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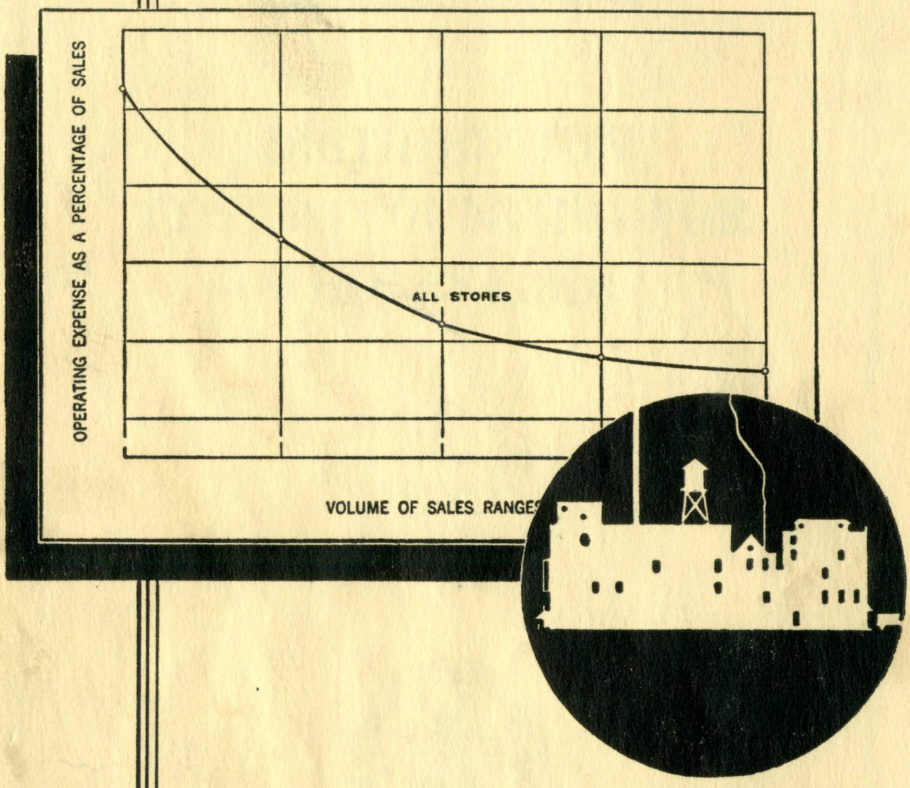
Distribution cost accounting for wholesaling

Herbert F. Taggart

United States. Department of Commerce



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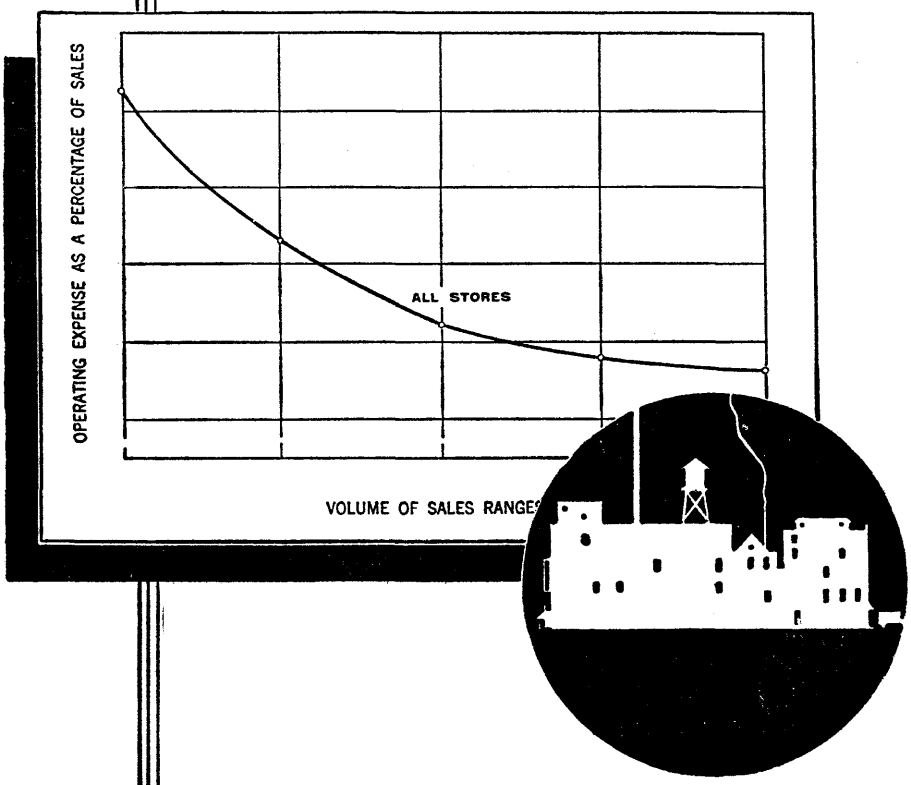

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U. S. DEPARTMENT OF COMMERCE
Harry L. Hopkins, *Secretary*
BUREAU OF FOREIGN AND DOMESTIC COMMERCE
F. H. RAWLS, *Acting Director*

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DISTRIBUTION COST ACCOUNTING FOR WHOLESALING

By

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Marketing Research Division

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FOREWORD

Recent legislation, such as the Robinson-Patman Act, has brought to the fore the need for improved distribution cost accounting. The Bureau, in response to demands from business for assistance in this field, has prepared this study of distribution cost procedure for the field of wholesaling. This important field includes the great variety of wholesale houses, and the newer types of wholesaling engaged in by direct distributors and direct purchasers.

The Bureau has in years past published a number of case studies of the analysis of wholesalers' costs, and in each of these studies the procedure has been carefully described and some attempt has been made to discuss the purposes to be served and the underlying philosophy of the analyses. However, in no one place has a Bureau publication brought together the whole subject of distribution cost analysis for the wholesale field. The present publication is an effort to supply that need. All of the methods used by the Bureau's staff are described and reexamined, and there is an attempt to coordinate them with methods used by other accountants and investigators as reflected in other published and unpublished material. It is hoped that the form and completeness of this publication may be of practical assistance to those engaged in wholesaling who are interested in modernizing their cost-accounting techniques.

This study is based upon methods that have a history of actual use and utility behind them, so that there need be no question of their practicability. Both accountants and business managers will, however, find it necessary to exercise the most discriminating judgment as to what particular types and degrees of analytical procedure are best suited to the needs of individual trades or enterprises. Since this compilation by its very nature has to be comprehensive, it cannot be thought of as a program of analysis which could be followed in its entirety by any one wholesale establishment. The terminology has of necessity been kept general, and the study does not pretend to describe all conceivable types and methods of analysis. While it is hardly possible that any one concern would find all of the suggestions useful, every company should find useful suggestions which can be adapted to its specific needs. Thus, the study supports and supplements but in no way takes the place of expert advice and technical assistance by accountants and statisticians in conducting actual analyses. If it succeeds in arousing interest in distribution cost analysis and in furnishing some basic equipment for those who wish to undertake such analysis, it will have accomplished its purpose.

In the preparation of this study, acknowledgments are also due the authors of the Bureau's previous studies of distribution costs. Their pioneering work furnishes the major basis for this analysis. Acknowledgment is due to individuals and trade associations for permission to use materials which are specifically acknowledged in footnotes. Material assistance was rendered by N. H. Engle, Assistant Director

of the Bureau, Wilford L. White, Chief of the Marketing Research Division, Nelson A. Miller, Assistant Chief, and John R. Lyman, Chief of the Distribution Cost Section of that Division, who have read the manuscript with care and have contributed many suggestions of great value in connection with its organization and content. Appreciation is also expressed for the help of Jettie Turner who aided in the preparation of the manuscript for publication.

F. H. RAWLS, *Acting Director,*
Bureau of Foreign and Domestic Commerce.

MAY 1939.

Although emphasis has been placed on distribution cost procedure for wholesaling activities, this book contains much valuable information for anyone confronted with a distribution cost problem.

DISTRIBUTION COST ACCOUNTING FOR WHOLESALING

Section 1.—NEEDS AND PURPOSES

The need for distribution-cost analysis, as well as the purposes of such analysis, can be embraced in one word "management" or, perhaps more precisely, in the requirements of better management. That management needs improving probably goes without saying—especially in wholesaling, which has been subjected to the stress of changing channels and techniques of distribution. Old methods of operating are no longer satisfactory. Previously enjoyed margins can no longer be relied upon. Furthermore, it is not safe to place long-term reliance on relief obtained from State and national legislation as to prices and business practices. Welcome as such relief may be, it does not take the place of efficient management as a means of salvation for the individual wholesale enterprise.

The field for the exercise of managerial control is well illustrated by comparative studies of operating-cost figures, such as those made by certain trade associations and those issued by the Bureau of the Census. These invariably show wide variances in costs as between different concerns in the same general line of business—some of which are obviously due to differences in products or services furnished, or to disparities in size, but others of which are explainable solely by differences in managerial ability as evidenced by operating efficiency. Such figures should be studied by every business management, whenever they are available, for the lessons that may be learned from the success of others in solving the problems with which every business is confronted.

The relationship of cost analysis to management can be studied at two levels. The first is what might be called direct or primary control, concerned strictly with the internal problems of management and depending on period-to-period comparisons of costs and comparisons of actual with estimated or expected costs. The second level of control relates cost analyses to prices and price policies.

COST ANALYSIS AND THE CONTROL OF OPERATIONS

Just as factory cost accounting has been a potent tool for the reduction of waste in the plant, so the analysis of selling and administrative costs can become a means of reducing wastes in these fields. The most obvious opportunities are in the clerical and physical operation of order handling and sales and customer accounting, but the lessons of cost analysis may also be applied to some extent in directing salesmen's activities and other phases of distribution. The mechanism most useful for these purposes is the establishment of standards in order that the management may know what distribution activities

ought to cost, as well as what they actually *do* cost. Budgets are established, and comparisons are made between plan and performance.

A special phase of internal control consists of decisions as to retaining or taking on products, territories, methods of sale and delivery, means of contacting customers, etc. Such decisions can be properly made only in the light of detailed cost information, at least part of which must consist of an isolation of marginal costs—costs which could be sloughed off with the elimination of the distribution factor in question or which would be added if a new factor were taken on.

The question of elimination arises when a cost analysis shows a need for remedial action of some kind. If prices cannot be raised, either the trouble may be disposed of by elimination or, if elimination is undesirable, some measures must be taken to reduce the cost of the particular activity under consideration. Obviously decisions of this character should not be made without thorough cost analysis. Only by means of such analysis can it be known how much chance of success such measures might be expected to have, and, after they are taken, only cost analysis can show with clarity what success they actually have had.

COST ANALYSIS AND PRICE POLICIES

The relationship of distribution-cost analysis to price policy takes two forms. In the first place, such analysis should be of substantial aid in the establishment of selling prices insofar as the individual businessman has the power to establish prices for himself. For this purpose he should have available all the cost information he can get, both as to the costs of the goods or services themselves and as to the costs of placing them in the hands of customers. Just as an average cost per pound or other physical unit of diversified merchandise would be of no practical value for this purpose, so is distribution cost per dollar of sales of no practical value where different goods are to be sold in different quantities to different customers by different methods of sale.

It does not require a belief that businessmen commonly do or should base prices on cost to argue for distribution-cost analysis as an aid to price establishment. All that is needed is assent to the proposition that, insofar as businessmen do set their own prices, this function is likely to be more intelligently carried out if a thorough knowledge of costs is available.

Secondly, distribution-cost analysis is of very considerable importance in the establishment of price differentials, as distinguished from prices. This may be merely a phase of the first benefit to price policy, but it is sufficiently distinct in law and in practice so that it may be treated separately. Here again the enterpriser's control over price differentials may be decidedly incomplete, since he may be bound by competition and trade customs, but to the extent to which he does have control over price differentials, his control is likely to be exercised with greater intelligence if he has reliable cost data than if he has not. The Robinson-Patman Act, if it has done nothing else, has awakened businessmen to the fact that the establishment of price differentials should not be left to chance or inspiration, but is a job which requires thorough study of all the factors involved.

The legal phase of the relationship between cost analysis and price policy has become of increasing importance during the past few years.

Wholesalers whose business crosses State boundaries cannot entirely ignore the Robinson-Patman Act, which places restrictions on the price differentials which they might wish to grant to certain customers. Only by means of cost analysis can a wholesaler be certain that such price differentials do not violate the law. Furthermore, many States already have "unfair practices acts," or laws similarly designated, which forbid sales below cost. Some of these laws are couched in such terms that cost analysis would be of little use, but others would seem to make such analysis essential for the wholesaler who wants to take full advantage of superior efficiency. In this instance cost analysis serves a double purpose: It conduces to efficient conduct of the wholesaler's activities and enables him to keep a step ahead of his competitors with full confidence in the justice of his opinion and in his impregnability to attack on grounds that he has violated the minimum-price laws.

Cost analysis plays an important part in connection with resale-price-maintenance laws, the so-called fair-trade acts. This fact is exceptionally well illustrated by the wholesale drug trade, whose associational cost-analysis activities have furnished invaluable material on which members may base judgments as to the adequacy of margins offered by resale-price contracts. Such contracts should presumably give the wholesaler a reasonable chance for an adequate margin on the goods he handles, but the individual wholesaler is in no position to judge whether they do or not unless he has his own or his trade association's cost-analysis data as a basis for formulating judgments.

Thus it is seen that analysis and study of operating costs may be useful to the wholesaler for many reasons and on many fronts of business activity. Further illustrations of the many uses to which cost analysis may be put are given hereafter in connection with descriptions of the specific types and methods of analysis. Other uses will naturally occur to anyone studying the material with his own problems in mind.

Section 2.—THE MEANING OF ANALYSIS

"Analysis" means simply the breaking down or separation of a whole into its component parts. The small boy "analyzes" the alarm clock, and has the same laudable motive for doing so as has the wholesaler who studies his operating costs by resolving them into their elements: the boy wants to see what makes the clock act as it does; the wholesaler wants to see why his costs are as they are—what makes them so high. To carry the analogy further would necessitate imagining a boy with an inventive turn of mind, who would like to make the clock keep better time, or to make it keep as good time with fewer parts. The wholesaler's next step is to discover ways of decreasing his costs or of getting better results by the same expenditure.

The analysis of wholesalers' operating costs need be neither complicated nor mysterious. Every wholesaler does some of it. The moment the records show any break-down of the operating expense total, some analysis has taken place. A degree of analysis is required on the Federal income-tax return.

Analysis of costs proceeds by steps or stages and can be carried far or broken off in the early stages, according to the wholesaler's ideas

as to what degree of analysis will reflect itself in better management and more economical operation. Although the early steps of analysis may be profitably employed without regard to the later ones, it is well to keep in mind the fact that the later steps are dependent on the earlier ones and cannot be carried out unless the earlier stages have been so designed as to fit the needs of the later ones. Specifically, this requires that the original classification of expense items be made up with an eye to their utility for subsequent break-downs by functions, and thereafter by departments, commodities, customers, and so forth.

One further matter needs to be made clear at this point. Practically all of the analysis of operating costs takes place entirely outside of the books of account. Bookkeeping as such is not, therefore, made more complicated by the requirements of cost analysis. To this statement there is only one important exception—that is, that the original classification of expense items must be more minute and more carefully done if cost analysis is to be attempted than if it is not. This fact need add nothing to the cost of bookkeeping, at least after the classification of expenses is once installed and in use. It must be emphasized that beyond this point the analyses themselves do not take place in the books, nor are their results ordinarily reflected by any bookkeeping entries. Their results are, rather, contained in tabulations and reports presented to the management in order to furnish information for appropriate action.

Section 3.—COST ANALYSIS BY KIND OF EXPENSE

EXPENSE CLASSIFICATION

The first step in analysis is the subdivision of total operating costs into primary expense accounts. This analytical step is found almost universally in books of account. The basis of this subdivision is that of the object of expenditure, or the "natural divisions" of expense. Usually it is done with little in mind beyond convenience in recording. The accounts are organized in such a way that each check issued or each voucher entered can be charged in total to a specific expense account, with additional titles sufficient to care for non-cash expenses such as depreciation and bad debts. A condensed expense classification by natural division is that of the National Retail Dry Goods Association, as follows: [1]

Pay roll.
Rentals.
Advertising.
Taxes.
Interest.
Supplies.
Service purchased.
Unclassified.
Traveling.
Communication.
Repairs.
Insurance.
Depreciation.
Professional services.

This classification, with some subdivision of such items as pay roll, supplies, communication, and service purchased, is typical of what is to be found in the vast majority of distributive enterprises. A statement of operating expenses in such detail as this for any one period, however, is of little use to anyone, with the possible exception of the income-tax auditor, who is charged with determining that the amounts claimed as deductions from gross revenues fall within the general field

[1] National Retail Dry Goods Association, Controllers' Congress; A Standard Method of Accounting for Retail Stores, New York, N. Y., 1922, vol. I, p. 22.

of ordinary and necessary business expenses. For managerial purposes it accomplishes almost precisely nothing. Managers may look at a statement of this kind with some satisfaction, but, if they are really getting anything out of it, the reason is that they are mentally carrying on one or more of the subsequent steps in cost analysis.

EXPENSE COMPARISONS

The next logical steps after classification are comparison of the expense items with some base such as sales in dollars or physical units and the passing of judgment on the unit costs so found by reference to preceding periods, to the similar costs of other enterprises in the same line of business, or to some other standard. Such comparisons can be made for expenses as a whole, but they serve little purpose except to arouse curiosity as to why noted fluctuations have occurred. The explanations are to be found only by regarding individual items of expense and discovering the reasons why these have fluctuated. Obviously, also, nothing can be done about changes in total operating expense except by taking hold of individual items and attempting to discourage factors which make them excessive and to encourage factors which have an opposite tendency.

Exhibit 1.—Operating Cost Comparisons, Calendar Years, 1936 and 1937

Cost item	Amount		Per sales dollar (in cents)		Per thousand feet (in cents)	
	1936	1937	1936	1937	1936	1937
1. Advertising	$155	$152	0.0561	0.0419	0.69	0.49
2. Allowances and adjustments	465	609	.1684	.1679	2.05	1.96
3. Bad debts	1,084	1,128	.3925	.3109	4.79	3.63
4. Bank charges and interest	611	576	.2212	.1589	2.70	1.85
5. Buying expense	256	502	.0927	.1385	1.13	1.62
6. Depreciation—furniture and fixtures	261	188	.0947	.0517	1.15	.61
7. Donations and charity	24	26	.0087	.0071	.11	.08
8. Dues and subscriptions	347	355	.1258	.0978	1.53	1.14
9. Entertainment	42	62	.0151	.0172	.19	.20
10. Insurance—general	264	290	.0956	.0799	1.17	.93
11. Insurance—life	302	247	.1093	.0682	1.33	.79
12. Legal and professional	219	261	.0794	.0719	.97	.84
13. Postage	404	591	.1465	.1630	1.78	1.90
14. Printing and stationery	311	282	.1127	.0776	1.37	.91
15. Rent, light, and heat	959	925	.3473	.2551	4.24	2.97
16. Salaries, owners	6,471	5,989	2.3441	1.6508	28.59	19.26
17. Salaries, executive and clerical	5,453	6,760	1.9751	1.8634	24.09	21.74
18. Salesmen's salaries and commissions	9,372	11,014	3.3950	3.0358	41.41	35.42
19. Salesmen's traveling expense	1,730	2,043	.6266	.5632	7.64	6.57
20. Sundry supplies and expense	509	679	.1842	.1872	2.25	2.18
21. Taxes (other than income)	353	330	.1278	.0909	1.56	1.06
22. Telephone and telegraph	1,355	1,810	.4907	.4989	5.99	5.82
23. Traveling—sundry	462	501	.1674	.1380	2.04	1.61
Total	31,409	35,320	11.3769	9.7358	138.77	113.58
24. Deductions from expense	1,011	928	.3662	.2558	4.47	2.98
Net total	30,398	34,392	11.0107	9.4800	134.30	110.60
Total costs	30,398	34,392				
Total sales			$276,065	$362,795		
Thousand feet sold					22,634	31,096

Source: A hypothetical case made up from actual cost records of several wholesale lumber establishments.

Exhibit 1 shows a type of cost analysis which is easily made by any wholesaler and which should prove valuable for observing changes in costs and giving clues to their causes and the remedies, if any, required. The classification of expenses is one in actual use by a

number of wholesalers, and the figures are compiled from actual cost reports. The business is that of a branch of wholesaling which does not carry stocks of goods, and the commodities sold are of such a character that they can be measured in terms of a common physical unit. This last feature is valuable and convenient in this type of analysis, and should be utilized wherever it is at all possible.

CONCLUSIONS FROM ANALYSIS

A brief study of the figures in exhibit 1 will indicate the kind of reasoning that can be applied and some of the benefits to be derived from this type of analysis. In the first place, this tabulation shows clearly the effects, on unit costs, of increased volume of business. While dollar sales increased 31 percent and unit sales more than 37 percent, expenses increased only 13 percent. This brought about a decrease in costs per dollar of sales from 11.01 to 9.48 percent, or a percentage decrease from the 1936 level of 14 percent. The decline in cost per thousand feet was from $1.34 to $1.14, or nearly 18 percent. Price received per thousand feet declined from $12.19 to $11.67, or 4.35 percent. (From this fact no conclusion should be drawn as to the effect of a price decrease on sales.)

The principal lessons from a comparison of this kind are to be learned by regarding the details of cost. The decline in unit costs is, of course, due to the presence of relatively fixed items among the operating expenses—fixed, that is, for any ordinary increase or decrease in business done. The most nearly fixed in this case are items 1, 7, 8, 10, 15, 16, and 21. Normally items 6 and 11 would be expected to be included among the fixed group, but in this particular case some unexplained cause has brought about a sharp decline in both of these items. Detailed knowledge of the business would, of course, clear up such aberrations. Of the relatively variable expenses, items 2, 9, 12, 13, 17, 18, 19, 20, and 22 come nearest to varying proportionately with dollar sales. Most of these items one would expect to find in this group. Allowances and adjustments, for example, should follow sales volume very closely unless policies or conditions materially change. Similarly, salesmen's compensation and expenses can be expected to vary almost proportionately with sales, although the latter should lag somewhat, because of the fixed elements in such expenses.

Insofar as expense items vary as expected, they can be disregarded from a managerial standpoint (unless their absolute amounts are too high or too low); attention can then be directed to those items which are out of line. For example, buying expense has nearly doubled instead of increasing more or less in proportion to volume, as might be expected, and the use of postage has increased more rapidly than would seem necessary. Printing and stationery, on the other hand, which might be expected to increase, has actually decreased by nearly 10 percent, bringing about a decrease in per-sales-dollar cost of more than 31 percent. This may, of course, be due to a carry-over of inventory which had been charged into expense in 1936, but this out-of-the-ordinary expense phenomenon should be investigated like the less favorable ones.

RULES FOR EXPENSE CLASSIFICATION

Contemplation of the results of this particular analysis points to the most important rules for expense classification when this type of analysis is in view. These rules are simple, and as follows:

1. A separate classification should be made for every important item of expense, and no "miscellaneous" group of appreciable size should remain. "Miscellaneous" means incapable, or unworthy, of analysis, and no substantial portion of operating costs can be thrown into any such category.

2. The classification should not be so fine that there are numerous items which, though distinct, are so small as to be insignificant. The attention of the management should be concentrated on those items which will respond to remedial treatment with a worth-while saving, and not distracted by items which offer no possibility of repaying the attention given them.

3. The classification should be so made that, as far as possible, the items charged to a given title are actually homogeneous—particularly that they are uniformly affected by increases and decreases in the volume of business.

The classification in exhibit 1 adheres to the first rule very well indeed. Item 20, which seems to contain all unclassified expense, is in both years less than 2 percent of total expense. It seems unlikely that it would pay to subdivide this item further.

Adherence to the second rule is by no means as clear. Items 7 and 9 are quite small. The former might well be added to advertising and the latter either to advertising or to the sundry-expense group. It should be added that a classification of expenses to be used for compiling the costs of an entire trade might well show these items of donations and entertainment separately, since they throw light on matters of policy which may perplex individual members.

Some attempt has been made in the classification of exhibit 1 to comply with the third rule. Compensation for personal services appears in three separate items, traveling expense of salesmen is separated from that of executives and others, and insurance on the lives of owners and executives is distinguished from other types of insurance. If "general" insurance were a larger item, it might be broken down still further, since some kinds of insurance, e. g., compensation insurance, tend to increase with increasing volume of business while others remain fixed. The same is true of printing, stationery, and postage, the variability of which differs according to the purposes for which they are to be used. It is to be noted that in examining such accounts as these for the reasons for unfavorable changes, it is necessary to resort to a functional break-down, and it may be well to incorporate such a break-down in the original classification.

The item "Salaries—owners" merits special attention. It is always desirable, of course, to segregate this item, because in a peculiar degree it is controllable and subject to changes not related to efficiency or volume of operations. Owners' salaries may not, as a matter of fact, be to their full extent a part of costs at all. That is, they may be in whole or in part a distribution of profits, rather than payment for personal services. If that is the case (or to the extent that that is the case) owners' salaries may well be left out of cost computations, since the inclusion of such an arbitrary item may

distort the over-all cost picture and make comparisons of cost totals of little value. This is a matter for determination in each individual case, however, since owners' salaries may be only reasonable compensation for services rendered.

FREQUENCY OF COMPARISONS

Exhibit 1 shows cost comparisons for two periods of a full year. For purposes of managerial control such comparisons should evidently be made more often. Once a month is none too short a period if action is to be taken which will be effective in locating unfavorable conditions and in preventing their continuation or recurrence. Such statements should be made up as soon as possible after the close of each month, showing the results for the month just passed and the cumulative results for the year to date. Comparisons may be made with the preceding month, but, especially in seasonal trades, a comparison with the same month of the preceding year will be more fruitful. Similarly a comparison should be made between the cumulative period this year and the same period last year.

The reason for the emphasis on cumulative comparisons is simply that monthly figures, no matter how carefully ascertained, cover so short a period that they cannot be entirely relied on. Such uncontrollable factors as the weather or the exact date of Easter or the occurrence of labor disputes or accidents may have a most important effect on both the volume and the expense of monthly operations. In the cumulative period such circumstances are merged in the total flow of business and tend to be ironed out. This does not mean that the monthly comparisons are entirely worthless, but merely that they must be supplemented by consideration of longer and more stable periods.

