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Distribution cost analysis methodologies, 1901-1941

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DISTRIBUTION COST ANALYSIS METHODOLOGIES, 1901-1941*

Abstract: The attempt to develop cost analysis methodologies for the marketing function began at the turn of the century. Early attempts followed the pattern of factory cost analysis and progress was slow until the break-through in the years 1940 - 1941.

The Pioneers

The first 20 years in the development of the methodologies of distribution cost analysis were characterized by the attempts of cost accountants to apply the costing methods of the factory to the marketing function. The early development of the area was dominated by cost accountants, and the most natural approach for them to take was to employ the methods with which they were most familiar. While they recognized the inherent differences between the production and marketing functions, the pioneer writers in the field felt that the similarities were greater than the dissimilarities. As such, the early work in the area was little more than an application of the developing production costing methodologies to the problem of distribution cost accounting. The early writers were fully cognizant of the fact that they were exploring a new area, however, and there was much disagreement in the early years concerning the proper approaches to be used and the correct methodologies to employ. Indeed, it could be said that as of the end of the 1920s there was no "generally accepted" system of distribution cost accounting.

To see how the methods of distribution cost analysis evolved from production cost accounting, we must go back to the turn of the century. One of the earliest discussions of the subject is to be found in an article published by Alexander Hamilton Church in *The Engineering Magazine* in 1901.[1] The article is entitled "The Proper Distribution of Establishment Charges" and is the last in a

*Based on a paper of the same title presented at the 1978 Annual Meeting of the American Accounting Association and published in its Collected Papers.

series of six articles which Church wrote for the magazine on the subject of overhead allocation. The articles were later combined into a book entitled *The Proper Distribution of Expense Burden* which was published in 1908.[2]

Church includes both office and selling expenses in his definition of "establishment charges," but he appears to view their allocation with some reservation. As he points out, "A more or less arbitrary basis of incidence" must be used when apportioning selling costs among products.[3] His view of the marketing, or "selling" function as he calls it, is an example of the classic production orientation of the time. In comparing production costs with office and selling costs, he states:

> There is no visible and tangible result connected with concrete things in the case of general charges. Nothing is produced. Expenditure may, in fact, lead to no result at all—nay, does often lead to pure loss of money and time. It is this vaugeness of the general charges that forbids our regarding them as bed-rocks on which we can base deductions without further inquiry.[4]

Church's recommended method of distributing "general charges" is quite simple and straightforward. He first suggests that products be grouped into classes which "correspond as closely as possible to the differences in their commercial treatment."[5] Next, the various natural expense categories should be allocated to the product classes on some reasonable basis. He points out that "the element of judgement is very strongly involved in this analysis." However, he believes that there is no reason why "a very close approximation to the facts should not be made at this stage if the work is carried out by a competent person, who has access to all the data necessary for decision."[6] Unfortunately, he fails to provide the reader with any guidance as to possible bases of allocation. He merely offers an example and assumes that "a competent person" would be able to determine a rational justification for the percentage allocations employed.

While Church's approach is primitive by contemporary standards, it does contain the essence of what has come to be known as the "traditional approach" to cost-revenue analysis, that is, the allocation of marketing expenses to product groups using an allocation base which has been determined by careful study. Indeed, we can say that his methodology is a considerable improvement over previous approaches which, according to Church, simply averaged general charges over all products produced.

Eleven years after the publication of Church's article, George E. Frazer, an instructor in Business Administration at the University of Wisconsin, published an article in which the subject is treated with more sophistication.[7] His analysis is surprisingly insightful and presages many later developments in the field. For example, he comes very close to conceptualizing the costs of distribution in terms of the costs of performing distribution functions—which was later to become the most significant contribution of the Department of Commerce studies in the late 1920s. Frazer classifies the costs of distribution in terms of the various departments which exist in the "sales" organization. (The term marketing did not begin to appear in the distribution cost literature until the early 1920s.) Frazer identifies three major classifications:

1. The cost of selling,
2. The cost of storing, packing and delivery, and
3. The cost of collection.

He also identifies a large number of subcategories of each of the above and recommends that separate ledger accounts be employed for each of the elements of the cost of distribution.

In discussing the nature of the various distribution costs, Frazer indicates that he is very much aware of the carry-over effects of selling and advertising effort and the problems this creates for distribution cost accountants. On this subject he states:

> . . . It must be taken into consideration that the salesman is employed not only to secure a particular order or orders, but also to constantly advance the good will of customers toward the house that he represents, so that his visits, whether resulting in immediate orders or not, may in the future result in business transactions.
>
> The difficulty found in attempting to charge expenditures for advertising and salesmen directly to particular orders arises from the fact that neither advertising nor salesmanship is a process expended upon the sales order secured . . . . The direct casual relationship is between the advertisement or salesman and the buyer, and not between the advertisement or salesman and the goods sold.[8]

The problem of carry-over effects and their potential for distortion of profit and loss statements was one which perplexed the distribution cost writers for some time.

