of ignorance.....	35
Patents, Royalty on.....	47
Philosophy of Cost and Profit, the.....	9
Piecework Wages, not an aid to Costfinding.....	25
Preface	3
Principle, invariable	36
Process Grouping, fundamental principle of.....	64
Process Hour Rate, how found.....	75
Profit, anticipation not justifiable.....	17
Profit, confused with Dividends.....	92
Profit, defined	15
Profit, related to Turnover.....	15
Red Tape, contrasted with system.....	69
Reserves, importance of.....	103
Rules, limitation of application.....	36
Schools, impractical teachings of.....	51
Selling Price, Basis of Profit and Selling Expense.....	86
Selling Prices, right method of making.....	89
Selling Prices, wrong method of making.....	87
Selling Prices and Profits.....	77
Statements, Cost and Profit, purposes of.....	95
Statements, Financial, frequently wrong.....	101
Stocks and Bonds, relation to capital.....	52
System and Red Tape contrasted.....	69
Terminology of Business, uncertainty of.....	60
Ultimate Expenses, examples of.....	38
Wages, not basic expense.....	24
War Taxes, basis of levy.....	98
Wealth, the source of.....	41

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