In order that monthly figures may be of any value the expense accounting must be on as nearly complete an accrual basis as possible. If not, nearly every comparison of individual cost items must be adjusted because of the accrual situation, and even the expense total may be seriously affected. For example, a given month in 1 year may contain 5 pay days, as compared to only 4 in the preceding year. It is evident that, if pay-roll accruals are not recognized in both cases, the comparison of cost items which reflect labor services will be useless. Similar recognition must be given to the accrual of such items as depreciation, insurance, taxes, utility bills (very possibly), and other items. Inventories of supplies must be taken, or at least estimated, and in some cases maintenance reserves and other devices for recognizing the expense properly applicable to the month's operations must be used.

THE EXPENSE BUDGET

For purposes of controlling costs a most useful device is the budget. The most satisfactory budget can be made only in connection with the functional cost analysis which is described hereafter, but a worthwhile budget can nevertheless be established on the basis of an expense analysis little more detailed than that shown in exhibit 1. Without attempting to go into all of the requirements of budget preparation and administration, it should be remarked that a useful budget can be made only with the cooperation of the operating personnel, who must be held responsible for results. Nothing will

be gained if the accountant, sitting at his desk, makes up a budget, no matter how carefully it may be adjusted by reference to preceding periods and expected trends. Furthermore, the budget figures must not reflect mere prediction as to what costs are expected to be, but must be a statement of costs as they ought to be. This requirement may in some cases not change the figures materially, but it places the emphasis where it belongs and animates and motivates the budget procedure.

An essential part of budget administration is the preparation of comparative cost reports similar in form to those already described, but comparing costs as actually experienced with costs as they ought to be, showing gains from bettering the budget and losses from falling short. From such exhibits the management can easily determine the items which are so far out of line as to require special attention. These comparisons will be especially fruitful if the budget has been made up on the so-called "flexible" basis, so that the budget figures shown in the tabulations have already been adjusted for changes which are due solely to changes in the level of business activity. The remaining unfavorable deviations from budgeted figures will be caused by inefficiencies, increased unit prices for commodities and services, and other causes which require the attention of management. Favorable deviations will represent, of course, the opposite conditions and may equally merit the study of management in order to encourage their continuation. If the budget is not of the flexible type but is instead made up in inflexible totals in advance of the period which it covers, the differences shown on the comparison schedule must be analyzed, as well as this can be done, to distinguish between that part which can be ascribed to changes in the level of business and that part which requires managerial action. It should be noted that the preparation of a flexible budget is greatly facilitated by a functional classification of costs, but an approximation of this managerial device can be obtained on the basis of a simple classification of the kind now under discussion.

ADVANTAGES AND LIMITATIONS OF COST ANALYSIS BY KIND OF EXPENSE

Important advantages of the analytical method just described are simplicity and economy. Its use is not barred to any wholesaler, no matter how small his operations may be, and no matter how difficult may be the application of more advanced analysis to his problems. However, analysis of operating costs in terms of the kinds of cost or the objects of expenditure has definitely limited value. Although its virtues are not to be completely disregarded, its applicability to problems of operating control is restricted by reason of its failure to recognize function and responsibility, and it offers nothing whatever toward the solution of problems of price and price policy.

Section 4.—FUNCTIONAL ANALYSIS OF EXPENSES

The type of cost analysis most useful in completing management's control over internal operating problems and, when extended, capable of furnishing assistance in problems of price policy and of other relationships with customers, is called functional analysis. It consists of a

study of expenses not in terms of primary accounts (the natural divisions or objects of expenditure) but in terms of the functions which they perform, or the responsibilities of those who are charged with carrying on business operations. For this purpose primary expenses are grouped with respect to the functions or responsibilities of which they are the costs. The total cost of each function is thus determined, and this total is divided by units of functional service to obtain the cost per unit. Control is maintained by watching the unit costs.

FUNCTIONS AND SERVICE UNITS

It is impossible to present a definitive list of functions and service units which will fit all wholesalers. The reasons are that different wholesalers perform different functions, that the internal organizations of wholesalers who perform the same functions differ widely, and that the managerial requirements for cost data vary from one concern to another in accordance with size, the degree of specialization of individual executives, and the experience, abilities, and mental make-up of the executive staff.

Following is a list of functions and their corresponding service units which have been used in actual analyses of distribution costs. Since these are taken from many case studies, they overlap and must be considered as suggested possibilities—not as a coordinated plan for any particular enterprise.

Function	Service Unit
Assembling and checking orders.	The order or the invoice line or the volume unit.
Carrying (financing).	The dollar of inventory.
Cash receiving.	The customer month.
City delivery.	The truck mile or hour or the order or invoice line or the unit of goods sold for city delivery.
Credit and collection.	The customer.
Dealers' helps.	The customer.
Delivery of country shipments to station.	The merchandise unit.
Direct mail advertising.	The mail solicitation.
Filling orders.	The invoice line.
Getting out stock for orders.	The invoice line.
Handling.	The invoice line.
Haulage (receiving and shipping truckage).	The hundredweight.
Keeping stock records.	The invoice line.
Maintaining order and letter files.	The order or letter.
Merchandise storage.	The square foot or cubic foot of storage space provided or used.
Packing and loading.	The merchandise unit or the order or the volume unit.
Posting invoices to customers' accounts.	The order.
Preparation and mailing of customers' statements.	The customer.
Preparation of invoices and shipping documents (except pricing and extending).	The order.
Pricing and extending invoices.	The invoice line.
Receiving and posting cash receipts.	The individual cash collection.
Receiving stock.	The volume unit.
Sales analyses and statistics.	The invoice line or the order.
Salesmen's compensation.	The call.
Salesmen's equipment.	The call.

FUNCTION—Continued	SERVICE UNIT—Continued
Salesmen's telephoning.	The call.
Salesmen's travel.	The day or mile traveled.
Stenciling or labeling orders.	The order.
Traffic and claims.	The order.
Transportation of country shipments (freight, express, postage).	The thousandweight-mile.

UTILITY OF FUNCTIONAL ANALYSIS—THE BUDGET

At this stage or level of analysis the emphasis is still on the users of cost accounting for the internal control of operations. Many of the functions and units above listed are useful also in translating functional costs into departmental or territorial or other types of cost, but their primary utility is for the management in conducting the internal affairs of the organization in an intelligent and efficient way. The principal way in which these functional analyses are useful for this purpose lies in their employment for the preparation and administration of standards and budgets.

Planning of sales activities can best be done in terms of the operations to be performed—the telephone and personal calls to be made by salesmen, the number of mail solicitations, the orders to be received, recorded, filled, packed, loaded, and delivered, the invoice lines to be written, priced, and extended, and so forth and so on through all the processes required in acquiring and disposing of the goods which it is intended to sell. On the basis of experience and the analysis of operating functions a standard cost for each operation can be determined. This standard does not merely reflect what the cost has been in the past but what it ought to be in view of expected wage rates, labor efficiency, and other circumstances.

The budget is made up in terms of the expected number of operations of every type involved in expected sales, and the standard unit costs of these operations. Then as actual sales, operations, and cost appear, actual costs can be compared with budgeted costs in such a way as to show how much of the difference can be accounted for by increased or decreased requirements for services and how much is chargeable to increase or decrease in unit costs. It is the latter cause of difference, of course, which requires the attention of management.

For example, suppose that the standard cost per item or invoice line for getting out stock for orders is 1.5 cents. If selling plans for the coming month call for 100,000 item sales, the total budgeted cost for this activity is $1,500. On this basis the financial plans for the month are prepared. Actual item sales, let it be assumed, total 110,000, and the actual cost of getting out stock is $1,600. The increase in cost is only 6⅔ percent, with an increase in activity of 10 percent. On a standard cost basis the cost would have been $1,650. Evidently $50 has been saved through improved efficiency in carrying out the function. If, on the other hand, item sales had been 90,000, and actual cost had been $1,450, a failure to attain expected efficiency would have been evident, with resulting "loss" of $100 (derived by subtracting the standard cost of the actual units of service, $1,350, from the actual expenditure).

In order that this device may attain the maximum usefulness the functions and units of service must be most carefully chosen. The functions must be really homogeneous, and the units must be sig-

nificant measures of the variability of their costs. Fixed items, such as supervision and space costs, must be separately dealt with. This does not mean, of course, that functions and units can be so devised that the cost can be expected to vary completely and perfectly with the difference in the number of service units, and it may be in some cases that the only solution will be "sliding scale" unit cost standards—that is, standard costs which are adjustable to changes in volume. In some cases the budget must presumably be fixed, since such costs as top supervision and the costs of furnishing space do not vary within wide limits of increased or decreased business activity. The conditions in each case will indicate to what extent the procedure must be varied in order to obtain the greatest possible benefit.

PARTIAL AND PIECEMEAL ANALYSIS

One of the things often overlooked in connection with cost analyses and budgetary procedures of this sort is that they do not have to be either complete or highly refined to accomplish a great deal of good. A small start can be made with very rough data and the scheme gradually improved and expanded until it reaches the point at which further refinement would not be reflected in enough improvement in management to repay its cost. Often there is hesitation in embarking on a program of this character because of a mistaken impression of the magnitude of the task, the complications of the procedure, and the increased statistical and accounting cost. To begin with, however, only one or a very few functions may be isolated, and the experiment can be carried only as far as it proves itself desirable. Or attention may first be concentrated on delivery, say, and then transferred to receiving or order taking or clerical techniques or wherever there seems to be a possibility of improvement. It is important that changes and reforms in any of these activities be not instituted without some study of the probable effects on costs.

Section 5.—APPLICATION OF FUNCTIONAL ANALYSIS TO CUSTOMERS AND COMMODITIES

The preceding material on functional analysis has indicated how this technique can be used in the control of internal operations. For this purpose attention is concentrated on the costs themselves without regard to their relationship to merchandise departments, specific commodities, or commodity groups, territories, methods of sale, order-size groups, or other characteristics of customers and commodities which have a bearing on costs and which determine selling prices and policies. This and subsequent sections of this study will be devoted to showing how functional analysis can be made use of in attaching distribution costs to commodities, customers, etc. Only the techniques employed in functional analysis have been found to be satisfactory for such purposes.

The underlying principle of all such applications of functional analysis is simply stated: The characteristics of commodities and customers cause them to demand more or fewer functional services. If the number of units of the several kinds of service required can be counted and the unit costs of such services can be ascertained, the total costs applicable to specific customers, commodities, or groups of the same can be determined. Thus a commodity which sells in

very small lots is bound to require a large number of units of handling and clerical operations for a given volume of sales. A customer who buys in large quantities requires few visits of salesmen and few trips of the delivery truck for a given volume of sales.

Furthermore the functional analysis furnishes a guide to the action required to adjust an unsatisfactory condition and indicates how much alleviation may be expected from remedial measures. Every unprofitable type of transaction may be attacked in a number of possible ways, other than the obvious expedients of raising prices or eliminating the offending transactions entirely. Every attack will result in changes in the characteristics of the transaction which will, in turn, bring about changes in the cost. Obviously the best way to judge the probable efficacy of proposed measures is by attempting to foresee these cost changes. And if the decision is that the unprofitable lines or customers can never be made profitable and must be eliminated, the cost analysis, if properly carried out, will give indispensable indications of the possible savings.

STEPS IN APPLICATION OF FUNCTIONAL ANALYSIS

A generalized description of the extended functional analysis is as follows:

1. With respect to the particular analysis desired (by commodities, customers, etc.) the totality of distributional activity is subdivided into distinct functions or activities of such a character that they are homogeneous within themselves and capable of being related to specific items of cost.
2. All expenses related to distribution are segregated and classified in terms of the functional activities which are responsible for them.
3. All costs directly and specifically applicable to the object of analysis (commodity, customer, etc.) are segregated for direct application. This procedure would single out outgoing freight, for example, if the analysis were by customers.
4. All costs of functions specifically inapplicable to the object of analysis are segregated for complete exclusion from the analysis. An example would be credit and collection costs in the case of cash customers, or brand advertising in the case of unbranded goods.
5. A unit of measure for each remaining functional activity must be selected, to be used for the measurement of the amount of service rendered or required.
6. A unit cost of each functional service is obtained by dividing the total cost of the function by the number of units of service involved.
7. The number of units of service of each kind required by the particular object of the analysis (commodity, customer, etc.), is ascertained.
8. The total cost of each function in relationship to the object of analysis is obtained by multiplying units of service by unit costs, and the total distribution cost applicable by addition of the several functional costs involved.

Section 6.—THE APPLICATION OF FUNCTIONAL COST ANALYSIS TO MERCHANDISE DEPARTMENTS

The first illustration of the application of functional analysis in this way will be in connection with an analysis by merchandise departments. A type of analysis sometimes called departmental is often

described in such a way as to make it appear to be essentially different from the analysis here called functional. The procedure is said to be one which examines each individual primary expense and relates it to the several departments by the most logical basis. However, in practice, the primary expenses are commonly grouped functionally in order to simplify the procedure, and a complete acceptance of the thesis that departmental analysis is but one application of functional analysis is likely to make such an analysis more logical and more fruitful.

The most familiar application of departmental analysis is in retail stores, but this form of analysis is equally applicable to wholesalers whose operations are or can be divided into distinct merchandise departments. Such departmental organization, in order to be suitable for cost analysis, must involve some physical segregation, a distinct classification of merchandise, and some degree of separation of responsibility. In the retail store each department is likely to have its own selling force and supervision, and the same may be true of the wholesaler. The greater the degree of separability the easier and more trustworthy the analysis, and the less distinct and complete the departmentalization the greater must be the resort to arbitrary and uncertain methods of cost allocation, and the less can effective managerial action be based on the results.

CLASSES OF FUNCTIONS

For all departmental and similar applications of functional analysis the functions chosen for cost determination fall into three broad classes: (1) Direct functions, which often correspond to individual primary expense accounts, and which are related exclusively to one object of analysis, such as one department or commodity, or one customer or branch; (2) indirect functions, which range from those which, though applicable to more than one department, can be allocated on logically defensible bases, to those which, if they are to be allocated at all to departmental operations, must be applied on bases which are largely arbitrary.

The boundary between these groups is nebulous and varying. In the individual concern it depends to a considerable extent on the degree of detail in which operating expenses are originally recorded. For example, packing supplies is normally an indirect item of cost, as above defined, and if all packing supplies used are charged to one account, the total charges must be assigned to departments on some basis logically related to the utilization of such supplies by each department. However, if certain packing supplies are used only by one department, it is entirely possible, if the resulting increased accuracy is worth while, to segregate them in a special account for special charging.

It would therefore be idle to attempt to make definitive listings of these classes of functions. They vary from one establishment to another and from time to time in the same establishment. However, some consideration of specific cost items will serve to bring out more clearly the nature and significance of the distinctions.

DIRECT DEPARTMENTAL COSTS

The following items of cost are most frequently capable of being identified with direct functions in a departmental analysis:

Salaries of departmental buyers and other expenses of the buying function, insofar as they can be identified with specific departments. General buying expense must be treated as an indirect function.

Compensation and expenses of departmental salesmen.

Costs of owning and operating special facilities for storage, such as refrigeration or humidifying equipment; for delivery, such as refrigerated trucks; or for other departmental purposes. These costs include such items as electric current, special supplies, depreciation, insurance, repairs, and taxes on such equipment.

Departmental advertising and sales promotion, including segregable pay-roll items, payments to advertising agencies and advertising media, and the like.

Special wrapping and packing materials and operations.

INDIRECT FUNCTIONS

Indirect functions range all the way from those whose bases for application to departmental operations are so obvious that the resulting allocation is scarcely distinguishable from the charges for direct costs to those functions whose relations to departmental operations are so remote as to make the choice of reasonable bases for application a difficult one. Generally speaking, the number of indirect functions utilized for departmental or similar analysis is rather small, since the cost of the analysis mounts rapidly with an increased number of functions and application bases. The wholesale-cost analyses of the Bureau of Foreign and Domestic Commerce have utilized not more than seven functions, and it is questionable whether any concern would be justified in carrying on a comprehensive analysis in a much more detailed fashion. On the other hand, it must be remembered that the accuracy of the analysis depends on recognizing a sufficient number of functions so that the major items of cost are adequately assigned. An analysis which is the result of too much insistence on simplicity and economy may be worse than useless, giving the impression of accuracy and scientific exactness where in fact these characteristics are not present.

ALLOCATION CRITERIA

Either of two criteria for selecting allocation factors may be followed. These criteria are *benefit* and *responsibility*. A department may be charged with a certain portion of the cost of a function, either because it receives a benefit therefrom or because it is responsible for its incurrence. Sometimes benefit and responsibility coincide; sometimes one is much more easily measured than the other; sometimes they actually seem to be at variance. In some instances a cost item must be divided and part allocated on one criterion and part on the other. It is seldom possible to follow one criterion or the other throughout, and no effort will be made here to be consistent in this respect.

DEPARTMENTAL ANALYSIS METHOD ILLUSTRATED

The departmental analysis of indirect functions is illustrated in exhibit 2, which shows the functions, the expenses which constitute

their total cost, and the units which measure the services for which the departments must be charged. Data for exhibit 2 are assembled with considerable modification from the source indicated in the exhibit. The functions given, their expense content, and the bases for distribution are in no sense definitive, and should be regarded purely as illustrations. For individual concerns or for entire branches of wholesaling they must be adapted and modified to suit particular needs and circumstances.

Many aspects of exhibit 2 require comment. In the first place, it must be remembered that the cost items here shown are completely exclusive of direct departmental costs. Any directly applicable costs are to be applied entirely outside of this tabulation.

Secondly, the lists of primary expenses are not exhaustive and would have to be supplemented in many cases.

Exhibit 2.—Functional Analysis of Indirect Wholesale Operating Costs by Departments

Function	Primary expenses included	Service unit for measurement of departmental benefit or responsibility.
Selling and promotion	General salesmen's compensation. General salesmen's expenses. Sales travel expense (other than salesmen). General advertising. Catalogs. Sales manager's salary. Miscellaneous selling expense.	The salesman-hour. The budgeted sales dollar. The actual sales dollar. The gross-margin dollar, budgeted or actual. The cost-of-goods-sold dollar.
Receiving and shipping	Wages of receiving and shipping employees. Receiving and shipping supplies. Miscellaneous receiving and shipping expense.	The standard handling unit. The invoice line. A weight unit.
Trucking (for subdivision into the subfunctions shown below).	Wages of truck drivers and helpers. Gasoline, oil, and grease. Tires. Truck repairs. Depreciation on trucks. Insurance on trucks. Taxes and licenses on trucks. Garage expenses. Miscellaneous truck expenses.	The truck hour.
Trucking incoming goods	(See above.)	A weight unit.
Trucking country shipments.	(See above.)	A weight unit.
City delivery	(See above.)	A weight unit. The delivered order. The invoice line (delivered orders only).
Occupancy	Rent. Light and heat. Depreciation on buildings. Taxes on land and buildings. Insurance on buildings. Warehouse wages and salaries. Warehouse maintenance and repairs. Miscellaneous occupancy expense.	The square foot of floor space occupied or assigned. The cubic foot occupied or assigned.
Investment	Taxes on merchandise. Insurance on merchandise.	The average inventory dollar.
Credit and collection	Credit department expenses. Collection fees and expense. Bad debts.	The net sales dollar.

Exhibit 2.—Functional Analysis of Indirect Wholesale Operating Costs by Departments—Continued

Function	Primary expenses included	Service unit for measurement of departmental benefit or responsibility
Office and accounting	Office salaries. Telephone and telegraph. Postage. Stationery. Office supplies. Depreciation on office equipment. Insurance on office equipment. Taxes on office equipment. Miscellaneous office expense.	The invoice line. The actual sales dollar.
General administration	Executives' salaries. Legal expense. Donations. Miscellaneous general expense.	The dollar of previously distributed expense. The gross margin dollar. The budgeted sales dollar.

Source: Adapted from Wholesale Accounting and Control by Heckert and Stone, McGraw-Hill Book Co., Inc., New York and London, 1935, chs. 5 and 6.

INTEREST

One item of "cost" which is omitted throughout the table is interest. If interest is to be included among costs at all, it should be imputed or implicit interest calculated as a function of the asset investments which pertain to each function. Specifically, the interest to be included in the cost of each function would be computed on net functional investments as follows:

Function	Assets on Whose Value Interest Must be Calculated
Selling and promotion.	Salesmen's cars. Other selling and promotional equipment.
Receiving and shipping.	Receiving and shipping equipment.
Trucking.	Trucks and truck equipment.
Occupancy.	Land, buildings, and building equipment. Warehouse equipment.
Investment.	Merchandise inventories.
Credit and collection.	Accounts receivable.
Office and accounting.	Office equipment.
General administration.	Administrative equipment.

Interest paid is not a cost of operation and cannot logically be included in a functional analysis. It is, instead, a distribution of the net income of the business. If net departmental income is ascertained as the result of an analysis which includes imputed interest among the costs, as above outlined, it must be remembered that the net income (or loss) figure is *after* such interest and is comparable with ordinary business net income only after a similar adjustment. It is seldom desirable to place such imputed interest on the books of account, but for comparative purposes something may be gained by including it in cost-analysis computations. The rate to be used may approximate the ordinary borrowing rate for the particular locality or concern, but for most purposes 6 percent is as good a rate as any.

OTHER EXPENSE ITEMS

Other items of expense which should be listed in each function are compensation insurance and the pay-roll taxes which accompany every item of wages or salaries. It is generally quite proper to allocate these items to the functions (assuming that they are recorded in total in the expense accounts) on the basis of relative functional pay rolls, unless compensation-insurance rates vary from one function to another. In such a case the differing rates must be taken into account.

The exhibit is made up on the assumption that occupancy will be applied only to the merchandise departments and not to any of the other functions, such as selling, office, and receiving and shipping. If greater accuracy is desired, the floor space occupied by the non-selling departments should also be measured, and their total cost would be increased by a portion of occupancy cost. This would involve omitting from total occupancy cost as here shown the items of warehouse labor and maintenance which apply solely to merchandise storage. The treatment of occupancy in this more elaborate way is justified only if the space used by nonmerchandise departments is substantial. Any special buildings or specially rented space occupied by the nonmerchandise departments will, of course, be chargeable to their operations as direct expenses.

SUBDIVISION OF FUNCTIONS

Several of the functions here shown may and should be subdivided if circumstances warrant. For example, selling and promotion are separable functions and may apply to commodity departments on entirely different bases. The selling function might include only the activities of the salesman in routine making of calls and taking of orders, while promotion might include advertising and that part of the salesman's time which is devoted to promotional work. Selling could then be charged to merchandise departments on the basis of salesmen's time reports and promotion on the basis of budgeted sales. Or promotion by salesmen could be distributed on the basis of time devoted to such work for each department, and advertising on the basis of budgeted sales on gross margin. The subdivision of salesmen's activities in this way may present serious difficulties, but it is not an unsolvable problem, and in some instances the distinction is an important one.

In the larger organizations the receiving and shipping divisions may have separate personnel and facilities, and under these circumstances the two functions should be treated separately. Obviously, for a given department the receiving of goods may be relatively simple and the shipping relatively difficult, or vice versa. Also, if the analysis covers a short period, such as a month, the quantities received may differ widely from the quantities shipped. The tabulation contemplates the use of shipping units for the application of both functions. In small concerns, however, receiving and shipping activities may be so intertwined as to be most difficult of separation.

The so-called office and accounting function embraces a number of activities which, in a more detailed analysis, should be treated separately. Part of the work is concerned with purchasing and should be related to the merchandise departments on a basis such as the

number or volume of purchases made. Billing and pricing of invoices and the keeping of sales records constitute an important part of office work and should be distributed to merchandise departments on the basis of the number of sales transactions. Customer and cash-receipts accounting are closely bound up with credit and collection activities and should be distributed on a similar basis. However, in the relatively small concern the analysis of these activities may be difficult and the resulting refinement of cost analysis may not be sufficient to justify the extra effort. It is, therefore, reasonable in such cases to distribute all of this composite function on a basis which will result correctly for the major portion of the cost.

Strictly speaking, there should be no such function as "general administration." The presence of such a cost group is confession of failure to attach responsibility to each item of expenditure. If it is actually impossible to assign such items on a logical basis to the functional divisions of business activity, it may be that they are not properly part of operating costs at all, at least for the current period, and might better be regarded as distributions or adjustments of net income. In any event, the application of such items to merchandise departments in the same way as is done with other functional costs is a dubious expedient. In some ways it would be better to arrive for each department not at a doubtfully valid "net profit" but, instead, at a departmental contribution to the common fund out of which such items as "general administration" must be met. Departmental efficiency can be compared fully as readily and perhaps more accurately on the basis of such a figure as on the basis of a labored and doubtful "net profit."

This observation applies to all items of operating expense for which no logical basis of allocation can be discovered. The usual procedure in such cases is to resort to purely arbitrary bases of allocation, such as sales or the total of previously distributed expense. This expedient gives a false appearance of scientific completeness to the analytical process and may lead to faulty conclusions and unwise action. It is much better to proceed with the analysis only so far as reasonable reliance can be placed on the results. The importance of this departure from the usual procedure depends, of course, on the amounts involved. If the items which must be distributed arbitrarily amount to a negligible portion of total costs, it does not make much difference how they are handled. Actions should never be taken, nor policies formed, on the basis of analyses of distribution costs without the allowance of a generous margin of safety on account of uncertain factors in the costing process. However, the fact remains that results should always be as dependable as careful choice of analytical procedures can make them.

MEASURING UNITS FOR FUNCTIONAL SERVICES

SELLING AND PROMOTION

The units for measurement of the activities of each function require detailed comment. For the selling and promotion function the salesman-hour is probably the best unit. Its use involves the necessity of time reports from the salesmen showing amounts of time spent on the merchandise of each department. Only actual solicitation time would be counted. Traveling and waiting time would thus be automatically distributed on the same basis as solicitation time.

The budgeted sales dollar has a good deal of merit as a distribution basis for this function, especially if time reports from salesmen are not practicable. The theory back of the budgeted sales basis is that the sales organization is set up and promotional activities carried on for the purpose of achieving planned sales, and that departments are responsible for the resulting expenditures regardless of actual results. The use of this basis is, of course, dependent on the existence of sales budgets.

The use of actual as contrasted with budgeted sales follows the "benefit" rather than the "responsibility" criterion. It is the easiest of all possible distribution bases, but neither it nor the budgeted sales basis is to be recommended, since neither takes into account sales effort, which is a vital factor in allocating the cost of sales effort. The gross-margin dollar, either budgeted or actual, is possibly a better measure of sales effort than total sales prices, since broadly speaking greater effort is necessary (and justified) to sell high-margin goods than low-margin goods. Cost of goods sold, on the other hand, has no merit whatever as a basis for distributing this type of cost. It is included in exhibit 2 only because it was included in the source from which the table was principally adapted.

RECEIVING AND SHIPPING

For receiving and shipping, the best allocation basis depends very largely on the type of merchandise handled. If it is chiefly homogeneous, a weight or other physical-measurement unit can properly be used. Weight units may have to be modified by considerations of bulk, but this is not so important in connection with receiving and shipping as it is in connection with trucking.

Under other circumstances the invoice line, representing the individual customer's order, may be satisfactory. In many cases an artificial handling unit must be developed. This involves choosing a standard handling unit (usually a typical actual unit, such as a case) and relating all other handling units to it by means of weighting factors. This is the scheme used for the allocation of delivery expense by the National Retail Dry Goods Association. These units are all sold units, of course, and do not do justice to the receiving part of the function, but, if the receiving portion is relatively small and very difficult to isolate, the harm done is not great.

TRUCKING

The section on trucking has been prepared on the assumption that the same trucks and operators handle incoming goods, deliver country shipments to the freight or express station, and make city deliveries. The problem of truck-expense allocation is simplified if any of these functions is performed by separate trucks or not performed at all. For the allocation of the general truck function to the subfunctions the truck hour is probably the best single measure. It is not entirely adequate, since loading and unloading time do not have the same cost significance as running time. It may be necessary to count stopping hours and running hours separately and work out a weighting factor to make them homogeneous. Another way of accomplishing the same result would be to determine separately the cost of running time and stopping time as subfunctions of total truck operation. In

any event only used or occupied hours will be taken, leaving truck idle time to be automatically distributed on the basis of active time. In any event the hours must be kept track of for a sufficiently long period to make sure that a typical picture of truck usage has been obtained. The ratios thus obtained can be used subsequently without actual time measurements except occasionally to make sure that changed conditions have not made changes in the relative truck usage.

To departmentalize the cost of trucking incoming goods, a weight unit, possibly modified by bulk, would seem best. A similar unit can be used for trucking country shipments to freight or express terminal. For city delivery the weight or other physical-measurement basis is not so likely to be satisfactory, since an important element in the cost of such delivery is the necessity for stopping, unloading, and making the actual delivery. Thus a department whose orders were typically small would not be charged with its fair share of cost on a weight basis while a department whose orders were typically large would be charged too heavily.

For city delivery the delivered order or the invoice line on a delivered order will be preferable to a weight or other physical unit. The delivered order and the invoice line will yield different results, since on the order basis a department is counted only once on a given delivery, whereas on the invoice-line basis it will be counted as many times as it furnishes lines on a given invoice. Circumstances alone can dictate which method will prove more desirable in a given case.

OCCUPANCY

The distribution of occupancy expense, which in this case includes warehousing labor and similar operations, is relatively easy. Space assigned to the several departments, either areal or cubic, is the best basis. In most cases the square foot will be entirely adequate. Relative value of space is seldom or never a factor of importance in wholesaling, unless it is brought about by special buildings or construction requirements for specific departments, in which case the occupancy expense becomes a direct charge to the departments affected.

INVESTMENT

The investment function relates solely to the necessity of carrying a stock of merchandise. Its cost will not ordinarily be great unless interest on investment in inventory is included. The average inventory dollar is the proper unit for assignment of this cost to departments. To obtain an adequate average, departmental inventories must be taken or estimated sufficiently often. If the period is a month, the average of inventories at beginning and end would presumably be adequate; if a longer period is under analysis, an average should be derived from monthly inventories, unless departmental inventories do not fluctuate widely.

CREDIT AND COLLECTION

The merchandise departments benefit from or are responsible for credit and collection activities in proportion to the number of dollars which the sales of each require to be collected. This statement is true in the great majority of cases. A situation might arise, of course, in which the characteristics of the customers of a given department were such that a deviation from this rule would be necessary,

but in general there is nothing about commodities which would dictate any other treatment.

OFFICE AND ACCOUNTING

Of the two methods shown for the allocation of office and accounting costs the first is generally to be recommended. Mere dollar volume of sales is not an adequate criterion of the amount of office work required by merchandise departments. The invoice line basis reflects the number of times individual customers order goods, and is likely to reflect the amount of office and accounting work required by each department as well as any one basis could. Ideally, as noted above, the office work should be subdivided and the several subfunctions applied to departments in bases best suited to themselves. Practically, this can be done only in organizations large enough to require separate personnel for the various activities. It could be done by time studies, of course, in smaller organizations, but it is decidedly questionable whether the increased accuracy of the analysis would justify the added cost.

GENERAL ADMINISTRATION

As previously indicated, the allocation basis for general administration does not much matter, since any allocation is of dubious validity. It is sometimes argued that the total of previously distributed expenses is a fair index of the amount of executive attention required by the several departments, but this argument is very questionable. The only thoroughly satisfactory solution, if it is felt necessary to analyze all costs, is to establish relationships between the items listed under general administration and the other functions. Any items for which such relationships cannot be determined are of doubtful propriety as operating costs and should be considered to be nonoperating in character.

It should be understood that the bases given for the functions listed in exhibit 2 are not exclusive of more adequate bases which may be available in specific instances. The analysis of operating costs is a highly individualistic process, and opportunities for improving technique by taking advantage of individual circumstances should never be sacrificed for adherence to generalized rules and suggestions. Of course if uniform analyses are desired for trade-association purposes, uniform methods must be followed regardless of a certain lack of adaptability to particular cases. However, trades and industries are rare indeed in which the circumstances of the members are enough alike to make uniform analysis of the minute character required by the functional procedure worth attempting. The development of such a program must be a process of long experimentation. The National Retail Dry Goods Association stands alone in having developed a comprehensive program of this sort.

DEPARTMENTAL ANALYSIS SUMMARIZED

In order to summarize the procedure for departmental analysis by functional classifications of cost and to indicate the types and extent of accounting and statistical information required, it is necessary to assume functions and units of service which could be used in a particular analysis. It would be emphasized that the scheme of analysis laid out for this purpose is not necessarily the best, since the merit

of the scheme used depends on its adaptability to particular requirements. The functions and service units chosen are as follows:

Function	Service Unit
Selling and promotion.	Budgeted gross margin dollar.
Receiving and shipping.	Hundredweight shipped.
Trucking.	Truck hour.
Trucking incoming goods.	Hundredweight trucked.
Trucking country shipments.	Hundredweight trucked.
City delivery.	Order delivered.
Occupancy.	Square foot of assigned floor space.
Investment.	Average inventory dollar.
Credit and collection.	Net sales dollar.
Office and accounting.	Invoice line.

It is assumed that the general administrative items have been assigned to operative functions or else eliminated from the analysis. The accounting and statistical data necessary to complete the analysis are as follows:

Primary operating expense accounts in sufficient detail to determine the cost of all direct functions (not shown above) and of all indirect functions.
Budgeted sales, in total and by departments.
Budgeted cost of sales, in total and by departments.
Hundredweight shipped, in total and by departments.
Truck hours, in total and by subfunctions.
Hundredweight of incoming merchandise trucked, in total and by departments.
Hundredweight of country shipments trucked, in total and by departments.
Orders delivered, in total and by departments (this involves counting an order which contains merchandise from more than one department as many times as there are departments represented).
Square feet of floor space assigned for merchandise storage, in total and by departments.
Average inventory investment, in total and by departments.
Actual net sales (gross sales minus returns and allowances), in total and by departments.
Number of invoice lines, in total and by departments.

A convenient form for summarizing the analysis is the familiar distribution sheet which would have the nine functions as side heads and columns for each department and for the total. Each column may be subdivided to show the number of units of functional service applicable to each department and the departmental cost, obtained by multiplying the units by the unit cost.

UTILITY OF DEPARTMENTAL ANALYSIS

The most obvious way in which departmental analysis is useful is in its ability to show which departments are making money and which, if any, are not. Or, if the analysis is not carried to the point of determining net departmental profits, one can nevertheless ascertain which departments are making a satisfactory contribution to the fund out of which joint and nonanalyzed expenses must be paid. It is too well recognized to need demonstration that a business as a whole may be profitable while there are unprofitable lines or departments within it. Departmental cost analysis will disclose any conditions of this sort. It will also disclose to some extent the reasons why the department is unprofitable, and thus suggest lines of action which may be expected to remedy the situation.

Analysis will indicate departments which require more than a fair share of attention from salesmen because of difficulty in making sales

or the small size of orders, or departments whose turn-over is so slow as to require excessive amounts of storage space and investment costs. It may show, also, that, though costs are not out of line, gross margins are not adequate in view of the costs involved. This may mean that higher gross margins should be sought either by improving purchasing methods or by obtaining higher prices from customers. If neither of these is possible, there is indicated the necessity of attempting to make the department operate more cheaply than others, and some of the same steps may be taken as would be necessary if the costs were found to be too high in the first place.

In addition to absolute results for a given period, comparisons of one period with another are most valuable. Trends in costs and profits are disclosed, and the reasons for improvement or the opposite are discovered. Also, the results of remedial treatment can be watched and the technique improved.

LIMITATIONS OF DEPARTMENTAL ANALYSIS

Just as the mere knowledge that a business as a whole is unprofitable gives few clues to the remedies required, so the determination of unsatisfactory performance of a department of the business does not begin to give all the information needed for a cure. Remedies must be applied to the departmental operations as a whole, while the real faults probably lie with specific commodities or specific salesmen or territories in which the departmental merchandise is sold. A remedy applied to an entire department may affect adversely the good elements in the department—the lines which keep it from being worse than it is. Furthermore, the profitable departments may very well contain unprofitable commodities which, needing attention, are neglected because their unprofitability is covered up by the favorable result of departmental operations as a whole.

Section 7.—SPECIAL PROBLEMS OF FUNCTIONAL ANALYSIS

In order to overcome the deficiencies of departmental analysis as a final answer to the need for cost information it is necessary to turn to analyses of costs by individual commodities or commodity groups or to analyses along other than the commodity lines. These will be described and illustrated hereafter, but first it is necessary to deal with certain special problems of functional analysis which will be encountered in all businesses and some solution for which must be found before the analysis is complete.

PURCHASE DISCOUNTS

One group of special problems in connection with functional analysis relates to the treatment of certain items whose relationships to costs, prices, and operations are not always properly expressed. Among these, cash discounts are most frequently mishandled. The cash discount on purchases is a reduction in the cost of goods, and not income or an offset to operating expense. This distinction may or may not be important from the standpoint of ascertaining net departmental profit or loss, but it is important in any study of departmental or functional efficiency. The correct treatment of purchase discounts will make a difference in departmental net profits if it is carried through

to its logical conclusion so that inventories are priced with discounts deducted—provided, of course, that inventories vary between the beginning and the end of the period under analysis.

The precise details of handling purchase discounts in the course of analysis will depend on circumstances. Generally all discounts taken are thrown indiscriminately into a single account. For the application of this account to the merchandise departments it may be sufficient to distribute in proportion to cost of goods sold. This will be the case, however, only if discounts are actually available for all departmental purchases at the same rates. If discounts can be taken on some goods and not on others, or if the rates on some lines differ from those on others, the only thoroughly satisfactory method of accounting for them is one which recognizes the discounts as they are available, and not as they are taken, and which separately accounts for the discounts on the purchases of each department. To the extent that discounts are not taken, this procedure will result in debit balances of untaken discounts which must be included in the expense analysis. The best method for departmentalizing these items is to apply them in the same proportions as the departmental discounts available. In no event should a department be penalized because the discounts on its own purchases were not taken, since the failure to take them is the responsibility of the financial management and not of the departmental management.

Trade discounts and ordinary quantity discounts on purchases do not commonly appear on the books at all, since they are deducted from invoice prices before the purchases are recorded. Patronage or volume discounts, however, the amount of which is determinable only after the lapse of time, cannot be deducted from invoice prices (except on the basis of estimates) and ordinarily show up on the books in the form of credit balances similar to those for cash discounts taken. The treatment is precisely parallel to that for cash discounts. The items are really deductions from cost of goods and must be subtracted from departmental cost of goods sold. The amounts to be deducted for each department depend on the circumstances of the offering and receipt of such discounts. Seldom will the expedient of distributing on the basis of departmental cost of goods sold give correct results. The only really equitable method is to set up such credits in departmental accounts, thus applying them directly. If the period under analysis is too short for the accurate determination of such discounts, estimates should be used. These need not be set up on the books, if there is objection, but may be shown only in the analysis. The importance of these observations depends, of course, on the amount of such discounts. If they are very small, their precise treatment does not matter. However, it should be remembered that inadequate treatment of enough small items will have just as bad an effect on the analysis as will improper handling of a large one.

SALES DISCOUNTS

Cash discounts taken by customers are reductions of selling prices, and not operating expenses. If they are offered to all customers at the same rate, regardless of the departments from which sales are made, they can be allocated to departments on the basis of net sales. If, however, discounts are offered in some departments but not in

others, or if the rates vary, a scheme similar to that required for cash discounts on purchases under similar circumstances must be adopted. Separate accounts must be set up for (or, at least, one must "keep track" statistically of) the discounts offered by each department. Any discounts untaken by customers should be credited to departmental net profits (if at all) in proportion to the discounts offered. Such untaken discounts are net income, and not reductions of departmental costs.

NONOPERATING INCOME AND EXPENSE

Nonoperating items of income and expense should never be included in operating-cost analysis. Interest earnings and similar nonoperating receipts are in no sense deductions from cost. Interest payments and other income deductions, such as income taxes and nonoperating losses, should also be omitted. Among nonoperating losses are such items as uninsured losses by fire, theft, or other casualty, losses on the disposition of fixed assets on which depreciation has not been sufficiently accumulated, and similar items. Bad-debt recoveries are, properly speaking, additions to net income (assuming that fees or commissions specifically paid to secure them are first deducted) and not, as often treated, deductions from current bad-debt charges. The amount of such recoveries is likely to be insignificant unless debts have been too lavishly written off in the past, so that incorrect treatment here is probably of no great moment. Bad-debt charges, whether additions to reserves or accounts actually written off, may reasonably be treated as operating expenses (assuming, of course, that the amounts are sensibly arrived at), although one school of accounting thought treats them as direct deductions from sales. For analysis purposes this possible alternative makes little difference, since they are applicable to departments on the basis of net sales, except in such instances as the credit risks of different departments may be different.

The philosophy back of these limitations on the scope of analysis is simply that profitable analysis is concerned only with the relationships existing between operating revenues for a given period and the operating expenses, or costs of obtaining revenues, for the same period. Any analysis which throws light on these relationships is logically justifiable, but indiscriminately throwing into the analytical melting pot elements which are not truly a part of current operations stultifies the analysis as a whole, and leads to wrong conclusions. Similarly the misplacement or wrong treatment of items which do belong in the analysis has the same undesirable effects. What the analyst is trying to find out is the causal relationship between efforts to obtain revenue and the revenue obtained, in order that the efforts may be more exactly directed, and that changes in the cost of revenue-producing efforts may be accurately appraised. It is obvious that perfection in such attempts can never be attained, especially in the field of distribution costs, a field in which unpredictable human factors refuse to lend themselves to analytical techniques. However, it is equally obvious that it is a great disservice to the management for the accountant to insist on including in an analysis of operating results nonoperating factors, simply because such factors have to be taken somewhere into the profit and loss account.

These considerations lead to two of the most difficult questions which the distribution cost accountant has to face. First, how are

seasonal fluctuations of sales and selling effort to be treated, and, secondly, what recognition can and should be given to the effect of cyclical irregularities on unit costs?

SEASONAL FLUCTUATIONS OF COSTS

Seasonality affects the cost accountant's problems in two ways. In the first place, sales fluctuate from month to month without an accompanying fluctuation in many important cost items, such as rent and other occupancy expense, executives' salaries, insurance, depreciation, and taxes. In the second place, selling efforts and the payment therefor do not necessarily coincide with sales results. Thus, salesmen are frequently sent out in one month to obtain sales which will be consummated in succeeding months. Similarly, advertising and other forms of sales promotion may be carried on at a given time with the expectation of producing sales in the future. The result is that expenditures do not match revenues when the period under analysis includes less than the full seasonal cycle. These problems are possibly less acute for the wholesaler than they are for the manufacturer, who must often secure orders before he can even begin to produce, but they are difficulties with which the wholesaler's accountant must contend, nevertheless.

These seasonal changes have two important aspects. One relates to bookkeeping and the preparation of statements, and the other to cost analysis of the type herein described. Orthodox bookkeeping writes off all distribution costs as they are incurred, resulting in the showing of operating losses in months of slack business or high expenditure and of unduly high net earnings in months when sales are high and sales effort, perchance, has slackened. It has been proposed that this situation be remedied by postponing the charging off of incurred expenses until the arrival of the time when the revenues begin to flow in adequate degree, thus smoothing out the net-earnings curve and obtaining a rational correlation between revenues and the expenses which presumably produce them.

This procedure, it is argued, is similar to that used by the factory cost accountant when he adopts a level burden rate for charging factory overhead to production throughout the year. This analogy is true, of course, and if the distribution accountant can make up his burden rates as logically and as accurately as can the factory accountant, the result can hardly be subject to objection on grounds of orthodoxy. However, it is doubtful whether the distribution accountant is in any such happy position. Furthermore, it is questionable whether any real advantage from the standpoint of operating control would be achieved by such an expedient. No management should be much disturbed by an operating loss shown on an interim statement and caused by seasonal influences which are well understood. Neither should any management become unduly optimistic over a high-profit showing under similar but opposite circumstances. Such results can be and are reasonably well discounted. It is well recognized that in seasonal businesses only the annual (or possibly semiannual) reports accurately match revenues and expenses. Interim statements are taken seriously only in comparison with expected or budgeted results, or in comparison with the same period last year. For control purposes such comparisons are entirely satisfactory, and it is hard to see how the situation would be improved by resort to artificial and uncertain methods of smoothing out the seasonal curve.

The effects of seasonality are the same, of course, when the operating statement is broken down by departments, customers, territories, etc., by the processes of functional analysis. Seasonal losses for the business as a whole will repeat themselves for individual departments or other foci of analysis, and so will seasonal gains (except, of course, that the seasonal incidence of both revenues and costs may differ from one department to another). However, the same allowances can be made for a department as for a business, and the same types of comparisons (with budgets and with the same period last year) will be equally fruitful. Furthermore, the benefits of functional analysis are by no means dependent on carrying it through to the point of ascertaining net profit or loss. The cost of salesmen's activities per call or of advertising per response or of order filling per item or order is of significance for managerial purposes regardless of tangible results in the form of revenues.

Nevertheless the fact of seasonality may have some effect on methods of distribution-cost analysis. For example, the unit of service for the storage or occupancy function should probably be the assigned or reserved square foot, rather than the square foot actually occupied. This is because inventories fluctuate seasonally, and for different departments in different degrees. The effective unit cost of providing storage space does not change merely because inventories are seasonally high or low. Such fluctuations would conceal the really important changes brought about by increases or decreases in the cost of maintenance, insurance, taxes, or other elements of the total cost of the function.

To the extent that cost analysis is to be used in determining prices and price policies the unit costs must be freed from seasonal fluctuations. Analysis on the annual basis is the only adequate procedure here. It would be very foolish to allow pricing policies to be affected by high unit costs in slack months and low unit costs in months of high activity. The resultant raising and lowering of offering prices would accentuate the seasonal swing and make economical and efficient operation still more difficult.

CYCLICAL FLUCTUATIONS

Cyclical and other nonseasonal fluctuations in costs and revenues present a much more difficult problem than seasonal changes whose occurrence and influence can be predicted and accurately discounted. The annual statement effectively damps the seasonal oscillations, but there is no such cure for the complications of cyclical variances. If business cycles obeyed laws similar to those of the seasonal round, it would be possible to make up a 5-year or 7-year statement which would consolidate the ups and downs and, what is more important, to discount with some accuracy the excess profits of good years and the undue losses of bad ones. However, even to the extent that the cycle can be forecast for business as a whole, it still remains an enigma for the individual enterprise. The management of a specific concern, surrounded by the special conditions which make that concern unique, are scarcely in a position to take philosophically the red figures of bad years, no matter how wise they may be not to become too optimistic over the excellent showing of good years.

Factory cost accountants have developed a theory of normal capacity which is used in the application of manufacturing overhead

to product costs for the twofold purpose of preventing too low unit overhead charges in times of abnormally high production and too high charges when productive facilities are being used at less than a normal rate. Normal capacity is defined as substantially less than theoretical 100 percent capacity, although authorities differ as to precisely how much less. Allowances must be made, of course, for seasonal influences, machine break-downs, interruptions for taking inventory (in cases where the inventory shut-down is still the rule), and for other normal and inevitable failures to attain maximum theoretical production. The amounts of such allowances differ in different industries, but may generally be said to range from 20 to 40 percent. The moot point is how much allowance, if any, to make for cyclical and other irregular fluctuations in demand. The best opinion seems to favor making little if any such allowances and hence basing operating and pricing policies on costs obtained by use of burden rates which will actually "pay out" only in years in which production is at least at a normal rate as above defined. Allowance for the necessity of carrying fixed charges during periods of depression must then be made by attempting to maintain adequate profit margins.

Charging products with overhead at normal rates results in unabsorbed burden in periods of subnormal production and overabsorbed burden in periods of the opposite character. Cost accountants are generally agreed that such balances should be written off to profit and loss at the ends of fiscal years, or oftener, leaving product costs unaffected.

The definition of normal capacity to manufacture is in many cases relatively easy, but the parallel definition in a distributive enterprise is difficult. It is possible to define a salesman's capacity to make calls, and to define the capacity of a warehouse to store goods, but the efficacy of calls depends on the size of orders taken, and the requirements for storage space depend on turn-over quite as much as they do on weight and bulk.

Thus capacity in a distributive enterprise is a decidedly intangible factor. Idle capacity exists, but it is most difficult to measure in a way which could be used for purposes similar to those of the factory accountant. The best solution of this problem seems to be not to attempt to exclude idle capacity cost from the analysis but instead to analyze costs as they come, showing unit costs excessively high or excessively low as the case may be. At the same time standard unit costs should be established on the basis of normal capacity as that is defined for each particular function. Such standard costs will furnish comparisons with the actual costs, and the amounts of variation due solely to the volume factor can easily be isolated. The procedure for doing this was illustrated in the section on functional analysis.

ASSIGNMENT OF JOINT COSTS TO FUNCTIONS

A problem of functional analysis of very different character from those already discussed is that of methods of assigning to specific functions expenses which are common to two or more functions. Such situations are extremely common, especially in smaller establishments where the duties of individual employees are not clearly functionalized and in cases in which an attempt is made to obtain great accuracy by means of a very minute functional break-down. As far as possible, it is desirable to define functions and keep primary

expense accounts in such a way that the totals of specific accounts can be assigned directly to particular functions. The functions of exhibit 2 are an example of functions so defined. However, accuracy of results may require a different treatment. A good example is afforded by salesmen's activities.

Salesmen have two broadly defined duties: They perform routine clerical and other duties in taking orders for goods, and they promote the sale of goods. The two functions are frequently performed in the course of the same customer interviews, and it is by no means easy to discover how much of the salesman's compensation and expenses pertains to each. The importance of making the distinction is that order taking and promotion apply to commodities on very different bases. The former is principally a function of the number of orders taken, while the latter must be applied to commodities on the basis of the amount of time or effort spent on each commodity promoted. The latter factor is by no means easy of ascertainment and must often be approximated by assumptions. Some most ingenious cost studies have been made for the purpose of solving these problems of the proper allocation of salesmen's time and efforts.

For the division of primary expense items between functions there are several available methods. Perhaps the most useful is the time study. Time studies solve problems of distribution of the activities of salesmen, clerical employees, warehousemen, truck drivers, executives, and, in fact, of all employees whose duties may embrace more than one function. They are useful also for distributing the time of equipment, such as trucks and office machinery. Such time studies usually need not be continuous, but must be carried on long enough to establish trustworthy relationships and must be repeated at intervals as a check on changes which may have taken place. In many cases they may be conducted as are time studies in the factory, by trained observers and the usual scientific methods. In other instances they may have to be rather rough, and may depend on the time reports or memories of the individuals involved. Needless to say, such studies should be accepted with great caution and should be checked by every available means.

The best substitute for time studies is estimates by managers or others in a position to make intelligent guesses. Reliance on such estimates is not uncommon, and where they are made by responsible individuals with a lively appreciation of the necessity for accuracy, they may be very dependable. They, too, should be checked from time to time. Obviously estimates are much more easily and cheaply procured than are time studies. However, their use is justified only when the estimator is competent and has some more reliable basis for estimating than mere impression.

Various other methods of allocation are useful for specific expenses. A number of them are similar to methods used for the subsequent application of functional costs to commodities, customers, etc. Floor space is a useful basis for allocating occupancy costs. The number of employees or the number of labor-hours may be used in connection with supervisory and personnel expenses. The total of all or a part of previously allocated expenses is frequently used for "general administration."

The temptation to be purely arbitrary in any but almost negligible expense items should be resisted, since failure to place primary expenses

correctly as regards the functions which they serve vitiates the entire analysis. It is far better to leave out of the analysis entirely items which seem to require arbitrary treatment, and to carry the analytical procedures, as heretofore suggested, only to the point of determining relative contributions of departments, commodities, etc., to a common pool out of which unallocable charges must be met.

Section 8.—ANALYSIS OF COSTS BY COMMODITIES

The procedure for analysis of costs by commodities is simply an extension of the departmental analysis already described. It may be carried to the extreme of determining costs for individual brands and sizes of specific commodities, or it may be sufficient to determine costs only for all brands and sizes of a given commodity together, or it may be that closely allied commodities can be grouped for analytical purposes. An excellent characteristic of commodity analysis is that it can be carried to different lengths at the same time. Nothing theoretically prevents a determination of costs for Commodity A on the one hand and all other commodities on the other, although little would be gained by doing so. A great deal of the benefit of commodity analysis comes from the ability to compare the performances of given commodities or commodity groups with each other. The great advantage of the flexible character of commodity analysis is that the more minute procedures can be carried on only in connection with lines which seem to require it in order precisely to locate sources of difficulty. Thus, while the business as a whole might be subject only to departmental analysis, the costs of handling the commodities of Department B, which shows unsatisfactory performance as a whole, may be determined individually. Obviously much time and expense may be saved by such a procedure. Another expedient which may be used when cost analysis is to be a permanent feature of managerial control is to make the more minute breakdowns in rotation so that each major commodity group receives attention in its turn.

Exhibit 3.—Allocation of Primary Expenses to Functional Expense Classes

[Expressed in percent of total expense]

Item	Total	Investment	Storage	Handling	Checking	Promotion	Reimbursement	Administration	Basis of distribution
Salaries:									
Officers	2.87	-----	----	-----	-----	----	-----	2.87	Administrative part of manager's salary, per his estimate.
Office	7.49	0.38	----	-----	3.37	----	0.75	2.99	Manager's estimate.
Financial and accounting	5.27	.52	----	-----	1.06	----	2.63	1.06	Do.
Sales	14.22	-----	----	-----	9.48	4.74	-----	----	Do.
Buying	1.44	.72	----	-----	.72	----	-----	----	Equally between speculative and replacement buying.
Warehouse	4.95	-----	0.25	4.70	-----	----	-----	----	Time study.
Chauffeurs	1.49	-----	----	1.49	-----	----	-----	----	Direct.
Total salaries	37.73	1.62	.25	6.19	14.63	4.74	3.38	6.92	

Exhibit 3.—Allocation of Primary Expenses to Functional Expense Classes—Con.

Item	Total	Investment	Storage	Handling	Checking	Promotion	Reimbursement	Administration	Basis of distribution
Rent (including light, heat, and power):									
Warehouse	4.79		4.79						Floor space.
Office	.38							.38	
Shipping room	.31			.31					
Total rent	5.48		4.79	.31				.38	
Taxes:									
On salesmen's cars	.15				.10	.05			Same as sales salaries.
On inventory and warehouse assets	2.58	2.58							Direct.
On delivery equipment	.07			.07					Do.
Total taxes	2.80	2.58		.07	.10	.05			
Insurance:									
Workmen's compensation	.10			.06	.02	.01		.01	Direct, according to asset or hazard insured.
Office furniture and fixtures	.15	.15							
Profits and commissions	.22	.22							
Burglary	.11	.11							
Public liability	.20			.16	.04				
Inventory	.61	.61							
Warehouse fixtures and equipment	.23	.23							
Delivery equipment	.08			.08					
Plate glass	.02	.02							
Total insurance	1.72	1.34		.30	.06	.01		.01	
Depreciation:									
Office furniture and fixtures	.35	.35							Direct.
Salesmen's cars	1.43				.95	.48			Same as sales salaries.
Warehouse fixtures and equipment	1.10	1.10							Direct.
Delivery equipment	.57			.57					Do.
Total depreciation	3.45	1.45		.57	.95	.48			
Interest on investment:									
Accounts receivable	11.83						11.83		Do.
Office furniture and fixtures	.19	.19							Do.
Inventory	7.37	7.37							Do.
Salesmen's cars	.15				.10	.05			Same as sales salaries.
Advances to salesmen	.02				.01	.01			Do.
Delivery equipment	.07			.07					Direct.
Total interest on investment	19.63	7.56		.07	.11	.06	11.83		
Other expenses:									
Telephone and telegraph	1.50	.22			1.13			.15	Manager's estimate.
Parcel post	.27			.27					Direct.
Other postage	.65	.04			.15		.33	.13	Manager's estimate.
Stationery and office supplies	1.94	.09			.49		.97	.39	Do.
Legal and professional services	1.48	.15			.37		.36	.60	Do.
Sales discounts	3.96						3.96		Direct.
Bad debts	6.50						6.50		Do.
Salesmen's traveling	5.38				3.59	1.79			Same as sales salaries.
Advertising	.82					.82			Direct.
Dues and donations	.31					.31			Do.
Miscellaneous selling, shipping, and delivery	.35				.35				Direct, per manager.
Packing materials	.59			.59					Direct.
Inward freight and express	1.71			1.71					Do.
Repairs to building	.50		.50						Do.
Cartage out	1.87			1.87					Do.
Service and maintenance of delivery equipment	.66			.66					Do.
Miscellaneous office expense	.70							.70	Do.
Total other expenses	29.19	.50	.50	5.10	6.08	2.92	12.12	1.97	
Total expenses	100.00	15.05	5.54	12.61	21.93	8.26	27.33	9.28	
Administrative expense distributed		1.54	.57	1.29	2.24	.84	2.80	9.28	Totals of previously distributed expenses.
Total expenses	100.00	16.59	6.11	13.90	24.17	9.10	30.13		

Source: Adapted from Wholesale Electrical Goods Distribution, Distribution Cost Studies No. 9, by Wroe Alderson and Frederick Haag, Jr., Bureau of Foreign and Domestic Commerce, 1931, pp. 51, 52, 53; for sale by Superintendent of Documents, Government Printing Office, Washington, D. C., price 15 cents.

PROCEDURE FOR COMMODITY COST ANALYSIS

The functions and service units described in connection with departmental analysis may be used without change for commodity analysis. The only additional requirement is that the service units must be ascertained for each commodity or commodity group under examination, rather than for merchandise departments as a whole. This involves more detailed clerical procedure and a more costly analysis, but the information gained about the relative profitability of commodities and the resulting indications of points at which losses may be stopped and profitability improved may be well worth the additional effort.

In order to illustrate commodity analysis further and to show how a somewhat different group of functions may be made to serve the purpose, exhibit 3 shows a functional distribution of costs used by the Bureau of Foreign and Domestic Commerce in the analysis of costs of a wholesale electrical-goods distributor.[2] Exhibit 3 is somewhat modified from the original study in accordance with some of the principles of cost analysis heretofore given, but the procedure remains essentially unchanged.

Seven functions are recognized, namely, investment, storage, handling, checking, promotion, reimbursement, and administration. The last is treated as a service function—that is, it is applied to the six other functions before they, in turn, are applied to commodities. The unit for application of the administrative function is the dollar of expense previously charged to the other functions. The theory on which this basis is justified is that the six functions require the attention of the general administrative staff roughly in proportion to the amounts which the six functions cost. This assumption is questionable, and is not recommended for use without careful consideration in any given case. It is decidedly better to examine with care the ways in which the administrative staff members spend their time and to charge the functions accordingly. The clerical and office expenses which are definitely related to the activities of certain officials can then be charged in proportion to their compensation and the rest can be treated separately in accordance with its nature.

The units by means of which the services of the six functions charged to commodities are measured are as follows:

Function	Service Unit
Investment.	The inventory dollar.
Storage.	The square foot occupied.
Checking.	The sales transaction, or invoice line.
Handling.	The standard handling unit.
Promotion.	The gross-margin dollar.
Reimbursement.	The sales dollar.

Each function and unit require some explanation and defense. The study groups the first two functions under the head of maintenance, the second pair under movement, and the third pair under contact. The following is quoted from the study.[3]

[2] Bureau of Foreign and Domestic Commerce; Problems of Wholesale Electrical Goods Distribution, by Wroe Alderson and Frederick Haag, Jr.; Distribution Cost Studies No. 9; Government Printing Office, Washington, D. C., 1931; price 15 cents; pp. 51, 52, 53.

[3] Ibid. pp. 36, 37, 38, 39.

MAINTENANCE

The first group of distribution costs, termed maintenance costs, includes all costs of maintaining capacity for distribution. It can also be described as the cost of offering merchandise for sale. In retailing it would be the cost of maintaining an exhibit store, fully equipped and stocked, from which no sales were expected to be made. It includes rent of building, heat, light, and power, cleaning and repairs, depreciation on fixtures, interest on inventory investment, insurance, and taxes on merchandise stock and plant. These costs are not conditioned by the volume of sales made during the year, but by the scale of the preparations for sale; that is, by the amount of inventory carried in stock.

Merchandise carried in stock involves maintenance costs for two reasons: first because it absorbs investment, and second because it occupies space. Maintenance is thus divided into two natural parts, investment costs and storage costs. Storage cost is computed on the basis of square feet, with the rent per square foot enhanced by a proportionate share of the utilities, such as light and cleaning, which add to its value. The space occupied by a given commodity is determined by actual measurement of the part of the establishment usually occupied by the commodity or reserved for it. In some cases an adjusted scale of space values will have to be set up, by floors, or other divisions. This is particularly true where a portion of the space carries a special utility; as, for example, refrigeration.

Investment cost includes all expenses which confront the manager as a direct result of investing in a commodity. Insurance on inventory and a portion of property taxes fall in this category. The largest element in the group is the interest on money tied up in inventory, whether owned or borrowed. It is not desired in this report to revive the controversy as to whether interest on assets owned should be set into the regular accounts as an expense. It is not proposed that such a step be taken, but merely that interest be charged against commodities for purposes of analysis in an independent study of commodity earnings. Interest income would still be shown, along with pure profit, as a part of total earnings. Equitable comparison between commodities, however, demands that a commodity which requires a large investment should be made responsible for earning interest income on that investment, and that a commodity requiring no inventory investment should be relieved from that responsibility.

MOVEMENT

Movement costs, so-called because they are involved in the flow of commodities through the establishment as contrasted with the static situation represented by maintenance, include the expense of many operations. Most fundamental in these operations, and usually most important as an element of cost, is the solicitation and assembly of orders and delivery to the customer or the common carrier. Since these operations deplete the stock of merchandise, they give rise directly to various replacement activities. If merchandise is sold, new merchandise must be bought, received, and placed in stock. There may be several processes short of manufacture involved in preparing merchandise for sale. Packing is the most common. Movement, then, may be defined as comprising a variety of activities involving clerical and physical labor and the cost of materials and equipment directly assisting in the efforts of labor.

The clerical and physical aspects of movement suggest an obvious division of movement costs, since clerical effort tends to vary with the number of times a commodity is ordered, and physical labor with the number of pieces or other measure of the quantity sold. In an establishment where packaged merchandise predominates, the number of pieces sold is a more accurate measure of physical labor than any other characteristic of the commodity, while the handling of bulk commodities would undoubtedly be measurable on a tonnage basis. In the more usual type of merchandising establishment, orders are filled in terms of cases or similar units. Even the physical labor of moving these units, as in order assembly or delivery, carries a certain responsibility to see that the proper number of units are moved in each instance. The case, therefore, rather than the pound, tends to be the time-consuming element in this type of effort.

It is the time-consuming, rather than the energy-using, character of the commodity which is important from a cost standpoint, since labor of this sort is usually paid for on an hourly basis. In a given trade, time studies should be made to determine the difference in handling time between essentially different types of physical units. A barrel, for example, requires a different set of manual operations than an ordinary packing case. On the basis of studies of the actual handling time of such diverse articles carried by the same concern, it should be possible to

establish ratios measuring this relative difficulty in physical handling. In this study a case of merchandise small enough to be handled readily by one man and shipped out without repacking in the same form as received was set up as the standard handling unit. Commodities requiring special preparation for delivery or having other unusual handling requirements were referred to this standard by means of ratios. Thus it was possible to measure the physical flow of each commodity in terms of standard handling units.

The basic division of the movement group of expenses, it has been suggested, is into the physical and clerical aspects, which are termed "handling" and "checking," respectively. Handling is allocated to the commodity on the basis of the number of units handled or, where there is a diversity of type in physical units, on the basis of standard handling units. Checking, which includes all buying and selling that is routine in nature, in addition to what is more strictly known as clerical effort, is allocated to commodities on the basis of the number of times each commodity is ordered. This number will correspond to the number of sales-invoice lines. Many clerical operations are directly proportional to invoice lines in the amount of time consumed, and many minor operations in which the invoice line is not the unit dealt with directly are roughly proportional to the same factor.

It is assumed that the clerical labor involved in handling sales invoices in most houses is much larger than that involved in handling purchase invoices. Where the effort of handling purchases was especially heavy, however, there would be no objection, from the standpoint of the system here described, to setting up that group as a separate subdivision of movement expense with its own special allocation factor. In fact, the movement group would be the one most subject to refinement or adjustment to meet the peculiar conditions of various trades. In any case, whatever the number of subgroups under the general head of movement, they should be set up and allocated on the same general principle illustrated by the two groups used in this survey. This principle calls for making a distinction between groups on the basis of fundamental differences in the character of effort involved and defining for each group a standard unit of work which will measure the time consumed by each commodity.

CONTACT

Maintenance and movement have been described as the cost of maintaining distributive capacity and the cost of performing distributive work. The third group, contact cost, represents the cost of securing compensation from customers. It is the effort involved in maintaining the return flow of money, which must at least balance the outward flow of commodities if the business is to survive. This effort is naturally divided into the two phases of promotion and reimbursement. Reimbursement operations include all the steps involved in obtaining and receiving payment from the customer. As soon as a commodity is sold at a certain price, that price sets the task for reimbursement effort. Reimbursement is, therefore, the one group of costs in which sales in dollars is a direct measure of commodity responsibility for cost.

That part of sales price which represents the cost of goods to the dealer must be passed back to his source of supply in order to replenish his inventory. Therefore, in securing compensation for that part of sale price, the merchant is really acting as a collection agent for the concern which supplies him. The remaining part of sales price, the merchant's gross margin on the sale, is the portion in which he has a direct interest, since he is permitted to retain it to cover his own operating expenses and profit. It is that portion which is always tending to shrink away under the pressure of competition. It is to the maintenance of the element which represents compensation for his own efforts that all the activities known as promotion are directed.

A few illustrations will suffice to indicate how completely promotional efforts are devoted to the extension of gross margin. One aim of promotion is to increase sales volume. The purpose of increased sales volume from the standpoint of business policy is that it constitutes an effort to provide a greater amount of gross profit against the fixed operating costs of the business. Another type of promotion is that which attempts to convince the customer of the high integrity, fairness, or ability to provide good values pertaining to the business institution, the aim being to make the customer willing to pay prices somewhat above the competitive level. Staple commodities are frequently sold at prices which the business manager realizes will not permit them to pay their way. There is always the hope, in such cases, that it will be possible to sell items of less frequent demand at prices which bring in an adequate gross margin for the business as a whole.

Both forms of contact cost present a special problem in allocation, since the results sought are financial in character. Reimbursement is allocated to commodities on the basis of percentage of sales volume and promotion on the basis of percentage of total gross margin. Such allocation might be objectionable if the chief aim of distribution costing was the setting of prices. It is hard to conceive any other basis of allocation, however, since these activities are directly constituted by the effort to include an adequate gross profit in the price paid by the customer and the effort to collect money from him on the basis of the stated price. Furthermore, the objection to the use of factors influenced by price does not hold, since distribution cost is the cost of disposing of commodities and cannot, therefore, be determined until the sale has been completed.

The expense items to be included in reimbursement cost would begin with bad-debt losses and direct cost of credit and collections. Further cost of credit reimbursement would include that part of bookkeeping cost which is involved in the accounts-receivable records and interest on the money tied up in accounts. Cash reimbursement also entails certain costs which can sometimes be shown separately, such as the cost of the cashier's department. Cash discounts taken by customers would usually be most conveniently and equitably considered as reimbursement cost.

The most typical expense item under the promotion group would be the cost of institutional advertising. The promotional efforts of salesmen, as opposed to mere routine order taking, placed in the movement group, naturally fall there also. Where rent is paid for a prestige site which is considerably in excess of the rent actually required to secure adequate storage, display, and work space, it is apparent that such excess expenditure is promotional in character. The cumulative quantity discounts paid in case the customer's purchases reach a specified volume should be considered as a promotional expenditure.

Although it is not usual to think of promotion in connection with buying, there is a portion of buying expense which serves the same purpose—that of extending or protecting gross margin. As in the case of selling, a considerable part of buying is routine in character, and as such is grouped under movement. Another part of buying, which may be called selective buying, is of a very different character. In selective buying the merchant may be selecting new products for his line, always with an eye to picking those which are likely to prove a new source of profit without injuring the showing of lines already established. Again, he may be expending buying effort in attempting to secure price concessions or favorable discounts on commodities purchased. Both types of buying activity are clearly directed toward the expansion of gross margin and can be equitably allocated to commodities on the basis of percentage of total gross margin.

If gross margin is to be used as the basis of allocation for an important group of costs, it must be recognized that this margin would sometimes be a gross loss rather than a gross profit. The manner of handling this problem would depend on the manager's reason for accepting the gross loss on the commodity. If the commodity were sold at a loss in order to clear it out, the gross margin should be considered as zero. If, on the other hand, it was sold at a loss in order to promote the sale of other commodities sold at a profit, it should receive a credit, which would add to the promotional cost to be distributed over other commodities.

A few additional comments must be made on the procedures thus described and defended, especially in view of what has gone before. The first point which needs to be mentioned is that certain costs which are direct for departmental purposes must be treated as indirect for commodity analysis. For example, refrigerated storage space may be required only for goods handled by a particular department, and therefore the entire cost of refrigeration must be borne by that department as a direct charge. Within the department, however, several commodities may participate in the refrigeration, and the cost thereof must be allocated to such commodities on some such basis as floor space. The same is true of the services of departmental salesmen and many similar items. If such items are at all numerous (and they usually will be if the business is organized along distinctly departmental lines) it will be found desirable to precede commodity analysis by departmental analysis. This will not be a duplication of effort, but will actually pay for itself by facilitating the commodity analysis.

The functions appear to be satisfactory for purposes of commodity analysis. It should be noted that they can be further subdivided at will in order to fit the needs of particular trades or enterprises. Such subdivisions involve not merely a partial reassignment of expenses to functional groups, but also the development of a different unit for the measurement of functional service and the counting of such units in total and in terms of commodities. This increases the cost of the study, but may be necessary in given cases in order that the results of the study may not be misleading.

The units for measuring the services of the functions to commodities appear to be well suited for the purpose. The argument for the gross-margin basis for the application of promotional cost is ingenious, although it is somewhat overdependent on the propriety of dividing the selling price of goods between their cost and the gross margin. If it be agreed that the object of promotion as here defined is the acquisition of gross-margin dollars, it would seem to follow that budgeted, rather than actual, gross margin is the proper basis for allocation. Where a budget does not exist, however, the use of actual gross margin is permissible. It is worth noting that the sales basis is used for only one cost group, namely, reimbursement, and that here the reason for its use is logical relationship and not the lack of any more reasonable basis.

The expense content of the functional cost totals can be ascertained in detail by an examination of exhibit 3. This table also shows the extent to which the expense assignments to functions were not direct in the study from which this information was taken but were the result of managerial estimates. Such estimates were used in connection with 44.34 percent of total expenses. Time studies were necessary for the assignment of 4.95 percent, and the floor-space basis was utilized for 5.48 percent—making a total of 54.77 percent of total expenses that could not be charged directly to functions. The following explanations quoted from the original study indicate the care that was taken in making and checking the estimates: [4]

> The greatest problem in handling expenses was in making the functional breakdown of salaries and wages where the same employees had two or more functions to perform. This break-down was made by a comparison of the manager's estimates and time study and observation. Observation of the activities of employees in the warehouse and office was used to check these estimates at points where it was felt that the manager might not be in a position to make an accurate approximation.
>
> In most large warehouses the assignment of salaries and wages to functional cost groups is not difficult except in the case of the higher executives. In such establishments all labor is of a clearly marked character, whether physical or clerical, and cannot ordinarily be assigned to cost groups without an analysis of the activities of individual employees. In this survey, however, some clerks who were engaged in processes incident to order filling also gave some of their time to the accounts-receivable ledgers. These two activities belong, respectively, under the checking and reimbursement cost groups. Each employee's wage and each item of expense was considered separately and assigned to the proper cost group if the total item could be shown to apply to a single function. Where the wage or expense item clearly covered two or more functions, the manager's estimate plus direct observation by the field staff making the study was the means by which the allocation was made.

INWARD TRANSPORTATION

Several comments are required in connection with the treatment of specific cost items. Inward freight and express, it will be noted,

[4] Ibid. pp. 48, 49.

is charged to the handling function. The result is that this cost is charged to commodities on the basis of the number of "standard handling units" sold. The theoretically proper treatment is to add such charges to the cost of goods purchased and to include them in cost of goods sold to the extent to which such goods have been sold and in inventories to the extent to which such goods are still on hand. However, if (1) inward transportation charges apply to all goods alike and if (2) the inventories have not changed substantially, the treatment here given will not result in serious distortion. These two conditions are not particularly likely to obtain, but, in view of the small size of the item (less than 2 percent of total expenses) in this case, no great violence to accuracy has been done. It should be pointed out, furthermore, that where an analysis is undertaken without special preparation in the original records for the correct charging of inward freight, some such procedure as the one followed here is unavoidable without a tremendous amount of detailed checking. Certainly the handling function is the place for this charge if it must be dealt with in this way.

DISCOUNTS

Sales discounts are here included in expenses and placed in the reimbursement function. These have been adequately commented on heretofore, and it is unnecessary to enlarge on that statement. In view of the fact that reimbursement is applied to commodities on the sales-dollar basis, the only real damage done is a slight inflation of the expense total and of the total cost of the reimbursement function and a resulting mild distortion of the distribution basis for administrative costs.

Purchase discounts both for cash and on volume were, in the original study, deducted from reimbursement costs. Since they amounted to nearly 5½ percent of net expenses, and since this treatment was unnecessary from the standpoint of practicable procedure, these discounts have not been deducted from expense in exhibit 3. Instead, it is assumed that they may be reasonably deducted from the cost of goods sold, each commodity receiving its share in proportion to its own cost. This treatment is not completely accurate, as noted heretofore, but in most cases will be satisfactory.

Concerning the precise treatment of certain other cost items there may be room for controversy, but a careful study of the functional definitions and the actual procedure used will bring conviction that all of the actual allocations had at least some reasonable basis.

FUNCTIONAL SERVICE UNITS

The same general comment applies to the units used to measure functional services. The following quotation from the study throws much light on the treatment of storage and handling costs: [5]

> The allocation of warehouse space to commodities was based on actual physical measurement. The measurement was made at a time when the proportions of space devoted to various commodity classes was thought to be representative. This measurement was taken only once, however, and may not have been entirely representative for some commodities. Measurement at the end of each quarter, or at least at the time of each annual inventory, would be a more satisfactory basis for assuming cost of storage to commodities.
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> Another basis which can be used with even greater facility is that of charging each commodity with the space actually reserved for it in the warehouse. In

[5] Ibid., pp. 49, 50.

some warehouses definite space has been allocated to each commodity handled on the basis of a study of average and maximum requirements. Such an assignment of space is probably the fairest basis for allocating storage cost, since maximum requirements really determine total rent paid, and the commodity should be charged with storage costs on the basis of its maximum requirement rather than the average amount on hand.

However, some correction for accidental variations in stock on hand for particular items was obtained under the method used. Actual space measurements were accepted as found only for the broader commodity groups. There was a very clear-cut assignment of floors to the uses of related commodities in the house surveyed. The commodities found on a given floor were made to bear the space cost for that floor, even though the floor might not be full at the time the physical measurement was made. Within the commodity group, assignment of space cost to the commodity classes was made on the basis of their percentage of average inventory investment in the total inventory investment for the group.

The establishment of standard-handling-unit equivalents for commodity groups was one of the most difficult steps in the study. It was felt that bulk and weight, which are ordinarily resorted to as a basis for this purpose, were not adequate measures in a trade handling such diverse items as are found in a house wholesaling electrical goods. The physical character of items sold diverges in many ways. Some of the larger conduit sections were kept in a horizontal rack reaching nearly across one end of the warehouse. While such items are something of a problem because of the labor involved in taking them out of this rack and loading them properly on the truck, they have the advantage of not requiring packaging or careful handling. Wire and cable, when sold in lengths less than a full spool, require the extra operation of unrolling from one spool to another, measuring, and cutting. Some small items like fuses and wiring devices present little problem in the way of weight, bulk, or special handling operations except for careful packaging. This is true, particularly, with some types of goods which are highly fragile.

The simplest item from the standpoint of physical handling is that which comes in and goes out in the same package, is light enough to permit one man to move it with ease, and is rectangular and compact in shape so that many such units can be stored in a truck with little loss of space. It is to that general type of physical unit that the term "Standard handling unit" has been applied. Where a commodity was made up entirely of standard handling units, that commodity could be assigned a handling charge based on the quantity figure applying on the invoice. With some very small items which are repacked for shipment without any particular difficulty in the packing operation, the number of sales would more nearly correspond to the concept of standard handling units.

Whatever the operations undertaken in connection with a physical package or unit, their time-consuming character can be related to the simplest type of unit in the establishment by time study and observation. Even though this relation should be established on no more substantial basis than careful estimate, it would perhaps be more practicable than any attempt to balance such diverse items as bulk, weight, shape, and space handling requirements into a single statistical index. For example, the contrast between a package of fuses sent out as received and an item of 500 feet of rubber-covered cable is so great that it can be measured only directly. Such direct measurement consists essentially of time study to determine the relative length of time consumed in handling the items. Time study of handling operations was undertaken in another study of electrical-goods establishments. In that case, however, an effort was made to establish an actual break-down of employees' time between all of the various departments of merchandise, even though employees might each individually be working on all of these groups simultaneously.

This problem is simplified greatly by the concept of a standard handling unit. On this basis time study can be directed to determining the time-consuming character of distinct types of physical units. Commodity groups in which the physical unit is similar may be costed on the same basis, even though the merchandise may be utterly unlike in use or other characteristics. Ordinarily only three or four definite types of physical units are found in an establishment. Such definite types are somewhat more numerous in a wholesale electrical establishment, but they are not nearly so numerous as items of merchandise or even as the major merchandise classifications for which statistics are presented in the report.

It is always necessary to keep in mind the fact that every business concern has its own peculiar conditions which demand special con-

sideration and treatment. While the procedures above described gave adequate results in the situation to which they were applied, and may be used as a guide by many wholesalers, they should not be blindly adhered to.

APPLICATION TO SPECIFIC COMMODITIES

The final steps in analysis of costs by commodities are fairly obvious. The total number of units by which functional services are measured are determined and used as divisors to obtain the unit costs. Then for each commodity or commodity group the service units are similarly ascertained, and the functional costs for that commodity are found by multiplication. Direct costs are added to the functional costs, and the total is deducted from the commodity's gross margin. The result is a net profit or loss on the commodity, or, if certain costs have not been included in the analysis, the result is a measure of the contribution (or of the failure to contribute) to the fund out of which such expenses must be met.

RESULTS OF COMMODITY ANALYSIS

Analysis of costs, by commodities, tells which commodities are being profitably handled and which are not and gives invaluable clues as to where the faults lie—what characteristics of the unsatisfactory commodities are to blame for their unprofitable showing. Low turn-over will be reflected in excessive investment and storage costs; excessively small unit sales will result in high handling and checking charges. It is in connection with these functions that remedial action can best be taken. Low turn-over suggests a reform of purchasing plans and policies, and small unit sales can be remedied by taking measures with salesmen and customers which will encourage larger orders. In some cases a direct attack on price may be indicated if it is evident that prospects of reducing costs are not bright.

The question of eliminating commodities cannot be answered directly by the cost analysis as given. For this purpose the costs which must be taken into account are not total costs but only those which would actually be saved by the action. Such savings would include all direct costs applicable only to the given commodity plus a portion of the functional costs. How large a portion can be determined only in the light of specific circumstances. If only one out of many commodities is to be eliminated, the savings would be very small, being confined principally to certain items of investment, handling, and reimbursement costs. If, on the other hand, a considerable cutting down is under consideration, storage, checking, promotion, and perhaps even administrative costs may be affected. The question to answer in each case is: Whose services or what facilities can be dispensed with if this action is taken? It must not be thought, of course, that cost considerations alone dictate any action or change of policy. The effects on other phases of business, especially of price changes or the elimination of commodities, must be given equal consideration. The most that can be claimed for cost analysis is not that it supplies the final answer to business problems but only that it throws an indispensable light on the causes of difficulties, points the way to possible action, and gives some indication of probable results.

Section 9.—ANALYSIS OF COSTS, BY TERRITORIES

The techniques of functional analysis are as capable of giving service in the study of the effects of customer characteristics on costs as in connection with commodity characteristics. The simplest case with which to deal is that in which the customers are grouped in accordance with one common characteristic, namely, geographic location. For this purpose the analytical procedure starts "from scratch"; that is, the primary expenses are regarded anew, with a view to their relationship to territories, regardless of any analysis by commodities which has been made or contemplated. It might be thought feasible, after the commodity analysis has been completed, to analyze territorial sales by commodities and then to apply to territories the commodity costs which have already been found. Such a procedure would give a very misleading idea of territorial costs, however, since the costs thus assigned to the territories would depend not on the characteristics of the territories but on the characteristics of the commodities sold therein. Thus two territories of very different character might show precisely equivalent results simply because the same commodities are sold in both in the same proportions. It is true, of course, that the characteristics of a territory, such as location, types of industries, and so forth, may determine the commodities sold in the territory, but it is none the less improper to determine territorial costs except by the direct method of ascertaining the relationships between the characteristics of the territories and the costs of supplying them.

On the other hand, if certain commodities are sold only in certain territories, all costs of such commodities are, of course, chargeable to such territories, but this will be done in the regular course of territorial analysis and not as a result of commodity analysis. The costs connected with the special commodities will become direct or allocated charges to the territories in which they are sold.

REQUIREMENTS OF TERRITORIAL ANALYSIS

Territorial analysis, like departmental analysis, will be profitable only if the foci of analysis (territories) are distinguishable entities. The clearest case is that in which each territory is served by its own salesman (or salesmen) and has distinct geographical limitations. The greatest good will be achieved if lines of responsibility run along territorial lines, so that someone may be held liable for the results in each territory.

DIRECT COSTS

Territorial analysis requires a redeal of both direct and indirect costs. Direct commodity costs, such as special storage facilities or commodity advertising, are indirect costs so far as territories are concerned (unless the sale of such commodities is limited to specific territories); and indirect commodity costs, such as salesmen's compensation and expenses and outward freight, become direct costs from a territorial standpoint. For territorial purposes the costs most likely to be direct are:

Salesmen's costs, including compensation, expenses, supplies, and other items.
Direct mail advertising.
Advertising space in local media.
Outward freight, express, and parcel post.

Delivery.
Special packing and shipping.
Costs of operating branch warehouses, sales offices, and the like, including supervisory and clerical activities at such points.

INDIRECT COSTS

The indirect costs must be applied to territories in much the same way as in the case of commodities. Functions must be chosen with a view to their relationship to territorial operations, and the units for measuring functional service must be such that they can be ascertained both in total and for each territory. This may require the use of some entirely different functions and service units.

If the functions of exhibit 3 are adhered to, it is evident that the same service units will not, in some cases, be available. It is evident that the inventory dollar and the square foot of storage space are related to commodity characteristics and not at all to territories. What shall be used in their place to measure investment and storage functions for territorial purposes? In both cases the sales dollar seems to be the answer. If it is fair to assume that the sales in all territories are homogeneous, then every dollar of sales in one territory requires as much investment in inventory and as much storage space to keep it as a similar sales dollar in another territory. Presumably if the sales volume of a given territory were eliminated a roughly corresponding reduction in the need for investment and storage would take place.

The other functional costs can presumably continue to be measured in the same terms as before, since it is possible to determine standard handling units, invoice lines, and gross margins for territories as well as for commodities. If the major part of promotional work is done by salesmen and if salesmen's compensation and expenses are treated as direct territorial costs, the promotion function will recede to a very minor position in the scheme.

RESULTS OF TERRITORIAL ANALYSIS

The benefits from territorial analysis are similar to those of the analyses which have previously been described. Out of a business generally satisfactory it will be possible to locate unsatisfactory areas. Measures may be taken to cure the ills of such areas, by changing methods of approach, by withdrawing or intensifying promotional activities, by adjusting delivery terms or charges, and by other methods short of withdrawing from the territory completely. If complete or partial withdrawal seems indicated the analysis will be useful in predicting what its results will be in terms of costs eliminated and other costs shifted to the retained territories. As always, of course, cost considerations are by no means the sole answer to any marketing question, but without cost data the answers actually arrived at are unlikely to be as intelligent as they might be.

Section 10.—ANALYSIS OF COSTS, BY INDIVIDUAL CUSTOMERS

Territorial cost differences are likely to be in large part a reflection of differing customer characteristics—their distance from the main warehouse, their density, their frequency of purchase, their volume of buying, the kinds of goods they buy, their requirements for service,

and other qualities which make their business profitable or unprofitable. Territorial analysis is thus a special type of customer analysis, with customers grouped in accordance with geographic location rather than by any of the other ways in which customers might be grouped.

DIRECT CUSTOMER COSTS

For individual customers relatively few costs are direct. Outward transportation by common carrier can and should be so treated. This one item may make all the difference between a profitable and an unprofitable customer. Sales discounts are also individually determinable either on an offered or on a taken basis. The latter is probably to be preferred for individual customer analysis. Computed interest on accounts receivable must also be handled as a direct individual charge. The sales basis used for this item in the previously described analyses would be unfair to the customer who is substantially on a cash basis and would not penalize adequately the customer who takes his time. Occasionally special services, such as special deliveries, extra salesmen's calls, telephone tolls, telegrams, and similar items may require to be given direct treatment.

Direct territorial costs must be ascertained and separately treated in the course of individual customer analysis. This is true because what it costs to sell a specific customer depends on where he lives, what salesman contacts him, what delivery route he is on, and what media of sales promotion are utilized to attract his trade. Costs which must be assigned to territories on the basis of proration factors, however, can usually be assigned to individual customers by means of the same factors, or, where they cannot, a previous territorial analysis is of no assistance and, in fact, may be a detriment.

INDIRECT CUSTOMER COSTS

Costs assigned directly to territories must usually be allocated indirectly to individual customers. A list of such items with possible allocation factors follows:

Function	Service Unit
Salesmen's costs, first divided between routine selling (included in checking in exhibit 3) and promotion:	
Routine selling.	The invoice line.
Promotion.	The call, possibly modified by the time factor.
Direct mail advertising.	The customer.
Local advertising space.	The gross-margin dollar.
Outward common-carrier charges.	Direct application.
Delivery.	The stop (order), or the standard handling unit.
Special packing and shipping.	Direct application, or the standard handling unit.
Costs of branch warehouses, etc.	Same as similar activities of main office.

It must be recognized, of course, that the cost items and units above listed are suggestive only, and may need to be varied considerably to fit given circumstances.

Another type of analysis which may be a necessary preliminary to sound analysis by individual customers is the departmental or commodity analysis, since when dealing with individual customers it is

often not possible to disregard what commodities they buy. The truth of this is well illustrated by the investment and storage functions. If all customers may or do buy the same lines of commodities, these functions may properly be applied to each of them on the basis of sales dollars, as in the territorial analysis. However, if certain customers buy only one or a few related articles which have distinctive characteristics affecting their storage and investment costs, such costs must be assigned to such customers in terms of the corresponding commodity costs. In other words, the investment and storage costs of the quantities of the specific commodities which they buy are the investment and storage costs of these customers. The procedure is to determine investment and storage costs per dollar of sales for the commodities in question and then to apply these cost rates to the purchases of the customers.

HANDLING AND CHECKING

For the handling and checking functions the same criteria apply to individual customers as to territories, departments, or commodities, namely, standard handling units and the number of invoice lines. The promotion and reimbursement functions, however, must be differently treated.

PROMOTION

The promotional function, so far as the individual customer is concerned, consists of the promotional activities of salesmen who are assigned to his territory plus the impact of advertising and similar promotional efforts. The most generally available and satisfactory basis for measuring the salesman's promotional efforts is the sales call. If accurate time reports could be secured these might be better, but in general the unweighted call must be relied on. Each customer is charged with his share of the total number of promotional calls made. This allocation includes traveling, equipment, supplies, and supervision expenses, as well as the salesman's compensation.

Other promotional costs are somewhat more remote from the individual customer. Direct mail advertising can probably be best apportioned equally to all customers, unless the particular nature of this advertising is such that some other basis is demanded. For space advertising and other similar promotion a reversion to the gross-margin basis suggested for commodity analysis is perhaps as satisfactory an expedient as any. Such promotion is so far removed from having a direct bearing on the individual customer that the only reason for allocating it is an insistence on the determination of final net profit or loss in the income sheet sense. An adequate analysis for many purposes would leave this item out of the calculations entirely.

REIMBURSEMENT

Reimbursement, with sales discounts and interest on accounts receivable removed for direct application, consists of only two items, namely, bad debts and the activities of accounting and credit and collection departments. It would obviously be unreasonable to charge customers with these costs in proportion to sales volume. In general the large customers are less responsible for credit costs than the small ones, and the keeping of the account of a large customer is little more costly than that of a small one.

One study by the Bureau of Foreign and Domestic Commerce divided these costs into two subfunctions, payment and collection.[6] The latter included only bad debts and fees paid to collection agencies, and the former was composed of all of the other expenses in this group. Both cost groups were then charged to customers on the basis of their credit ratings. These ratings were A, which was given a weight of 1; B, 1¼; C, 1¾; D, 4; and E (for c. o. d. orders), 2. This meant that the unit for measuring the application of these subfunctions was the customer, weighted by his credit rating.

Such a basis would seem not unreasonable for routine credit and collection activities, but hardly for the keeping of customers' accounts (including the preparation and mailing of statements) or for bad debts and collection fees. Cash and c. o. d. customers should not participate in the latter costs at all. The clerical activities might well be assigned to customers on a basis of equality. A modification of this would be necessary if the period under study were longer than 1 month and the purchases of individual customers were so irregular that they were on the books during some months and not during others. In these circumstances the customer-month would be the proper unit, rather than the individual customer. Bad debts plus collection fees must presumably be borne by the customers who take advantage of credit facilities, and the weighted basis given above (omitting rating E) would seem to have merit. The weighting factors were developed for the specific concern which the study covered and are presumably not universally suitable. To summarize:

Functions	Service Units
Routine credit and collection activities.	The customer (both cash and credit) weighted by credit risk.
Customer accounting.	The credit customer.
Bad-debt losses (including collection fees).	The credit customer weighted by credit risk.

SUMMARY OF CUSTOMER COSTS

The business obtained from each customer is therefore charged for the following items, determined in the manner indicated:

1. Sales discounts taken, if these are not deducted directly from sales.
2. Delivery charges actually incurred by common carrier, *or* delivery costs of the wholesaler's own delivery equipment, based on number of orders (a different charge for each delivery route).
3. Computed interest on average account balances over period under study.
4. Any special direct charges.
5. Routine selling, on basis of number of invoice lines.
6. Salesman promotion, on basis of number of calls.
7. Direct mail advertising, equally to all customers.
8. Local advertising space, on basis of gross margin.
9. Special packing and shipping, directly or on basis of standard handling unit applicable only to goods so packed and shipped.
10. Investment and storage, either at main office or at branches, on basis of sales dollars.
11. Handling costs not previously allocated, on basis of the standard handling unit.
12. Checking costs not previously allocated, on basis of invoice lines.
13. General advertising and promotion, on basis of gross margin.
14. Routine credit and collection, on basis of weighted credit ratings.

[6] Bureau of Foreign and Domestic Commerce; Wholesale Druggists' Operations, by Edward J. Carroll, Domestic Commerce Series No. 86; Government Printing Office, Washington, D. C., 1934; price 15 cents; p. 12.

15. Customer accounting, equally to all credit customers or on basis of customer-months.
16. Bad debts and collection fees, on basis of weighted credit ratings of credit customers.

UTILITY OF INDIVIDUAL CUSTOMER ANALYSIS

Analysis of costs in terms of every individual customer is not to be recommended. Fortunately it is quite possible to analyze the costs of doing business with a few customers without analyzing for all. Thus the analysis needs to be made only when some demand arises, such as the need for information on which to base bargaining policies in connection with terms and discounts. Occasionally, too, it may be desirable to analyze costs by individual customers in order to obtain a picture of a typical customer in a certain locality or volume or trade class. This sort of information can probably better be obtained by grouping customers in the desired categories and then analyzing by groups, obtaining averages, medians, and other representations of the typical picture desired. For the most part actions which need to be taken with regard to any given customer can as intelligently be taken on the basis of information concerning the group to which he belongs, with such modification as his special characteristics seem to require, as on the basis of a complete study (containing a good many arbitrary factors) of his own costs. As a matter of fact, modification of methods of dealing with a given customer can seldom be justified except as part of a policy adopted for all members of the customer group of which he is a member. It follows that cost analysis by groups will serve most of the purposes of customer cost analysis.

Section 11.—COST ANALYSIS BY CUSTOMER-GROUPS

It might be supposed that the way to find costs in terms of groups of customers would be first to obtain costs by individual customers and then to add the results. Such a procedure, however, would not only be much more expensive but also would probably give less satisfactory results than the direct method of treating groups as a whole throughout the process. The smaller the foci of analysis, the more uncertain and arbitrary become the methods required.

CUSTOMER CLASSIFICATIONS

Customers may be grouped in numerous ways. A few significant groupings which may be used for cost analysis purposes are as follows:

1. By territories (already discussed).
2. By volume of purchases over a period.
3. By size of average order.
4. By characteristics related to use of purchases—resellers, institutions, industrial users, etc.

Such groupings may be attacked separately and the analysis carried on without regard to any other customer classifications, or any one may be approached within a previous analysis along a different line of cleavage. Perhaps the best example of such a procedure is the subdivision of customers within a given territory into size, industrial, or other groups. This may very well be done to find out in greater detail the reasons for an unsatisfactory territorial showing. The procedure in such cases for the subordinate analysis is exactly the same

as if the same sort of analysis were carried on for the business as a whole.

ANALYSIS BY VOLUME OF PURCHASES

The material on territorial analysis heretofore presented is, of course, an example of analysis by customer groups. It seems desirable, however, to give one more example of such analysis both because of differences in procedure and because of the special significance for purposes of management and price policy of the example chosen. Analysis by volume of purchases is of much importance both in the guidance of relations with large and small customers as to selling methods, and the like, and in the determination of proper price differentials. The latter feature has been brought into recent prominence by the Robinson-Patman Act, but it has always been an important managerial problem whether so recognized or not.

Exhibit 4.—Results of Cost Analysis by Customer Volume Classes

Customer class	Number of customers	Operating expense (percent of sales)	Average order	Customer class	Number of customers	Operating expense (percent of sales)	Average order
Under $10	995	201.0	$2.75	$6,000.01–$7,000	23	10.4	$27.02
$10.01–$100	995	58.7	6.73	$7,000.01–$8,000	13	7.6	40.55
$100.01–$250	242	37.8	10.97	$8,000.01–$9,000	8	9.9	28.73
$250.01–$500	173	29.0	10.09	$9,000.01–$10,000	7	10.0	28.30
$500.01–$750	103	34.2	8.96	$10,000.01–$15,000	11	7.5	34.65
$750.01–$1,000	81	29.5	9.92	$15,000.01–$20,000	2	5.9	45.48
$1,000.01–$2,000	191	22.9	10.89	$20,000.01–$25,000	2	9.4	28.60
$2,000.01–$3,000	118	16.7	15.39	Over $25,000	2	7.7	37.03
$3,000.01–$4,000	66	12.8	20.52				
$4,000.01–$5,000	49	10.8	23.40		3,115	16.2	17.30
$5,000.01–$6,000	34	10.2	26.11				

Source: Bureau of Foreign and Domestic Commerce; Wholesale Druggists, Operations, by Edward J. Carroll, Domestic Commerce Series No. 86; Government Printing Office, Washington, D. C., 1934; price, 15 cents; pp. 12, 13.

CHOICE OF VOLUME CLASS LIMITS

The volume classification is ordinarily made in dollars, and in most lines of wholesaling the dollar is the only unit in which volume classes can be set up. Where conditions permit, however, there is certainly no objection to stating the classification in terms of physical units. The classes to be set up must depend on circumstances of the particular trade and enterprise. The study of Wholesale Druggists' Operations utilized the classes shown in exhibit 4. This exhibit also shows the number of customers in each class, the operating expense for each class, determined as a percentage of net sales, and the average order size, which is one of the most important indexes of relative cost. It is clear from a study of these figures that the number of classes set up was too large. At the lower end of the scale, little is gained by knowing that the cost of serving customers whose annual volume is less than $10 is 201 percent of the net sales to them. The lowest volume class justified here is $100 and less. In the higher volume brackets, it is obvious that classes consisting of less than a dozen customers reflect individual differences rather than class differences. The last three classes, particularly, are classes in name only. They exhibit with great clarity the important effect on costs exerted by average order size.

For choosing class limits there are few rules other than those of common sense applied to the case in hand. Those which may be mentioned are as follows:

1. The classes should be as few in number as will result in a sufficient analysis. Multiplicity of classes both increases the cost of analysis and confuses the results.

2. So far as possible, classes should be chosen which have some significance in the minds of the management—on the basis of which some managerial action might conceivably be taken. Little is gained, for example, by subdividing the obviously and hopelessly unprofitable accounts. If volume discount scales exist, their demarcation points would presumably be good class limits.

3. Classes should be sufficiently large so that the differences discovered are really class differences, and not individual differences masquerading as class differences. If very small classes seem inevitable in the higher volume brackets, it may be well to make individual customer analyses. It is usually only in the higher volume brackets that such individual analyses are of benefit.

ANALYTICAL PROCEDURE

The procedure for analysis may well be an adaptation of that followed in Wholesale Druggists' Operations. This method is outlined in exhibit 5, which shows the functions set up, the expenses charged to each, and the units utilized to measure the functional services. For analysis by volume classes there are ordinarily no direct expenses—that is, no expenses chargeable solely to one class, and not to others, as in the case of territorial analysis. All operating expenses, therefore, are indirect so far as the customer groups are concerned and must be treated by the functional method.

Exhibit 5.—Method of Cost Analysis by Customer Volume Classes

Functions	Principal primary expenses charged to functions	Units used for measurement of functional service
Maintenance (2.577 percent of sales; 15.87 percent of total expense).	Interest on inventory	The sales dollar.
	Taxes on inventory	
	Insurance on inventory	
	Rent on space occupied by commodities.	
	Maintenance of storage equipment	
Movement (7.229 percent of sales; 44.52 percent of total expense).	Buying	The order.
	Receiving	
	Order taking	
	Billing	
	Order filling	
	Packing	
	Light	
	Rent on shipping space	
	Maintenance of moving equipment	
Delivery (0.711 percent of sales; 4.38 percent of total expense).	All costs of getting merchandise from warehouse to customers (the concern studied used hired trucks).	The delivered order.
Promotion (3.143 percent of sales; 19.36 percent of total expense).	Advertising	The sales call.
	Cost of salesmen's time and travel devoted to promotion.	
Reimbursement (2.577 percent of sales; 15.87 percent of total expense).	Bookkeepers' salaries	The customer, weighted by credit rating.
	Time of truck drivers spent in collecting payments.	
	Bad debts	
	Fees paid to collection agencies	
	Interest on accounts receivable	

Source: Bureau of Foreign and Domestic Commerce; Wholesale Druggists' Operations, by Edward J. Carroll, Domestic Commerce Series No. 86; Government Printing Office, Washington, D. C., 1934; pp. 11, 12.

DATA REQUIRED

The statistical and accounting information necessary to carry the analysis through is listed below. It is apparent that much of this information is not obtained in the ordinary course of accounting procedure. In the study in question it was obtained after the expiration of the period covered, with no preliminary preparation. This statement does not pertain to some of the bases of allocation, such as the time studies, which naturally had to be obtained in the course of the investigation and applied retroactively. Punched cards and tabulating equipment were used, and a large number of statistical tables were prepared which had little bearing on the cost analysis. For cost-analysis purposes alone other methods of tabulation would be entirely adequate. The accounting and statistical data required for this study were as follows:

1. Customers classified according to annual sales volume and according to credit ratings.
2. Sales classified by customer classes.
3. Orders classified as delivered and undelivered, and by customer classes.
4. Salesmen's calls, classified by customer classes.
5. Time studies of salesmen's activities for the purpose of distinguishing between routine order taking and sales promotion.
6. Time studies of truck drivers' activities in order to distinguish between delivery time and collection time.
7. Floor-space measurements for the several functions utilizing floor space.
8. Primary expenses in at least the detail shown in Exhibit 6.

RESULTS OF ANALYSIS

Exhibit 6 shows in detail the operating expenses of the wholesale druggist under consideration. All are stated both as percentages of sales and as percentages of total expenses.

Exhibit 6.—Expenses of Wholesale Drug Operation

Expense item	Percent of total expense	Percent of sales
Salaries, wages, and commissions:		
Administrative	7.99	1.29
Selling:		
Salesmen's salaries	8.27	1.34
Salesmen's commissions	1.84	.30
Selling, office	2.65	.43
Sales, telephone	.89	.14
Selling, clerical	1.31	.22
Total selling	14.96	2.43
Handling and shipping:		
Order filling	5.06	.82
Assembling and packing	5.05	.82
Checking, pricing, costing	2.53	.41
Billing	2.37	.39
Total handling and shipping	15.01	2.44
Salaries, wages, and commissions—Continued.		
Receiving and stock maintenance:		
Stock care and replacement	1.22	0.20
Inventory, checking and counting	.70	.11
Returns, checking, and handling	.27	.04
Receiving	1.32	.22
Total receiving and stock maintenance	3.51	.57
Fiscal:		
Accounts receivable	2.95	.48
Accounts payable	.65	.10
Cash, handling, and checking	.27	.05
Total fiscal	3.87	.63

[1] Less than 0.005 percent.

Exhibit 6.—Expenses of Wholesale Drug Operation—Continued

Expense item	Percent of total expense	Percent of sales	Expence item	Percent of total expense	Percent of sales
Salaries, wages, and commissions —Continued.			Other operating expenses—Con.		
Storage	0.32	0.05	Depreciation:		
Buying	3.85	.62	Office equipment	0.72	0.12
Watchmen	.53	.09	Warehouse equipment	1.09	.18
Total salaries, wages, and commissions	50.04	8.12	Bad debts	6.00	.97
Other operating expenses:			Interest on investment	10.20	1.66
Rent	5.66	0.92	Stationery and office supplies	1.42	.23
Travel:			Postage	.80	.13
Selling	10.73	1.74	Telephone and telegraph	1.04	.17
Buying	.08	.01	Credit association	.12	.02
To conventions	.56	.09	Other association dues	.23	.04
Other	.03	(1)	Customer's entertainment	.05	.01
Taxes:			Legal (not collections)	.04	.01
Alcohol	.04	.01	Auditing	.21	.04
Narcotics	(1)	(1)	Detective service	.02	(1)
Inventory	2.11	.34	Donations	.55	.09
Warehouse equipment	.01	(1)	Advertising	1.11	.18
Office equipment	.01	(1)	Utilities	1.24	.20
Salesmen's cars	.02	(1)	Delivery (hired trucks)	3.86	.63
Cash	.05	.01	Packing supplies	1.14	.18
Insurance	.74	.12	Outside watchman	.04	.01
			Miscellaneous	.04	.01
			Total expenses	100.00	16.24

Source: Bureau of Foreign and Domestic Commerce; Wholesale Druggists' Operations, by Edward J. Carroll, Domestic Commerce Series No. 86; Government Printing Office, Washington, D. C.; price 15 cents; p. 8.

Exhibit 7 shows the final result of the analysis, with customers classified by annual volumes of purchases and expenses classified by functions.

Exhibit 7.—Cost of Serving Customers, According to Annual Sales Volume

[Expressed as percentage of sales]

Annual sales	Total operating expense	Maintenance	Movement	Delivery	Sales promotion	Reimbursement
Under $10	201.041	2.577	45.537	4.479	0.000	148.448
$10.01–$100	58.742	2.577	18.597	1.829	.713	35.026
$100.01–$250	37.812	2.577	11.407	1.122	1.499	21.207
$250.01–$500	29.034	2.577	12.393	1.219	3.433	9.412
$500.01–$750	34.243	2.577	13.954	1.373	10.700	5.639
$750.01–$1,000	29.527	2.577	12.606	1.240	9.179	3.925
$1,000.01–$2,000	22.939	2.577	11.484	1.129	5.515	2.234
$2,000.01–$3,000	16.707	2.577	8.130	.799	3.898	1.303
$3,000.01–$4,000	12.801	2.577	6.096	.600	2.747	.781
$4,000.01–$5,000	10.828	2.577	5.345	.526	1.780	.600
$5,000.01–$6,000	10.186	2.577	4.790	.471	1.886	.462
$6,000.01–$7,000	10.376	2.577	4.629	.455	2.327	.388
$7,000.01–$8,000	7.627	2.577	3.085	.303	1.320	.342
$8,000.01–$9,000	9.860	2.577	4.354	.428	2.225	.276
$9,000.01–$10,000	9.994	2.577	4.420	.435	2.340	.222
$10,000.01–$15,000	7.456	2.577	3.611	.355	.727	.186
$15,000.01–$20,000	5.898	2.577	2.749	.270	.184	.118
$20,000.01–$25,000	9.373	2.577	4.375	.430	1.868	.123
Over $25,000	7.705	2.577	3.377	.332	1.346	.073
Average	16.237	2.577	7.229	.711	3.143	2.577

Source: Bureau of Foreign and Domestic Commerce; Wholesale Druggists' Operations, by Edward J. Carroll, Domestic Commerce Series No. 86; Government Printing Office, Washington, D. C., 1934; price 15 cents; p. 13.

CONCLUSIONS FROM ANALYSIS

Conclusions from exhibit 7 derived by the author of Wholesale Druggists' Operations are contained in the following quotation from the study:[7]

[7] Bureau of Foreign and Domestic Commerce; Wholesale Druggists' Operations, by Edward J. Carroll; Domestic Commerce Series No. 86; Government Printing Office, Washington, D. C., 1934; price 15 cents, p. 13.

It will be seen that in the larger volume groups there was a general tendency for the total expense to be a smaller percentage of sales. This same general tendency was found in all the individual types of expense with the exception of maintenance cost, which, being distributed on the basis of sales volume, was a uniform percentage of sales in each volume group, and promotion cost, which varied with the number of sales calls.

The operating expense charged to customers whose annual purchases from this wholesaler amounted to less than $10 each was twice the annual sales volume received from these customers. This expense was due principally to the high payment and collection cost, most of these customers being on a cash basis. The movement cost of the customers in this first group was also very high, for with such small purchases the average number of items on which movement was distributed was high in relation to sales volume. The same was true of delivery cost, which, being distributed on the basis of the number of orders, showed a higher percentage of sales for a small average order. Of course, no promotional effort was expended in the direction of these small-volume customers.

Needless to say, the customers in the three smallest volume groups are a constant loss to the wholesaler and should be dropped unless the social aspect, the health of their community, requires that they be served. The customers in the next few groups should be subjected to careful scrutiny, and those customers who are responsible for the high expense should be weeded out, subject to the same consideration mentioned above. In each case, when considering the elimination of a customer, the question as to whether the elimination would decrease the operating expense or would merely shift it to other customers should be considered. * * *

In addition, it should be said that some of the cost differences shown are probably excessive, especially on account of the harsh treatment given cash customers in the application of the reimbursement function. This has been commented on previously in connection with analysis by individual customers. The other items which cause the low-volume groups to be so unprofitable are movement and delivery. While delivery cost can be eliminated by refusing delivery on small orders, or offset by making a delivery charge, the movement cost is inevitable when an order is accepted.

The importance of order size in the determination of costs suggests another classification of customers which is of much value in determining policy as to encouraging or accepting business. It is evident that the same technique as is used in analysis by volume groups could be used for order-size groups—that is, for customer groups classified by the average size of order received. Wholesale Druggists' Operations makes the classification, as shown in exhibit 8, but does not carry out the cost analysis. It does not require much analysis, however, to demonstrate that something is wrong when the orders received from nearly one-fourth of all customers average less than $3. Presumably nearly all of these customers are in the "Under $10" group in the volume analysis and are costing the wholesaler at least a dollar in operating expenses (to say nothing of the cost of the goods) for every dollar of sales.

LIMITATIONS OF GROUP ANALYSIS

It should be remembered, of course, that the cost results shown by such analyses, while true for the groups taken as a whole, may not be fully applicable to every member of each group. A customer who is in the lowest volume class because he purchases just one $9.95 order in a year, which he pays for and carries away himself, must be regarded quite differently from a customer in the same class who takes advantage of credit and delivery services and sends in 10 or more orders of

less than a dollar each. However, this is true: that if a customer be found in unprofitable classes in two analyses of the sort described, his unprofitability is rather well established.

Exhibit 8.—Customers Grouped by Average Order Size

Average order class	Average order	Percent of sales volume	Percent of total orders	Percent of total customers
Under $1	$0.79	0.02	0.43	7.58
$1.01–$3	2.50	.69	4.76	17.08
$3.01–$6	4.51	5.02	19.27	19.45
$6.01–$10	7.77	8.92	19.87	14.41
$10.01–$15	11.85	8.05	11.76	11.20
$15.01–$25	20.07	21.58	18.60	14.41
$25.01–$40	31.71	30.87	16.84	10.50
$40.01–$60	47.33	20.20	7.38	4.05
$60.01–$90	72.64	4.35	1.04	.93
Over $90	108.91	.30	.05	.39
	17.30	100.00	100.00	100.00

Source: Bureau of Foreign and Domestic Commerce; Wholesale Druggists' Operations, by Edward J. Carroll, Domestic Commerce Series No. 86; Government Printing Office, Washington, D. C., 1934; price 15 cents; p. 18.

UTILITY OF COST ANALYSIS BY VOLUME GROUPS

From analyses of this type can be derived criteria of customer profitability which can be used for relatively long periods in the determination of policy as to customer relationships. It is not necessary to carry on such studies continuously, or even to repeat them frequently, unless conditions change. One of the factors which may cause conditions to change, of course, is the reforms put into effect as a result of the first analysis. In a good many cases which are cited as examples of the benefits derived from cost analysis the reforms have been so drastic as to require a fairly thorough reanalysis as soon as they have taken effect. Repetition of analysis occasionally, even when not required by changed conditions, is a good form of reminder that unsatisfactory customer relationships exist and need attention.

The criteria of customer profitability above referred to relate to the size and frequency of orders, the credit standing, the use or nonuse of service facilities, and, of course, the volume of business. Although it should not be thought that the analysis is sufficiently exact to establish precise dividing lines between profitable and unprofitable business, a study intelligently conducted can mark out three zones into which all customers can be placed. These are (1) a zone of unquestionable unprofitability, as in the case of the two lowest volume classes in exhibit 7; (2) a zone of doubt, in which the business done needs to be scrutinized; and (3) a zone of undoubted profitability. This by no means answers all questions of customer relationships; it does not give the last word on what needs to be done, even in zone (1); but it does contribute information without which the manager is greatly handicapped in his efforts to improve the net return from the resources which have been entrusted to him.

Section 12.—ANALYSIS OF COSTS, BY ORDER-SIZE CLASSES

The analysis of costs, by customer classes, set up on the basis of their average order size, as suggested in the previous section, is one method of approach to the problem of determining costs in terms of order sizes. It is obviously not entirely satisfactory, however, since

one given customer's orders may vary widely in size while another customer's orders are reasonably uniform, and still both may fall in the same order-size class. Also, characteristics of customers other than their average order size are likely to disturb the result. Furthermore, complete customer cost analysis of the sort required for this purpose is rather complicated and expensive, and it is possible to get at a rough approximation of costs, by order sizes, by simpler means.

Although it is thoroughly agreed that small orders are costly and that measures ought to be taken by every business to increase the size of orders for the purpose of reducing the per-dollar cost of distribution, accurate methods of measuring the costliness of different sizes of orders are rare—in fact, it may safely be said that no entirely satisfactory methods exist. It is obviously impossible to analyze costs in terms of each individual order (as occasionally may be done for individual customers), and the only alternative is to attack the problem from the standpoint of order groups or classes.

CROSS-CLASSIFICATIONS OF ORDERS

The classification of orders may run along several lines, and it may be that the analysis, by size classes, may have to be done within another classification—by methods of obtaining the orders, if different methods exist, or perhaps by types of customers or methods of delivery or territories. Each case must receive the treatment appropriate to it. The reason for such cross-classification is that orders may differ from each other in cost fully as much because of differences in methods of getting them, for example, as because of differences in size. The cost of orders of a given size classified by size only, therefore, would be a poor guide for action with respect to all such orders, whether obtained by salesmen, for example, or received without solicitation at the house. It may very well be that an order of a given size is profitable if obtained in one way, although unprofitable if obtained in another.

EXAMPLE OF ORDER-SIZE CLASS ANALYSIS

A method of finding order-size costs which has been used effectively by certain food-distributing organizations is described by Howard C. Greer in the Bulletin of the National Association of Cost Accountants (November 1, 1937). For this purpose orders are classified thus:[8]

Under 25 pounds.	50–200 pounds.	500–1,000 pounds.
25–50 pounds.	200–500 pounds.	Over 1,000 pounds.

The use of a physical unit of this sort is possible because the products handled are sufficiently similar in physical characteristics to make such a unit a significant means of measuring differences between orders. In other cases a different unit may have to be used. Possibly a "standard handling unit" can be developed, such as was used in some of the Department of Commerce studies of wholesalers' costs. It may be that dollar value is the only reasonably available common measure, but some other measure should prove better if it can be found.

Orders in the Greer study are of four classes, each of which require a separate determination of functional costs. These classes are:

1. Street sales, obtained by outside salesmen and delivered.
2. House sales, obtained by inside salesmen as the result of calls at the house by buyers. These are also delivered.

[8] Bulletin of National Association of Cost Accountants, Distribution Costs as Factors in Pricing Policies, by Howard C. Greer, New York, N. Y., Nov. 1, 1937.

3. Peddler sales, made by driver-salemen, who consummate sale and delivery in one operation.
4. Platform sales, the orders for which are taken by telephone or by house salesmen and the transportation of which is assumed by the customers.

PROCEDURE IN ORDER-SIZE ANALYSIS

Exhibit 9 shows how the functional costs of selling are applied to each of these classes of sales. Costs are classified under four functions, and for the purposes of the study it is assumed that a large part of the costs of each function varies with the number of orders, while the balance, called overhead, varies only with the total weight of products sold. For some classes of sales a particular function may be entirely overhead, since its cost obviously does not vary with the number of orders. This is true of packing and loading in the case of peddler sales, since the driver-salesman's truck is loaded with products in bulk and regardless of the number of orders, which, of course, has not been ascertained at the time of loading. Some functions do not apply at all to certain classes of sales, as, for example, delivery in the case of platform sales. The selling function is not lacking in the case of peddler sales, but is combined with delivery, for obvious reasons.

Exhibit 9.—Analysis of Distribution Expenses, by Methods of Sale, for Typical Period

Item	Street sales		House sales		Peddler sales		Platform sales	
	Direct	Overhead	Direct	Overhead	Direct	Overhead	Direct	Overhead
EXPENSES								
Selling:								
Salesmen's salaries:								
Route men	$2,746		$218					
House men			850				$625	
Salesmen's expense:								
Travel	1,013							
Telephone	177		114				83	
Other selling expense		$814		$372				$334
Total	3,936	814	1,182	372			708	334
Packing and loading:								
Labor—picking, weighing, marking	1,315		419			$201		247
Shipping containers	235		67			31		
Dock expense		319		143		52		131
Total	1,550	319	486	143		284		378
Delivery:								
Drivers' wages	1,831		570		$1,860			
Truck expense	1,193		351		815			
Garage expense		617		291		104		
Total	3,024	617	921	291	2,675	104		
Records								
Labor, billing	428		136		123		50	
Labor, posting	182		56		58		12	
Forms, postage	85		27		30		6	
Office expense		141		45		34		14
Total	695	141	219	45	211	34	68	14
Total distribution expense	9,205	1,891	2,808	851	2,886	422	776	726
ORDER DATA								
Number of salesmen	22		5		10		2	
Orders per man	447		702		781		233	
Total number orders	9,834		3,509		7,812		466	
Items per order	2.8		2.1		1.2		8.2	
Total number items	27,551		7,371		9,371		3,820	
Weight per order—pounds	114		147		21		1,014	
Total number—hundredweight	11,212		5,162		1,651		4,737	

Source: Bulletin of National Association of Cost Accountants; Distribution Costs as Factors in Pricing Policies, by Howard C. Greer; New York, N. Y., Nov. 1, 1937.

At the bottom of exhibit 9 are shown certain assumed data with regard to the number and quantity of orders and similar information with respect to each sales classification. These are useful in the subsequent steps of analysis.

Exhibit 10 shows the next step. The variable costs are calculated per order and the overhead costs are, in turn, reduced to a hundredweight basis in order to show clearly the different costs per hundredweight involved in making sales of the several classes. As might be anticipated, the peddler sales are considerably the most expensive, and the platform sales the cheapest per hundredweight on account of the small size of the peddler orders and the large size of those delivered at the platform. The per-order costs, on the other hand, show the opposite tendency, since the peddler method constitutes an economical way to handle small orders. House sales are somewhat less costly per hundredweight than street sales, chiefly because of the higher average size of orders.

Exhibit 10.—Costs Per Order and Per Hundredweight for Various Methods of Sale

Costs	Street sales		House sales		Peddler sales		Platform sales	
	Per order	Per hundredweight	Per order	Per hundredweight	Per order	Per hundredweight	Per order	Per hundredweight
Selling	$0.40		$0.34				$1.52	
Packing and loading	.16		.16					
Delivery	.31		.31		$0.34			
Records	.07		.07		.03		.15	
Total direct	.94	$0.82	.88	$0.54	.37	$1.75	1.67	$0.16
Overhead		.17		.17		.26		.15
Total cost		.99		.71		2.01		.31

Source: Bulletin of National Association of Cost Accountants; Distribution Costs as Factors in Pricing Policies, by Howard C. Greer; New York, N. Y., Nov. 1, 1937.

With this much information in hand, it is possible to determine costs for different sizes of orders by classification and tabulation of the numbers and weights of such orders, followed by the application of the per-order and per-hundredweight costs. Exhibit 11 shows such a compilation for street sales. Similar exhibits can readily be made for the other sales classifications. This tabulation shows all of the characteristics which are to be expected in compilations of this character. The smallest order-size class accounts for nearly 25 percent of all orders and a trifle under 3½ percent of the physical volume of sales. The resulting application of nearly 25 percent of the variable costs to less than 3½ percent of the poundage sold brings about an extraordinarily high cost per hundredweight for this class of orders. This cost per hundredweight falls very rapidly as the orders grow larger, but the amount and rate of decrease become progressively smaller.

Exhibit 11.—Differences in Costs for Street-Sales Orders in Various Size Groups

[All direct costs apportioned on per-order basis]

Order group	Total weight sold	Number of orders	Weight per order	Direct cost per order	Direct cost per hundredweight	Overhead cost per hundredweight	Total cost per hundredweight
	Pounds		*Pounds*				
Under 25 pounds	385	2,396	16	$0.94	$5.87	$0.17	$6.04
25–50 pounds	1,035	2,882	36	.94	2.61	.17	2.78
50–200 pounds	3,383	3,257	104	.94	.90	.17	1.07
200–500 pounds	2,977	945	315	.94	.30	.17	.47
500–1,000 pounds	2,067	273	757	.94	.12	.17	.29
Over 1,000 pounds	1,365	81	1,685	.94	.06	.17	.23
Total or average, all orders	11,212	9,834	114	.94	.82	.17	.99

Source: Bulletin of National Association of Cost Accountants; Distribution Costs as Factors in Pricing Policies, by Howard C. Greer; New York, N. Y., Nov. 1, 1937.

LIMITATIONS OF ORDER-SIZE ANALYSIS

The procedure above described is obviously somewhat crude. It suffices for some purposes, if not taken to represent cost differences with too great exactitude. It can probably be used as a rough guide to the propriety of existing order-size price differentials or for the establishment of such a pricing scheme. It has the decided advantage of being relatively simple and inexpensive. The accounting and statistical information required is as follows:

1. Orders, tabulated by poundage and by method of sale.
2. Primary expenses, classified by function and by method of sale.

The first is a purely clerical requirement and can be ascertained directly from copies of invoices or shipping documents. The second may require some degree of allocation of joint expenses, as has evidently been done in exhibit 9. Such allocations may require time studies or time reports of certain activities or may be made on the basis of relative numbers of orders, items, etc.

ELABORATION OF ORDER-SIZE ANALYSIS

If a more accurate and reliable cost is desired, more elaborate procedures must be developed. In the case at hand, it was evident that some of the costs which were applied on an order basis vary more precisely with the number of items sold. For example, a salesman's time with a customer was found to be longer or shorter in accordance with the number of items which the customer required. It was hardly reasonable, therefore, to charge an order consisting of one item the same amount of salesman's time as another order which consisted of several items. For the purpose of making a more accurate apportionment of variable selling cost, an analysis of salesmen's time and expense similar to that shown in exhibit 12 was made. With an analysis of this sort, it is possible to say not merely that each order costs 40 cents of the street salesman's time, but that a one-item order costs 33 cents plus 2½ cents, a two-item order costs 33 cents plus 5 cents, and so on.

Exhibit 12.—Analysis of Street Salesman's Time for Typical Week

Item	Productive time				Nonproductive time	Total time
	Route travel	Route selling	House selling	Total productive		
DAY	*Minutes*	*Minutes*	*Minutes*	*Minutes*	*Minutes*	*Minutes*
Monday	348	117	85	550	60	610
Tuesday	111	64	113	288	66	354
Wednesday	222	84	156	462		462
Thursday	157	77	105	339	75	414
Friday	436	132		568		568
Saturday					195	195
Week	1,274	474	459	2,207	396	2,603
EXPENSE					*Orders*	*Items*
Salary	$19.05	$7.09	$6.86	$33.00	R—99	288
Auto expense	12.00			12.00	H—44	93
Phone expense	1.70		.70	2.40		
Total	32.75	7.09	7.56	47.40	T—143	381
UNIT COST						
Per order	0.33					
Per item		.025	.081			

Source: Bulletin of National Association of Cost Accountants; Distribution Costs as Factors in Pricing Policies, by Howard C. Greer; New York, N. Y., Nov. 1, 1937.

Another example of a cost item which was found to vary according to the number of items is the stopping time required for delivery. Travel time was treated as roughly varying with the number of stops, but it was determined that the stopping time lengthens with each additional item delivered. Exhibit 13 shows the analysis of truck operations necessary to give effect to this conclusion.

With similar analyses carried out for the records and packing and loading functions, the result in unit costs is as follows:

Item	Selling	Packing and loading	Delivery	Records	Total
Per-order costs	$0.330	$0.050	$0.230	$0.040	$0.650
Per-item costs	.025	.038	.028	.011	.102

The application of these unit costs to the data shown at the top of exhibit 14 gives the results shown at the bottom of the same table.

The result of these added calculations is a flattening of the cost curve, with substantial reduction of the per-hundredweight costs of smaller-sized orders and a correspondingly increased cost of the larger orders. The explanation lies in the fact that in this case the small orders typically show a small number of items and the large orders a larger number of items, so that the costs which under the modified procedure are applied on the item basis are in part transferred from the small to the large orders. The reduction in cost and in cost differentials is significant for the smaller orders, but the corresponding increase in costs and slight increase in differentials for the larger orders are of little practical importance.

Exhibit 13.—Analysis of Delivery Truck Time for Typical Week

Item	Travel time	Unloading time	Total weight	Number of orders	Number of items
DAY	*Minutes*	*Minutes*	*Pounds*		
Monday	144	182	3,960	47	144
Tuesday	110	101	2,827	21	68
Wednesday	126	124	3,358	33	102
Thursday	119	135	3,407	34	96
Friday	155	210	4,715	51	150
Saturday	146	188	4,114	43	142
Total	800	940	22,381	229	702
EXPENSE					
Wages	$16.55	$19.45			
Truck expense	36.65				
Total	53.20	19.45			
UNIT COSTS					
Per stop	$0.23				
Per item		$0.028			

Source: Bulletin of National Association of Cost Accountants; Distribution Costs as Factors in Pricing Policies, by Howard C. Greer; New York, N. Y., Nov. 1, 1937.

Exhibit 14.—Differences in Costs for Orders of Various Size Groups, Street Sales

DATA FOR FIGURING COSTS

Order group	Total hundredweight sold	Number of orders	Weight per order	Number of items	Weight per item
			Pounds		*Pounds*
Under 25 pounds	385	2,396	16	3,115	12
25–50 pounds	1,035	2,882	36	6,052	17
50–200 pounds	3,383	3,257	104	10,748	32
200–500 pounds	2,977	945	315	4,821	62
500–1,000 pounds	2,067	273	757	2,021	102
Over 1,000 pounds	1,365	81	1,685	794	172
All orders	11,212	9,834	114	27,551	41

COST ALLOCATIONS

Order group	Item cost per item	Number items per order	Item cost per order	Order cost per order	Total direct cost per order	Number orders per hundredweight	Direct cost per hundredweight	Overhead cost per hundredweight	Total cost per hundredweight
Under 25 pounds	$0.102	1.3	$0.13	$0.65	$0.78	6.25	$4.88	$0.17	$5.05
25–50 pounds	.102	2.1	.21	.65	.86	2.78	2.39	.17	2.56
50–200 pounds	.102	3.3	.34	.65	.99	.96	.95	.17	1.12
200–500 pounds	.102	5.1	.52	.65	1.17	.32	.37	.17	.54
500–1,000 pounds	.102	7.4	.75	.65	1.40	.13	.18	.17	.35
Over 1,000 pounds	.102	9.8	1.00	.65	1.65	.06	.10	.17	.27
All orders	.102	2.8	.29	.65	.94	.88	.83	.17	1.00

Source: Bulletin of National Association of Cost Accountants; Distribution Costs as Factors in Pricing Policies, by Howard C. Greer, New York, N. Y., Nov. 1, 1937.

The procedure thus illustrated is nothing more than the familiar functional analysis which has previously been utilized for analyses of costs in terms of commodities, territories, and so forth. The first example uses only two units for the measurement of functional costs—the order and the hundredweight. The modified example recognizes subdivisions of functions and utilizes one additional unit—the item—

for their measurement. Even with this modification, the procedure is somewhat crude, but it may well be sufficiently accurate for practical purposes. It must always be kept in mind that distribution cost analysis in its most complex and refined forms is still an approximation. No managerial decision is justifiable which is predicated on a degree of accuracy which such analyses are incapable of attaining.

The method of order-size analysis here illustrated is only one of many possible methods of carrying out such analyses. It has the advantage of simplicity, but is probably best adapted to a business in which the products are reasonably homogeneous. In case the merchandise handled varies widely in physical and economic characteristics, the method may require considerable modification. It may even be found necessary to carry on a degree of departmental or commodity analysis preceding or in conjunction with the order-size analysis. Otherwise the straight order-size analysis as applied to individual commodities may give misleading results.

UTILITY OF ORDER-SIZE ANALYSIS

Although the current tendency, spurred on by the Robinson-Patman Act and similar legislation, is to think solely in terms of the effects of distribution cost analysis on price policy, a failure to recognize the other implications is scarcely excusable. The manipulation of prices always carries with it the probability of results quite different from those anticipated. Cost is only one thing that must be taken into account. Prices most scientifically constructed from the most elaborate cost computations may prove to be quite the wrong prices. The only proper attitude to take is that cost computations which bring an undesirable situation to light are simply indexes that *something* needs to be done. Changing prices is only one way of meeting the situation—and very possibly not the best.

Where substantial cost differences between different sizes of orders are disclosed the management is put on notice that steps need to be taken to discourage the small order, to encourage the large order, or both. The extent of the cost differences and the relative numbers of the various sizes of orders indicate how vigorous such steps should be and how much of a result in the form of increased net profits may be expected from a successful application of remedies. The remedies may take the form of changes in methods of sales approach, changes in the methods of compensating salesmen, special charges for excessive use of services by small orderers, or a direct change in the prices of products. This is, of course, not an exhaustive list of possible means of attack.

If the price approach is chosen, it may well be that the differences in cost will set the upper limits of differences in price. This does not mean, of course, that price concessions for larger orders should give away all of the cost advantage of selling in larger quantities or that, on the other hand, competitive conditions may not necessitate greater price concessions than the cost calculations will justify. It merely means that such price concessions as are made cannot be intelligently judged without some measure of the cost differences involved. At the other end of the scale, if penalties are to be added to base prices for orders smaller than standard quantities, it would be difficult to justify penalties which exceed the excess cost.

Section 13.—SHORT CUTS IN ANALYTICAL PROCEDURE

Some of the more complete and elaborate analyses of costs are so expensive and burdensome that carrying them on regularly or continuously is hardly possible, even though the information which they afford may be of great value. The demand for simple and inexpensive methods is very understandable. Simple methods of attacking essentially complex problems, however, involve serious dangers of self-deception. "The longest way around is frequently the shortest way home" in cost analysis as in other human affairs. The management of a business is better off without any figures at all than with figures which present a false appearance of accuracy.

There are, however, certain short cuts which, if used judiciously, may yield results which can be satisfactorily substituted for the results of the more laborious processes of analysis. Some of these short cuts have heretofore been suggested, but it is desired here to discuss a few of them in some detail.

OMISSION OF COST ELEMENTS

Cost analysts are often obsessed with the idea that every element of cost must be brought into every analysis, regardless of the difficulties of finding suitable bases of application and regardless of the possibility that the results sought after may be obtained quite as well without including certain cost items in the study.

There are a number of conditions under which the omission of certain cost elements is entirely justified. One has already been described, namely, the situation in which certain costs can be assigned to commodities, customers, or whatever the object of analysis may be, only on the most arbitrary bases, such as the notoriously "last resort" basis of sales dollars. In such instances the results of such allocations in terms of total costs or net profit or loss figures are of questionable merit to the precise degree to which such arbitraries have been used. It is better in such cases to give up the search for ultimate total cost or net profit and to be content with results short of such goals by the indeterminate amount by which such unallocable costs would affect the final results. Thereafter the customers, commodities, etc., can be thought of as contributing to a pool or fund out of which such unallocated expenses must be paid. Judgments as to the adequacy of such contributions may then be formed without any pretense that such expenses are being allocated.

The same procedure may be used if the expenses unallocated are capable of accurate allocation only at too considerable trouble and expense. If their exact allocation is not vital to the obtaining of useful results, they may better be omitted from the analysis than allocated on an unsuitable basis.

Another set of circumstances which clearly calls for the omission of certain cost elements is that in which the goal sought is the difference between unit costs and in which the cost elements omitted will have no effect on the difference.

Still another case in which the omission of cost elements is justified is the case in which interest centers around differential costs. If the question to be answered is solely "What costs will be eliminated by the elimination of this commodity or customer?" or "What costs will be added by the addition of this department or territory?" the answer

can be found only by disregarding the costs which will not be affected by such action and concentrating on those costs which will be decreased or increased, as the case may be. Differential cost analysis, in fact, almost constitutes a separate field, although the techniques, aside from the careful selection of cost factors to be studied, are not dissimilar from those of the more comprehensive studies.

THE USE OF COST ESTIMATES OR STANDARDS

Another short-cut method of great potentialities, accompanied by great dangers, is the use of cost estimates or standards in place of detailed cost analyses. These estimates or standards are often established as the result of previous detailed analysis either by the individual concern or by a trade association, but occasionally they may be based on other information and belief.

By far the best origin of such estimates is a careful and complete cost study. Such a study establishes relationships which, in the lack of substantial changes in economic conditions, commodities handled, and customers served, will persist. Even where such changes do occur it may be possible to make adjustments to the estimating factors which will bring them again into line with reality. Of course if the preliminary analysis discloses conditions which necessitate sweeping reforms, the relationships originally existing will doubtless be too far upset to furnish a reliable basis for subsequent estimates, and the study may have to be repeated in whole or in part. Such repetition may be well worth while, however, if only to obtain an accurate measurement of the gains resulting from the reforms.

Acceptance of cost estimates derived from other sources, such as a trade-association survey, must be exceedingly cautious. Individual concerns differ widely from their neighbors in numberless respects, even when they are carrying on the same line of business with the same general classes of customers. Costs ascertained by cost surveys show a remarkable lack of uniformity—a lack which is almost invariably concealed in the published figures by the process of averaging. Nevertheless it may be that with the proper precautions the cost relationships, if not the absolute costs, established by a cost survey may be adopted by an individual concern as its own.

The application of estimates ordinarily involves periodic adjustments to conform to changed conditions and to bring the estimated costs into agreement with the actual costs. Between adjustments the estimated costs stand in lieu of the actual costs for all purposes where judgment must be based on cost considerations.

The shifting of estimates without the most discriminating consideration of the causes of the change and their probable effects on the costs applicable to the commodities, customer classes, or whatever may be the object of analysis, will vitiate the estimates, making them entirely unsuitable for their original purpose. The causes of change may be any one of several things, including changes in wage rates or purchased commodity prices, a general increase or falling off of demand, a shifting of demand from one commodity to others, or from one set of buyers to others, changes in selling methods or policies, and increases or decreases in the prices of some or all commodities sold. Such changes may come singly, or they may, and frequently do, come in combination with each other. Any or all of them bring about alterations in the cost-price ratio and in the relationships of costs to

commodities, customers, and the other foci of cost analysis. So long as they are not too complex or severe, the cost estimates may be altered to meet them, but the time inevitably comes when the whole situation must be reviewed anew and new bases for estimates established.

Despite its limitations, however, the method of estimates is a cost-analysis short cut which should not be neglected. As long as the estimates can be relied on they furnish a cheap and efficient substitute for painful and detailed analysis.

THE "AVERAGE COMMODITY" METHOD

This method of analysis is not precisely a short cut. In theory it involves as much detail as any other application of the functional method of analysis. In practice, however, it can be applied on the basis of estimates and impressions and is peculiarly well adapted to situations in which tests and samples can be substituted for detailed and comprehensive tabulations.

The "average commodity" method is used by the National Wholesale Druggists' Association and by the National Electrical Wholesalers' Association. In both instances it has been used for analysis of costs by commodities, but its technique could readily be adapted to analysis by customers or customer classes. The two examples cited are trade-association cases using cost figures derived from the operations of the membership at large, but the method is fully adaptable to an individual wholesaler.

In brief the method, as applied to commodity analysis, involves the determination of functional costs in terms of percentages of dollar sales of a hypothetical "average commodity," that is, a commodity which has average bulk for its weight, which requires an average inventory investment to produce a given amount of sales, which sells in quantities sufficient to amount to the average line-extension on an invoice, and which possesses all other characteristics necessary to make it an average commodity from every operating standpoint. No such commodity really exists, of course, although many commodities may be average in one or more respects. The costs of selling actual commodities are determined by relating their characteristics to the characteristics of the average commodity and adjusting the functional costs accordingly. Thus, a commodity whose rate of turn-over is twice the average will take only one-half as much inventory investment cost as the average commodity, per dollar of sales.

To make the procedure clear, the electrical wholesalers' figures for 1933 will be used as an example. It should be understood that the figures quoted do not represent the present costs or margins in this trade and are here used solely to explain the cost-analysis methods involved. The analysis follows the functional break-down of costs developed by the Department of Commerce in Problems of Wholesale Electrical Goods Distribution. The functions and the units for measuring functional services are as follows:

Functions	Units
Investment.	The average inventory dollar.
Storage.	The square foot of space occupied.
Handling.	The standard handling unit.
Office (checking).	The sale transaction, or the item sale.
Selling (promotion).	The gross margin dollar.
Reimbursement.	The sales dollar.

The distribution cost of the average commodity was determined and divided functionally as shown in exhibit 15. Some features of this exhibit and the characteristics of the average commodity require comment. The outstanding peculiarity of the exhibit is the separate presentation of cost figures for appliances and supplies, which are the two grand divisions of electrical merchandise. The compilation was on the basis of reports from members of the trade, and the different costs of selling supplies and appliances were presumably obtained from actual reports which made a corresponding differentiation. Apparently the two merchandise divisions differ only in the selling function. Thus, there are really two average commodities, an "average supply" and an "average appliance."

Exhibit 15.—Cost of Distributing an "Average Commodity"

[In percent of sales]

Functions and items of cost	Bases of allocation to commodities	Functional costs applied to all commodities	
Investment:			
Interest on inventory at 6 percent	Average value of stock on hand.	0.40	
Insurance on inventory	do	.15	
Taxes on inventory	do	.30	
Repair service (net)	do	.30	
Mark-down losses	do	.60	
Total investment	do	1.75	
Storage:			
Warehouse rent	Space occupied	1.50	
Light, heat, power, janitor, etc	do	.40	
Depreciation and repairs, furniture and fixtures	do	.20	
Total storage	do	2.10	
Handling:			
Warehouse salaries, including stock records	Number of standard handling units.	1.50	
Packing materials	do	.10	
Cartage inward	do	.15	
Cartage outward	do	.45	
Total handling	do	2.20	
Office:			
Salaries, including sales clerical	Number of items	2.75	
Office rent	do	.20	
Telephone and telegraph, stationery, office supplies, etc	do	1.00	
Total office	do	3.95	
		Appliances	Supplies
Selling:			
Salaries, excluding sales clerical	Gross margin	3.20	2.50
Travel and entertainment	do	2.00	1.40
Advertising and catalogs	do	.40	.20
Association dues, display-room rent, exhibits, etc	do	1.10	.40
Total selling	do	6.70	4.50
Reimbursement:			
Salaries, bookkeeping, and credits and collections	Sales	0.70	
Bad-debt losses	do	1.00	
Interest on receivables at 6 percent	do	.60	
Other reimbursement costs	do	.20	
Total reimbursement	do	2.50	
Grand total		19.20	17.00

Source: Operating Cost Committee report made in 1933 for the information and use of the members of the National Electrical Wholesalers' Association, New York, N. Y.

Two practices in the electrical wholesaling trade complicate the cost computations somewhat. One is the existence of consignment sales by manufacturers and the other is direct shipments from manufacturers to the wholesaler's customers. Consignment goods do not involve investment by the wholesaler and therefore take no investment cost. Direct shipments involve no investment storage or handling by the wholesaler and therefore take no costs for these functions. The costs in exhibit 15 are made up on the assumptions that 50 percent of all commodities do not require inventory investment and that 20 percent of merchandise is shipped directly from the manufacturer. Therefore when a given commodity is owned by the wholesaler, the investment costs must be doubled, and when it is shipped from the wholesaler's warehouse the storage and handling costs shown in exhibit 15 must be increased by 25 percent.

The average commodity has the following characteristics:

1. It is 50 percent owned by the wholesaler and 50 percent by the manufacturer.
2. It is 80 percent shipped from stock and 20 percent shipped directly.
3. Its rate of turn-over is equal to the average of all commodities.
4. It occupies a portion of total storage space equal to its proportion of total sales.
5. Its handling requires the same proportion of total handling effort as its proportion of total sales; in other words, its share of total individual physical units handled, both in and out, is the same as its proportion of total sales.
6. The office and clerical work required by a dollar of its sales is the average amount required for every sales dollar; in other words, the invoice lines for which it is responsible bear the same ratio to total invoice lines as its sales bear to total sales.
7. Its gross margin is such as to require and justify the average amount of promotional effort.
8. Its sales dollars, of course, are just like the sales dollars of all other commodities so far as the routine activities of reimbursement are concerned. However, in this trade different commodities are sold to different classes of customers and the resultant credit services and credit risks differ widely. Therefore this commodity is sold to an average customer who demands an average amount of credit service and involves an average amount of credit risk.

The process of determining the costs per dollar of sales for any given commodity consists of comparing the characteristics of the given commodity with those of the average commodity as listed above. In every case some characteristics are likely to increase costs and others are likely to decrease them. Five examples of varying complications are shown in exhibits 16a and 16b explained and commented upon hereafter. (The following material can be understood only by constant reference to these exhibits.)

The first example is rigid conduit (shown in exhibit 16a), a supply item which is 100 percent consigned and therefore takes no investment cost, but which is shipped from stock and therefore bears 25 percent more than the average storage and handling charges. Its storage cost is further affected by the fact that it takes up 20 percent less

than the average amount of floor space in relation to its sales value. The multipliers used for storage cost are therefore 1.25 and 0.8. These exactly offset each other, so that the storage cost for this commodity is 2.10 percent of sales, the same as for the average commodity.

Exhibit 16a.—Operating Costs Applicable to Specific Commodities

[In percent of sales]

Functions and items of cost	Cost of average supply items	Rigid conduit		Underfloor duct		Rubber-covered wire and cable	
		Multipliers	Costs	Multipliers	Costs	Multipliers	Costs
Investment		0		0		0.8 and 1.0	
Interest on inventory at 6 percent	0.40						0.32
Insurance on inventory	.15						.12
Taxes on inventory	.30						.24
Repair service (net)	.30					0	
Mark-down losses	.60						.48
Total investment	1.75						1.16
Storage		1.25 and .8		0		1.25 and 1.5	
Warehouse rent	1.50		1.50				2.81
Light, heat, power, janitor, etc	.40		.40				.75
Depreciation and repairs, furniture and fixtures	.20		.20				.38
Total storage	2.10		2.10				3.94
Handling		1.25 and 1.2		0		1.25 and .7	
Warehouse salaries, including stock records	1.50		2.25				1.31
Packing materials	.10	0					.09
Cartage inward	.15		.22				.13
Cartage outward	.45		.68				.39
Total handling	2.20		3.15				1.92
Office		.7		.35		.5	
Salaries, including sales clerical	2.75		1.92		0.96		1.38
Office rent	.20		.14		.07		.10
Telephone and telegraph, stationery, office supplies, etc	1.00		.70		.35		.50
Total office	3.95		2.76		1.38		1.98
Selling		.7		.8		.7	
Salaries, excluding sales clerical	2.50		1.75		2.00		1.75
Travel and entertainment	1.40		.98		1.12		.98
Advertising and catalogs	.20		.14		.16		.14
Association dues, display-room rent, exhibits, etc	.40		.28		.32		.28
Total selling	4.50		3.15		3.60		3.15
Reimbursement		1.6		2.0		1.8	
Salaries, bookkeeping, and credits and collections	.70		1.12		1.40		1.26
Bad-debt losses	1.00		1.60		2.00		1.80
Interest on receivables at 6 percent	.60		.96		1.20		1.08
Other reimbursement costs	.20		.32		.40		.36
Total reimbursement	2.50		4.00		5.00		4.50
Grand total	17.00		15.16		9.98		16.65

Source: Operating Cost Committee report made in 1933 for the information and use of the members of the National Electrical Wholesalers' Association, New York, N. Y.

Exhibit 16b.—Operating Costs Applicable to Specific Commodities

[In percent of sales]

Functions and items of cost	Cost of average appliance item	Ranges and water heaters		Radio sets	
		Multipliers	Costs	Multipliers	Costs
Investment		2.0 and 1.4		2.0 and .6	
Interest on inventory at 6 percent	0.40		1.12		0.48
Insurance on inventory	.15		.42		.18
Taxes on inventory	.30		.84		.36
Repair service (net)	.30	2.0	1.68		[1] 1.85
Mark-down losses	.60	2.0	3.36		[2] 3.00
Total investment	1.75		7.42		5.87
Storage		1.25 and .8		1.25 and .8	
Warehouse rent	1.50		1.50		1.50
Light, heat, power, janitor, etc	.40		.40		.40
Depreciation and repairs, furniture and fixtures	.20		.20		.20
Total storage	2.10		2.10		2.10
Handling		1.25 and .3		1.25 and .3	
Warehouse salaries, including stock records	1.50		.56		.56
Packing materials	.10		.04		.04
Cartage inward	.15		.06		.06
Cartage outward	.45		.17		.17
Total handling	2.20		.83		.83
Office		.2		.2	
Salaries, including sales, clerical	2.75		.55		.55
Office rent	.20		.04		.04
Telephone and telegraph, stationery, office supplies, etc	1.00		.20		.20
Total office	3.95		.79		.79
Selling		.6		1.1	
Salaries, excluding sales clerical	3.20		1.92		3.52
Travel and entertainment	2.00		1.20		2.20
Advertising and catalogs	.40		.24		.44
Association dues, display-room rent, exhibits, etc	1.10		.66		1.21
Total selling	6.70		4.02		7.37
Reimbursement		.5		1.5	
Salaries, bookkeeping, and credits and collections	.70		.35		1.05
Bad-debt losses	1.00	.1	.05		1.50
Interest on receivables at 6 percent	.60		.30		.90
Other reimbursement costs	.20		.10		.30
Total reimbursement	2.50		.80		3.75
Grand total	19.20		15.96		20.71

[1] Actual.
[2] Estimate.

Source: Operating Cost Committee report made in 1933 for the information and use of the members of the National Electrical Wholesalers' Association, New York, N. Y.

Rigid conduit accounts for 20 percent more physical handling units in proportion to sales than the average commodity. It requires no packing materials at all, however, so that the multipliers for the handling function, namely, 1.25 and 1.2, apply only to the other elements of handling cost. The result is a handling cost for this commodity of 3.15 percent of sales.

Rigid conduit sells in larger line extensions than the average commodity, thus reducing its office costs to only 70 percent of the average. Its gross margin is relatively low, so that the multiplier for the selling

function is also 0.7, which is applied, of course, to the selling cost items for supplies. This commodity is sold to customers whose credit requirements and risks are 60 percent greater than the average, so that the multiplier for the reimbursement function is 1.6.

The final result is a total cost of 15.16 percent of sales for this commodity, as compared to 17.0 percent for supplies as a whole. In case of direct shipments this cost would be reduced an additional 5.25 percent.

Before going on to the next example it is desirable to comment on the methods of ascertaining the variations which give rise to the multipliers. The zero multiplier for the investment function is obvious, since this commodity, being entirely consigned, requires no investment. The 1.25 multiplier for storage and handling is necessary to put the commodity on a stock-shipments basis. The average commodity, it will be remembered, is only 80 percent shipped from stock, and, therefore, the handling and storage costs of any actual commodity which is shipped from stock must be 25 percent greater than the average. The basic 80-percent figure is obtained by classifying sales in dollars as direct and out of stock. The dollar value of direct-shipment sales is found to be 20 percent of the total.

The 0.8 multiplier for storage expense is found by comparing (1) physical measurements of space occupied with (2) sales value. Thus, if rigid conduit sales are 5 percent of total sales, it must have been found to occupy only 4 percent of merchandise storage space.

The 1.2 multiplier for handling expense is found by comparison of the number of physical units of rigid conduit handled, both in and out of the warehouse, with the total number of physical units of all commodities handled, and a comparison of this ratio with the sales ratio. There is no evidence in the original study of an attempt to weight physical units in such a way as to make them comparable for this purpose, but presumably they were so defined as to produce the same result. Rigid conduit, if its sales be assumed to be 5 percent of total sales, provided 6 percent of the total number of handling units. Such figures can be obtained with exactness only by tabulating the handling units of all commodities from both incoming and outgoing invoices. However, a sample count for a representative period might be adequate.

The 0.7 multiplier for office costs is similarly obtainable with complete accuracy only by tabulating invoice lines by commodities for the period of the study. However, here again an adequate sample might well serve the same purpose. Evidently rigid conduit, assumed to account for 5 percent of sales, had only 3.5 percent of invoice lines. Another way of getting at the same information would be a study of the dollar-size of invoice line extensions. If the average commodity has a line extension of $10, rigid conduit will be found to have an average line extension of $14.28.

The 0.7 multiplier for selling or promotion is apparently in part the result of the exercise of judgment in the original study, but a most important factor is relative gross margin. The basis for the use of gross margin as the allocation factor for promotional expense has been explained heretofore (see p. 20). The assigned reason is that a high gross margin permits or justifies more intensive promotional effort than a low one. In this case the gross-margin percentage of rigid conduit is presumably 70 percent of the gross-margin percentage of

the average commodity. Thus, if the average gross margin is 15 percent of sales, the gross margin of rigid conduit is 10.5 percent. Gross margins can evidently be found without a great deal of tabulation or other clerical effort. For commodities as a whole, gross margin is simply the difference between cost of goods sold and their selling price. For individual commodities the gross margin is measured by the amount by which cost is marked up to obtain selling price. In case commodity groups are the object of study, and if the rates of mark-up on individual commodities within the group differ from one another, it is necessary to determine sales and cost of sales for the group in order to find the rate of mark-up. Inasmuch as one object of analysis is likely to be the ascertainment of net profit or loss by commodity groups, however, no additional effort is involved in such a compilation. In cases like the present one, in which large areas of expense may be completely eliminated by consignments or direct shipments, it would seem reasonable to modify the gross-margin basis accordingly.

The 1.6 multiplier for reimbursement expense must be arrived at principally as a result of judgment and estimate. Customers of electrical wholesalers range from small contractors and specialty dealers whose credit is none too good to large railroads and utilities whose credit is of the highest character and who ordinarily pay with the greatest promptitude. Different classes of goods are typically sold to different classes of customers and therefore take different rates of reimbursement cost. If such a study were carried on in a situation where any customer might buy any commodity, all commodities would be average in their relationship to reimbursement costs and all would receive the same percentage charge.

The second commodity whose costs are shown in exhibit 16a, namely, underfloor duct, is assumed to be entirely shipped directly by the manufacturer. Therefore it receives no charges for investment, storage, or handling. The orders for this product are more than twice as large as the average, so that there are only 35 percent as many invoice lines per dollar of sales and the charge for office costs is correspondingly small.

The promotional factor is relatively low, on account of low gross margin, although not as low as that of rigid conduit. The multiplier for this function is 0.8. This commodity is sold entirely to contractors, and the credit risk and credit service demanded are relatively very high. Therefore the reimbursement cost assigned is twice as high as the average. The low level of total cost (9.98 percent of sales) is due to the omission of the first three functional cost groups.

Rubber-covered wire and cable are handled on a consignment basis 60 percent of the time. This is a higher consignment ratio than the average and the first multiplier for investment cost is 0.8. The second multiplier, 1.0, signifies that the turn-over of this commodity is exactly average. The repair-service item, which is included in investment cost, receives a special multiplier of zero, presumably because repair service is not required for this commodity.

The inclusion of repair-service cost in the investment function is highly questionable. This item has no relationship to either the quantity or the turn-over of inventory. It is, as a matter of fact, a separate function entirely, affecting only appliances and depending on the physical characteristics of the appliances and trade customs with respect to them and not at all on any common unit of measure

such as dollar sales or unit sales or any of the other commodity characteristics relied on for the allocation of the other costs. Repair service is properly treated, therefore, as a direct charge to the commodity, rather than as an indirect cost item. The amount of the direct charge can be readily ascertained by keeping detailed job cost records for a period long enough to be representative. In a number of cases in the study here described, such direct, actual charges were used in place of any multiplier of the average cost. An example is found in radio sets, in exhibit 16b.

There is little objection, on the other hand, to the inclusion of mark-down losses among the investment cost items. While mark-downs are, strictly speaking, direct deductions from sales, made even before the sale is recorded, so that they never appear on the books, the study under consideration is making comparisons between the total "costs" and the original mark-up—that is, the difference between the cost of the goods and the price originally placed on them. It would possibly be better, in the case of rubber-covered wire and cable, for example, to put the case as follows:

	Percent
Original mark-up	11. 70
Less: Mark-downs	. 48
Maintained mark-up	11. 22
Less: Distribution costs	16. 17
Net loss	4. 95

Instead, the study, for the sake of uniformity and simplicity, shows simply the following:

	Percent
Original mark-up	11. 70
Less: Distribution costs, including mark-downs	16. 65
Net loss	4. 95

So long as it is clearly recognized that mark-downs are not costs, the second form of statement is not particularly objectionable.

The placing of this item in the investment function does not completely lack logic, although, here again, its treatment as a direct charge would be preferable. Other things being equal, mark-downs will be greater, the higher the inventory and the slower the turn-over. Other things are not equal, however, in the case of many commodities, since some are much more subject to style changes than others. This is recognized by the utilization of special multipliers for this item, as in the case of ranges and water heaters, and of straight estimates, as in the case of radio sets. This item could be dealt with as a direct charge by the simple expedient of recording mark-downs by commodities or by comparison of realized gross-margin percentages with original mark-ups. Since this study was an industry-wide survey, rather than an investigation of a particular concern, the treatment here shown is excusable.

The other items of cost relating to rubber-covered wire and cable require no special comment. In the light of explanations given previously the interpretation of the multipliers should be fairly clear. Stock shipments are assumed, and it is evident (1) that this commodity takes up more than an average share of storage space; (2) that it requires less than the average amount of handling per dollar of sales; (3) that it sells in orders of twice the average size; (4) that its

margin is insufficient to justify as much as the average selling effort; and (5) that it is sold to customers of substantially less than average credit rating.

Exhibit 16b contains data on two types of appliances. The ordinary multipliers are easily understood, but the special cases require some comment. In the case of ranges and water heaters, repair service and mark-down losses are doubled. This reflects excessive cost of repairs and replacement of damaged parts and the losses which must be taken on superseded types. A remarkably low credit risk is indicated by the extraordinary reduction of bad-debt losses. In the case of radio sets, actual reports of repair-service cost are used in place of assigned charges, and a special estimate is made of mark-downs.

The results of this study are summarized in the manner indicated in exhibit 17. Although the individual tabulations are made up on the basis of stock shipments (except where all shipments are direct), this table gives effect to estimates of the proportion of direct shipments of each commodity in determining profit or loss by commodities. Twenty percent of direct shipments, for example, decreases the cost of rigid conduit distribution by 1.05 percent, or 20 percent of the storage and handling cost items (see exhibit 16a). If this commodity were not 100 percent consigned, the direct shipments would correspondingly decrease the investment cost, as they do in the case of ranges and water heaters. Rubber-covered wire and cable present a peculiar situation in this regard, since the original cost figures are made up on the basis of 60 percent consignment sales. This fact reduces investment costs to only 40 percent of what they would be if the commodity were fully owned. The 20 percent of direct shipments further reduce the investment costs by half, or 0.58 percent of sales. They reduce storage and handling costs by one-fifth, or a reduction of 1.17 percent of sales, thus making a total reduction of 1.75 percent of sales. In the case of radio sets two gross margins are shown, one without price protection and one with. The latter is higher by 3 percent, which is, of course, the exact amount of mark-down losses which price protection would eliminate.

Exhibit 17.—Summarization of the Results of Commodity Cost Studies

Commodity	Estimated ratio of direct shipments	Percent of sales			
		Cost of stock shipments	Adjusted cost	Gross margin	Net profit (or loss)
	Percent				
Rigid conduit	20	15.16	14.11	11.50	−2.61
Underfloor duct	100		9.98	10.00	.02
Rubber-covered wire and cable	20	16.65	14.90	11.70	−2.20
Ranges and water heaters	20	15.96	13.89	10.80	−3.09
Radio sets	0	20.71	20.71	[1] 15.00	−5.71
				[2] 18.00	−2.71

[1] Without price protection.
[2] With price protection.

Source: Operating Cost Committee report made in 1933 for the information and use of the members of the National Electrical Wholesalers' Association, New York, N. Y.

The flexibility of this type of analysis is evident. The results shown in exhibit 17 are for the commodities as a whole, or, as it might be put,

for the average sale of rigid conduit, etc. Thus the costs shown are average costs of selling the particular commodity and do not apply to every individual sale. In order to determine whether particular sales or classes of sales are profitable it is quite possible to vary the costs in accordance with the varied conditions. For example, while rigid conduit as a whole is an unprofitable commodity, direct sales are profitable (given the same gross margin), since storage and handling costs totaling 5.25 percent are eliminated, bringing total cost down to 9.66 percent of sales, as compared to a gross margin of 11.50 percent. Similarly, while selling rigid conduit in orders of the present average size is unprofitable, sales in orders of larger-than-average size would be less unprofitable, and sales in orders of smaller-than-average size would be more unprofitable. Sales to customers who pay promptly and have good credit ratings are evidently less costly than sales to customers with the opposite characteristics.

It is possible to make up tables showing the variations in costs brought about by changing the factors on which costs depend, and giving a picture of the specific costs of which the average costs of handling a commodity are composed. This makes it possible for the management to take steps to discourage those classes of sales whose results are unsatisfactory and to encourage those which yield a profit without eliminating the good with the bad or cultivating the bad with the good. It is possible also, starting with the average commodity, to project the probable results of taking on a new line with given characteristics as to size of inventory that must be carried, probable quantities of individual sales, and so forth.

These procedures disregard the fact that these costs contain fixed as well as variable items, but this omission is not of serious import in case either the fixed items of cost are substantially less than the variable items or the changes contemplated are not of a major and sweeping character. As has been pointed out previously, complete elimination of products or services will not result in complete elimination of all cost elements attached thereto by the ordinary methods of cost allocation, and if radical changes in policy are contemplated this fact would have to be taken into account. Under some circumstances it might be well to segregate the more firmly fixed items of cost before undertaking an analysis of the sort just described.

Section 14.—ROUTINE AND MECHANICS OF ANALYSIS

However formidable the task of initiating some of the more complete analyses may appear to be, the making of such analyses after the establishment of the necessary routines and procedures is by no means difficult. The requisites for putting the analyses on a practicable basis are, broadly, three in number: In the first place, a sufficiently detailed expense and revenue classification must be adopted; secondly, methods must be devised for the allocation and application of costs to the several classes of revenues, to departments of the business, to commodities, to customers and customer classes, and in the other ways which may be found desirable; and finally, forms and procedures must be developed for the collection and summarization of the necessary operating statistics.

EXPENSE CLASSIFICATIONS

It is impossible, of course, to lay down account classifications and related methods and procedures that would be adaptable to all types of wholesaling and for all analytical purposes. It is suggested that each wholesaling trade association is in the best position to consider the problems of its own members and to prepare such materials as may be deemed most practicable for their use, in view of the character of the membership and the types of analysis which would be likely to prove useful. Some trade associations have already prepared special distribution-cost classifications, usually in response to a demand on the part of members for assistance in meeting problems raised by the Robinson-Patman Act. A notable example is the Rubber Manufacturers Association.

FUNCTIONS AND BASES OF ALLOCATION

This study has been chiefly devoted to suggestions as to the functions desirable for use in analyzing costs, the bases for assigning costs to the functions, and the methods of attaching functional costs to the foci of analysis. It is believed that accountants and statisticians should be able to adapt such of the procedures described as are suitable to the trades or enterprises in which they are interested to the requirements of such trades or enterprises. In addition to the suggestions made here, other publications of the Bureau of Foreign and Domestic Commerce, of the National Association of Cost Accountants, and of certain trade associations contain information concerning methods followed and results obtained by specific trades and enterprises.

FORMS

Every cost investigation requires the use of forms for gathering data, making distributions, and presenting reports. Such forms are so highly individualistic, however, that it would hardly be worth while to attempt to present forms which would have widespread utility. Accountants and statisticians are familiar with the preparation of such forms and the problems of making them most efficient for the purposes intended. Forms for the gathering of data must be carefully devised so as to be complete, to minimize the chances of error, and to save as much labor as possible. Forms for making cost distributions will depend to some extent on the mechanical aids available. It may be possible to combine them to some extent with the forms used in the initial gathering of data. Forms for making of final reports must be so devised as to be suited to the needs of the particular executives who must act on the information shown. The most fundamental requisite is that they emphasize figures of vital importance and do not bury them in a mass of unimportant data. The executive rightly feels that he should not be required to wade through columns of figures in which he is not interested in order to get at those which require him to take action. Free use must be made of highly particularized and summarized reports, supported to whatever extent is necessary by detailed schedules.

Above all, the making and utilizing of distribution-cost analyses requires the exercise of an intelligent understanding of the potentialities and limitations of such studies. The field for experimentation and improvement is literally limitless, and the accountant or statistician who chafes at dull routine can find no better outlet for the exercise of imagination, insight, and ingenuity. Similarly the executive who is satisfied that he has done all he can to improve the mechanical operation of his business and its relations with its customers will find that cost analysis opens up new fields of profitable attack on the problems of business management.

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APPENDIX

SUPPLEMENTARY EXHIBITS

Presented in this appendix are exhibits which are intended to supplement those contained in the body of the study, and especially to indicate how a given set of figures from an individual enterprise would appear when some of the procedures which have been described are applied to them. The figures chosen are those of a hypothetical grocery wholesaler and have been adapted from actual operating results.

Exhibit 18 represents an analysis by type of expense (or "natural division") for 2 separate years and a 10-year cumulative period. From comparisons of this character the wholesaler can determine whether the period under review has been better or worse than his previous experience. If budgeted figures were available, the comparison could be improved by expansion to include the budgeted amounts and percentages, so that the wholesaler could see how close he had come to hitting the mark at which he had aimed. It is worth noting that neither the percentage to net sales nor the percentage to total operating expense is adequate to tell the whole story. Both are needed. In the first expense item, for example, 1937 shows a marked improvement over 1936 in expense per dollar of sales, but an actual increase in expense as a portion of total expense. It may be, therefore, that the management should not be content with a falling off in this item from 2.60 percent to 2.44 percent of sales but should inquire into reasons why the decrease was not greater.

This example is not given as a model of perfection in expense classification. Some of the items shown, particularly the first, might well be broken down still further. This table corresponds roughly with exhibit 1.

Exhibits 19, 20, and 21 correspond to exhibit 3. They show the assignment or allocation of the primary expenses to functional groups, using as functions the seven adopted by the Bureau of Foreign and Domestic Commerce in its study of wholesale electrical-goods distribution. The application of expenses to functions follows the lines of the electrical-wholesaling study, being direct wherever possible and utilizing the simplest and most suitable allocation factors where allocation has to be made. It is to be noted that in any actual case the treatment of administration should be much more adequately handled. It is quite unlikely that there would be no better way of distributing executive salaries, for example, than on a basis of total previously distributed costs.

Exhibits 22, 23, and 24 carry out the determination of unit functional costs. The interpretation and use of these exhibits are simple. In exhibit 22, for example, it is shown that the total investment cost was $7,025, that the average inventory during the year was $94,631, and that the investment cost per dollar of inventory was a trifle over 7.4 cents.

Exhibit 25 applies the unit costs obtained in exhibit 22 to a hypothetical commodity having the characteristics shown in the first column.

The net result of trading in this commodity is a profit of $13.30, obtained by subtracting the total costs, $336.70, from the gross margin, $350. This disregards, of course, any direct costs of the commodity in question, assuming that all operating costs are contained in the previous tabulations. In practice, any costs which can be identified as pertaining only to specific commodities would have to be omitted from the unit cost computations shown in the preceding exhibits and applied directly in the process of determining the profitability of trading in specific commodities.

Exhibit 26 presents certain functional cost comparisons both in totals and in unit costs. Such comparative tabulations can be multiplied indefinitely according to the needs of the individual trade or enterprise. They are particularly valuable, of course, when accompanied by interpretative comment, and especially useful if budgeted figures are available and comparisons can be made not merely between historical achievements but between what has actually been experienced and what was planned or expected. The inclusion of percentage figures to show the rates of decline or increase in costs is also a most useful device for bringing to the attention of management the extent and significance of changing operating conditions and costs.

Exhibit 18.—Comparison of Operating Results, 1937, with 1936, and with 10-Year Average, 1928–37

[In actual figures, percentage of net sales, and percentage of total operating expense]

Item	1937			1936			1928–37		
	Amount	Percent net sales	Percent total operating expense	Amount	Percent net sales	Percent total operating expense	Amount	Percent net sales	Percent total operating expense
Net sales	$591,442	100.00	1,000.12	$491,806	100.00	894.89	$693,792	100.00	991.64
Cost of goods sold	524,756	88.72	887.36	432,553	87.95	787.08	614,893	88.63	878.87
Gross margin	66,686	11.28	112.76	59,253	12.05	107.81	78,899	11.37	112.77
Operating expense:									
Salaries, commissions, and expenses of sales force	14,449	2.44	24.43	12,786	2.60	23.27	17,790	2.56	25.40
Advertising and other selling expenses	1,307	.22	2.21	1,055	.21	1.92	817	.12	1.17
Receiving and shipping wages	7,711	1.31	13.04	6,801	1.38	12.38	10,060	1.45	14.38
Other shipping expense	8,825	1.49	14.92	7,794	1.58	14.18	9,251	1.33	13.22
Executive salaries	6,943	1.18	11.74	6,985	1.42	12.71	8,275	1.19	11.83
Office salaries	5,688	.96	9.62	5,301	1.08	9.65	7,443	1.07	10.64
Office supplies and expense	1,559	.26	2.64	1,311	.27	2.39	1,844	.27	2.64
Rent	2,755	.47	4.66	2,811	.57	5.11	3,200	.46	4.57
Heat, light, and power	796	.14	1.35	765	.16	1.39	795	.11	1.14
Taxes	2,087	.35	3.53	2,216	.45	4.03	2,736	.39	3.91
Insurance	1,076	.18	1.82	942	.19	1.71	998	.14	1.43
Repairs to warehouse and office equipment	191	.03	.32	55	.01	.10	313	.04	.45
Depreciation of warehouse and office equipment	420	.07	.71	335	.07	.61	557	.08	.80
Miscellaneous expense	1,520	.26	2.57	1,360	.28	2.47	1,851	.27	2.65
Losses from bad debts	3,810	.64	6.44	4,440	.90	8.08	4,034	.58	5.77
Total operating expense	59,137	10.00	100.00	54,957	11.17	100.00	69,964	10.06	100.00
Net operating profit or loss	7,549	1.28	12.77	4,296	.88	7.82	8,935	1.29	12.77
Net nonoperating gain or loss	353	.06	.60	−279	−.06	−.51	−9	------	−.01
Net profit or loss	7,902	1.34	13.36	4,017	.82	7.31	8,926	1.29	12.76

NOTE.—Minus sign (−) indicates expense or loss.
Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 19.—Allocation of Primary Expenses to Functional Expense Classes, 1937

Item	Total	Investment	Storage	Handling	Checking	Sales promotion	Reimbursement	Administration	Basis of distribution
Salaries, commissions, and expenses of sales force	$14,449				$10,933	$3,516			Manager's estimate.
Advertising and other selling expense	1,307				304	1,003			Direct, per manager.
Receiving and shipping wages	7,711			$6,475	1,236				Direct.
Other shipping expense	8,825			7,096	1,729				Do.
Executive salaries	6,943							$6,943	Direct, per manager.
Office salaries	5,688	$1,486			938		$2,294	970	Manager's estimate.
Office supplies and expense	1,559	295			199		569	496	Do.
Rent	2,755		$2,204	138				413	Floor space.
Heat, light, and power	796		637	40				119	Do.
Taxes	2,087	1,920		63	63	41			Direct, per manager.
Insurance	1,076	939		82	36			19	Direct, according to asset or hazard insured.
Repairs to warehouse and office equipment	191	191							Direct.
Depreciation of warehouse and office equipment	420	420							Do.
Miscellaneous expense	1,520	700		83	164	43	449	81	Direct, per manager.
Losses from bad debts	3,810						3,810		Direct.
Total expenses	59,137	5,951	2,841	13,977	15,602	4,603	7,122	9,041	
Administrative expenses distributed		1,074	513	2,522	2,816	831	1,285	−9,041	Dollar expense of direct function.
Total expenses	59,137	7,025	3,354	16,499	18,418	5,434	8,407	0	

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 20.—Allocation of Primary Expenses to Functional Expense Classes, 1936

Item	Total	Investment	Storage	Handling	Checking	Sales promotion	Reimbursement	Administration	Basis of distribution
Salaries, commissions, and expenses of sales force	$12,786				$9,942	$2,844			Manager's estimate.
Advertising and other selling expense	1,055				179	876			Direct, per manager.
Receiving and shipping wages	6,801			$5,441	1,360				Direct.
Other shipping expense	7,794			6,235	1,559				Do.
Executive salaries	6,985							$6,985	Direct, per manager.
Office salaries	5,301	$1,389			864		$2,307	741	Manager's estimate.
Office supplies and expense	1,311	273			178		572	288	Do.
Rent	2,811		$2,249	141				421	Floor space.
Heat, light, and power	765		612	38				115	Do.
Taxes	2,216	2,039		66	66	45			Direct, per manager.
Insurance	942	838		45	43			16	Direct, according to asset or hazard insured.
Repairs to warehouse and office equipment	55	55							Direct.
Depreciation of warehouse and office equipment	335	335							Do.
Miscellaneous expense	1,360	649		69	98	39	416	89	Direct, per manager.
Losses from bad debts	4,440						4,440		Direct.
Total expenses	54,957	5,578	2,861	12,035	14,289	3,804	7,735	8,655	
Administrative expenses distributed		1,043	535	2,250	2,671	711	1,445	−8,655	Dollar expense of direct function.
Total expenses	54,957	6,621	3,396	14,285	16,960	4,515	9,180	0	

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 21.—Allocation of Primary Expenses to Functional Expense Classes, 10-Year Average, 1928–37

Item	Total	Investment	Storage	Handling	Checking	Sales promotion	Reimbursement	Administration	Basis of distribution
Salaries, commissions, and expenses of sales force	$17,790				$10,006	$7,784			Manager's estimate.
Advertising and other selling expense	817				122	695			Direct, per manager.
Receiving and shipping wages	10,060			$7,048	3,012				Direct.
Other shipping expense	9,251			6,578	2,673				Do.
Executive salaries	8,275							$8,275	Direct, per manager.
Office salaries	7,443	$2,844			903		$2,894	802	Manager's estimate.
Office supplies and expense	1,844	701			193		628	322	Do.
Rent	3,200		$2,560	160				480	Floor space.
Heat, light, and power	795		636	40				119	Do.
Taxes	2,736	2,517		82	82	55			Direct, per manager.
Insurance	998	916		52	14			16	Direct, according to asset or hazard insured.
Repairs to warehouse and office equipment	313	313							Direct.
Depreciation of warehouse and office equipment	557	557							Do.
Miscellaneous expense	1,851	684		98	115	55	816	83	Direct, per manager.
Losses from bad debts	4,034						4,034		Direct.
Total expenses	69,964	8,532	3,196	14,058	17,120	8,589	8,372	10,097	
Administrative expenses distributed		1,439	539	2,371	2,887	1,449	1,412	−10,097	Dollar expense of direct function.
Total expenses	69,964	9,971	3,735	16,429	20,007	10,038	9,784	0	

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 22.—Cost of Functions Per Service Unit, 1937

Function	Cost of function	Number of service units	Cost per service unit (cents)	Service unit used
Investment	$7,025	94,631	7.424	Inventory dollar.
Storage	3,354	27,158	12.350	Cubic feet occupied.
Handling	16,499	70,973	23.247	Hundredweight.
Checking	18,418	95,335	19.319	Invoice line.
Sales promotion	5,434	66,686	8.149	Gross-margin dollar.
Reimbursement	8,407	591,442	1.421	Net-sales dollar.

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 23.—Cost of Functions Per Service Unit, 1936

Function	Cost of function	Number of service units	Cost per service unit (cents)	Service unit used
Investment	$6,621	78,689	8.414	Inventory dollar.
Storage	3,396	19,672	17.263	Cubic feet occupied.
Handling	14,285	59,017	24.205	Hundredweight.
Checking	16,960	79,274	21.394	Invoice line.
Sales promotion	4,515	59,253	7.620	Gross-margin dollar.
Reimbursement	9,180	491,806	1.867	Net-sales dollar.

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 24.—Cost of Functions Per Service Unit, Average, 1928–37

Function	Cost of function	Number of service units	Cost per service unit (cents)	Service unit used
Investment	$9,971	111,007	8.982	Inventory dollar.
Storage	3,735	27,752	13.458	Cubic feet occupied.
Handling	16,429	83,255	19.733	Hundredweight.
Checking	20,007	111,832	17.890	Invoice line.
Sales promotion	10,038	78,899	12.723	Gross-margin dollar.
Reimbursement	9,784	693,792	1.410	Net-sales dollar.

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 25.—Application of 1937 Unit Functional Costs to a Hypothetical Commodity

Item	Service units required	Cost per unit (cents)	Total cost
Average inventory	$500	7.424	$37.12
Storage space	150 cu. ft.	12.350	18.53
Handling units	400 cwt.	23.247	93.99
Invoice lines	600	19.319	115.91
Gross margin	$350	8.149	28.52
Net sales	$3,000	1.421	42.63
Total cost			336.70

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

Exhibit 26.—Functional Cost Comparisons

Function	Total cost of function			Functional cost per net sales dollar (in cents)			Cost per functional service unit (in cents)		
	1937	1936	Average, 1928–37	1937	1936	Average, 1928–37	1937	1936	Average, 1928–37
Investment	$7,025	$6,621	$9,971	1.189	1.346	1.437	7.424	8.414	8.982
Storage	3,354	3,396	3,735	.567	.692	.538	12.350	17.263	13.458
Handling	16,499	14,285	16,429	2.790	2.905	2.368	23.247	24.205	19.733
Checking	18,418	16,960	20,007	3.114	3.449	2.884	19.319	21.394	17.890
Promotion	5,434	4,515	10,038	.919	.918	1.447	8.149	7.620	12.723
Reimbursement	8,407	9,180	9,784	1.421	1.867	1.410	1.421	1.867	1.410
Total	59,137	54,957	69,964	10.000	11.177	10.084			

Source: A hypothetical case made up from actual cost records of several wholesale grocery establishments.

PUBLISHED STUDIES, BUREAU OF FOREIGN AND DOMESTIC COMMERCE

[NOTE.—Publications listed are available for purchase from the Superintendent of Documents, Washington, D. C., unless otherwise noted, or for review in most public and college libraries.]

DISTRIBUTION COST STUDIES

WHOLESALING

Wholesale Confectioners' Operations, by E. J. Carroll; Domestic Commerce Series No. 85. 1934. Price 5 cents.

Wholesale Druggists' Operations, by E. J. Carroll; Domestic Commerce Series No. 86. 1934. Price 15 cents.

Jewelry Distribution by Wholesale Jewelers, by John Hall; Part I. National Study of General Operations. 1933. National Wholesale Jewelers' Association, 505 Arch Street, Philadelphia, Pa. (Out of print.)

Cost Control by Wholesale Grocers, by John R. Bromell; Domestic Commerce Series No. 63. 1932. Price 10 cents. (Out of print.)

Wholesale Grocery Operations, by John R. Bromell; Part IV., Louisville Grocery Survey; Distribution Cost Studies No. 14. 1932. Price 20 cents.

Profits from Cost Analysis of Paint Distribution, by S. L. Kedzierski; Domestic Commerce Series No. 79. 1932. Price 5 cents.

Problems of Wholesale Electrical Goods Distribution, by Wroe Alderson and F. Haag, Jr.; Distribution Cost Studies No. 9. 1931. Price 15 cents. (Out of print.)

Problems of Wholesale Dry Goods Distribution, by Wroe Alderson and N. A. Miller; Distribution Cost Studies No. 7. 1930. Price 10 cents. (Out of print.)

Wholesale Grocers' Problems: Costs, Customers, and Commodities, by J. W. Millard; Distribution Cost Studies No. 4. 1928. Price 5 cents.

Problems of Wholesale Paint Distribution, by Wroe Alderson and J. R. Bromell. 1928. (Out of print.)

RETAILING

Survey of Retail Management Practices, by F. Kilby Hall; Domestic Commerce Series No. 81. 1933. Price 10 cents.

ST. LOUIS DRUG-STORE SURVEY, 1932

Costs, Sales, and Profits in the Retail Drug Store, by Wroe Alderson and N. A. Miller; Domestic Commerce Series No. 90. 1934. Price 20 cents.

Merchandising Requirements of the Drug Store Package, by Wroe Alderson and B. B. Aiken; Domestic Commerce Series No. 73. 1932. Price 5 cents.

Drug Store Arrangement, by Wroe Alderson and W. H. Meserole; Domestic Commerce Series No. 57. 1932. Price 10 cents.

Causes of Failure Among Drug Stores, by Victor Sadd; Domestic Commerce Series No. 59. 1932. Price 5 cents.

Prescription Department Sales Analysis in Selected Drug Stores, by F. A. Delgado and A. A. Kimball; Domestic Commerce Series No. 61. 1932. Price 5 cents.

Merchandising in Country Drug Stores, by John R. Bromell; Domestic Commerce Series No. 65. 1932. Price 5 cents.

Merchandising in City Drug Stores, by E. J. Carroll; Domestic Commerce Series No. 70. 1932. Price 5 cents.

(Available from other sources)

Ice Cream at the Drug Store Soda Fountain, Volume I, by W. H. Meserole and O. M. Johnson. Findings and interpretation concerning ice cream at the soda fountain. Part of the St. Louis Drug Store Survey. 1933. Price 25 cents. International Association of Ice Cream Manufacturers, Harrisburg, Pa.

Ice Cream at the Drug Store Soda Fountain, Volume II, by W. H. Meserole and O. M. Johnson. Statistical tables setting forth the basic data developed concerning ice cream at the soda fountain. A part of the St. Louis Drug Store Survey. 1933. Price 15 cents. International Association of Ice Cream Manufacturers, Harrisburg, Pa. (Out of print.)

The Professional Pharmacy—An Analysis of Prescription Department Activities, by F. A. Delgado. 1935. Price 25 cents. American Pharmaceutical Association, 2215 Constitution Avenue, Washington, D. C.

LOUISVILLE GROCERY SURVEY, 1928

Part I. Census of Food Distribution, by Wroe Alderson and W. H. Meserole; Distribution Cost Studies No. 6. 1930. Price 15 cents.

Part II. Costs, Markets, and Methods in Grocery Retailing, by W. H. Meserole; Distribution Cost Studies No. 8. 1931. Price 20 cents.

Part III–A. Merchandising Characteristics of Grocery Store Commodities—General Findings and Specific Results, by Nelson A. Miller; Distribution Cost Studies No. 11. 1932. Price 20 cents.

Part III–B. Merchandising Characteristics of Grocery Store Commodities—Perishables, by N. A. Miller and A. A. Kimball; Distribution Cost Studies No. 12. 1932. Price 20 cents.

Part III–C. Merchandising Characteristics of Grocery Store Commodities—Dry Groceries, by N. A. Miller and A. A. Kimball; Distribution Cost Studies No. 13. 1932. Price 30 cents.

MANUFACTURING

Mark-downs in the Women's Coat and Suit Industry: Their Causes and Control, by S. L. Kedzierski; Domestic Commerce Series No. 91. 1934. Price 10 cents.

Meeting the Small-Order Problem in the Confectionery Industry, by S. L. Kedzierski and C. E. Hughes. 1932. Price 10 cents. (Mimeographed; out of print.)

Distribution Cost Problems of Manufacturing Confectioners, by S. L. Kedzierski; Distribution Cost Studies No. 10. 1931. Price 10 cents. (Out of print.)

OTHER STUDIES RELATING TO MARKET ANALYSIS

[NOTE.—These publications are available for prices quoted, from the Bureau of Foreign and Domestic Commerce, unless otherwise noted.]

WHOLESALING

Atlas of Wholesale Grocery Trading Areas, by Elma S. Moulton; Market Research Series No. 19. 1938. Price $1.

Estimated Net Sales of Service Wholesalers, for Kinds of Business. Marketing Research Division. (Annual release issued during March of each year. No charge.)

RETAILING

Small Scale Retailing—A Statistical Analysis of Unpublished Data from the Census of American Business, by W. H. Meserole; Domestic Commerce Series No. 100. 1938. Price 10 cents.[1]

[1] Available from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Store Arrangement Principles, by W. H. Meserole and H. P. Warhurst; Domestic Commerce Series No. 104. 1938. Price 10 cents.[1]

Patterns of Stores, Sales, and Population in the United States, by W. H. Meserole; Market Research Series No. 18. 1938. Price 10 cents.

Store Modernization Needs, by N. A. Miller; Market Research Series No. 8. 1936. Price 10 cents. (Out of print.)

Final Estimates of Retail Sales. Marketing Research Division. (Annual release issued during March of each year. No charge.)

INDUSTRIAL

Check Sheet—Introduction of New Industrial Products, by O. C. Holleran; Market Research Series No. 6. 1937. Price 10 cents.

Check Sheet—Introduction of New Consumer Products, by O. C. Holleran; Market Research Series No. 7. 1935. Price 5 cents. (Out of print.)

Basic Industrial Markets in the United States:

The Textile Industries, by O. C. Holleran; Market Research Series No. 14.1. 1936. Price 10 cents.

The Iron and Steel Industry, by O. C. Holleran; Market Research Series No. 14.2. 1936. Price 10 cents.

Gas and Electric Utilities, by O. C. Holleran; Market Research Series No. 14.3. 1937. Price 10 cents.

The Pulp and Paper Industry, by O. C. Holleran; Market Research Series No. 14.4. 1937. Price 10 cents.

The Paint, Varnish, and Lacquer Industry, by O. C. Holleran; Market Research Series No. 14.5. 1939. Price 10 cents. (In press.)

Effects of City Water and Sewerage Facilities on Industrial Markets, by O. C. Holleran; Market Research Series No. 17. 1938. Price 10 cents. (Out of print.)

Industrial Market Data Handbook, by O. C. Holleran. (In preparation.)

GENERAL

Consumer Market Data Handbook, by Ben P. Haynes and Guerry R. Smith, Domestic Commerce Series No. 102. 1939. Price $1.75.[1]

Market Research Sources, A Guide to Information on Domestic Marketing, by Rachel Bretherton; Domestic Commerce Series No. 55. 1938 edition. Price 30 cents.[1]

Suggestions for Use in Making a City Survey (Industrial and Commercial), by Ada Lillian Bush; Domestic Commerce Series No. 105. 1938. Price 10 cents.[1]

Selected Trade Associations of the United States—1937—National and Interstate, by L. W. Marceron and C. Judkins; Market Research Series No. 1. Price 10 cents. (Out of print; 1939 edition in preparation.)

Sources of Current Trade Statistics, by Jettie Turner; Market Research Series No. 13. 1937. Price 25 cents. (Out of print.)

Industry Statistical Summaries. Marketing Research Division. Monthly releases showing current developments in the distribution of drugs, electrical goods, food, and hardware. The following data are issued currently:

Drugs.—Manufacturers' and wholesalers' sales, credit conditions, and inventories. Retail sales for chain and independent stores.

Electrical goods.—Manufacturers' and wholesalers' sales and credit conditions. Also inventory figures for wholesalers.

Food.—Manufacturers' and wholesalers' sales, credit conditions, and inventories. Retail sales for chain grocery stores and independent grocery stores.

Hardware.—Manufacturers' and wholesalers' sales and credit conditions. Also inventory figures for wholesalers. Retail independent hardware store sales.

Distribution Cost Analysis by Commodities. An address by N. H. Engle, Assistant Director, Bureau of Foreign and Domestic Commerce, at the Ninth Boston Conference on Distribution, Boston, Mass., September 21, 1937. Published in the 1937 Report of the Boston Conference on Distribution by The Boston Conference on Distribution, 80 Federal Street, Boston, Mass.

Distribution Cost Accounting. An address by Wilford L. White, Chief, Marketing Research Division, Bureau of Foreign and Domestic Commerce, at the annual meeting of the National Association of Cost Accountants, June 27, 1935.

[1] Available from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Domestic Commerce. A current review of business research and information. Periodical, published on the 10th, 20th, and 30th of each month by the Bureau of Foreign and Domestic Commerce, Washington, D. C. Price $1 a year (foreign $2), in advance; 5 cents a single copy.

Business Information Service. Provides data on 133 subjects pertaining to business problems through the medium of abstracts and basic data sheets. This service is on file for reference in chambers of commerce, universities, public libraries, and trade associations that meet certain requirements. Private firms may subscribe for $10 a year.

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