Frazer suggests a number of different bases for the actual allocation of distribution costs. In the case of selling costs (which includes the cost of advertising), he recommends the use of what he calls the "actual price realized" method. This is nothing more than the development of an application rate by dividing total selling costs for the period by total net revenue for the same period. This percentage would then be multiplied by the net revenue of each individual order to determine the selling cost content of the order. The method is analogous to that used in production cost accounting where factory overhead is apportioned to products on the basis of some variable item such as direct labor hours. In this case the variable item being employed is net revenue.

Frazer's reason for recommending such a simplistic method is a function of his concern over the previously mentioned carry-over effects of selling and advertising expenditures. It is his belief that "No records can be devised . . . that will show advertising and salesmanship as processes expended upon particular sales orders in the same way that stock requisitions and labor tickets show materials and labor respectively to have been expended upon production orders."[9]

Herein lies the crux of the problem which arose when production cost accountants began to concern themselves with distribution cost accounting. The cost accountants were familiar with "tangible" production processes. In the plant the costs of labor, materials, and overhead have a very close relationship to the product produced. It is quite a simple process to allocate the weekly expense of a worker to the products he produces in that week. It is quite another thing to allocate the weekly expenses of a salesman to the orders he writes in that same week. The cost accountants, in their attempts to apply production costing techniques to distribution, found it very difficult to reconcile themselves to the inherent differences in the two functional areas. This led to a good deal of debate in the 1920s and 1930s over the best means for handling the costs of distribution.

In the case of the indirect costs of storing, packing, and delivery, Frazer suggests a method very similar to that employed for selling costs. However, he believes that the direct expenses of this department are chargeable to individual orders. As for the costs of collection, Frazer believes that many of the costs in this department are direct charges to particular orders (e.g., credit information costs, legal expense, etc.) and can be determined from a check of the department's records. He suggests that indirect collection costs may be apportioned on the basis of net sales revenue per order.

The National Association of Cost Accountants

One of the most important developments in the history of distribution cost analysis was the continuing interest of the National Association of Cost Accountants—now the National Association of Accountants. Throughout the 1920s and 1930s the NACA provided a forum for the discussion of developments in distribution cost analysis. Through the presentation of papers at its annual meetings and the publication of articles in its official journal, the *NACA Bulletin,* the association did much to stimulate interest in distribution costing.

The NACA's interest dates from 1922. In that year four members of the association presented papers at the group's annual convention on the subject of sales and administrative costs. The four papers which were presented are evidence of the embryonic state of the art at this time. All four take a different approach to the subject, and each author tends to stress a different point which he considers to be the most important issue in the field.

For example, William Basset, a member of a New York City accounting firm, believes that the most important use of distribution cost data is in the control of salesmen and sales managers.[10] It is his belief that salesmen spend far too much time and effort trying to obtain orders from marginal accounts which are frequently unprofitable. Basset believes that control of salesmen can be achieved through a two-part allocation of selling costs—one allocation to salesmen and one to customers. He states that the common practice of allocating selling expense to orders on the basis of an expense-revenue ratio (Frazer's method) fails to account for the differences in the cost of selling to various types of customers. (Basset estimated that 95 percent of the firms represented at the 1922 convention used this ratio method.)

Basset's method for controlling individual salesmen consists of comparing each salesman's cost per call against a standard cost per call figure. This marks the first time that standard costs have been suggested for use in the distribution costing literature. It is interesting to note that as late as 1941 Donald R. Longman pointed to the use of actual rather than standard costs as "the most important of all criticisms of current methods of [distribution] cost analysis."[11]

Basset's approach to customer profitability involves the construction of a customer profit and loss analysis. In developing the P & L statement, he charges each customer with a standard cost per call multiplied by the actual number of sales calls made on the customer.

Other direct selling expenses are charged directly to the customer, i.e., display advertising, newspaper advertising, billing costs, and the cost of goods sold. In this way each customer's profit or loss can be determined. Basset suggests that these data may be used to determine which customers should be abandoned and which customers should be cultivated further because of their unfavorable or favorable expense-to-revenue ratios.

Another approach to distribution cost analysis was taken by William Castenholz.[12] His main concern is the problem of the carry-over effects of selling and advertising effort. It is his contention that carry-over effects distort the monthly profit and loss figures in that "there is absolutely no relationship, as a rule, between the things shipped and the actual expenses of selling during a particular month."[13] His solution to this problem is to apply the same methods used in production cost accounting to the distribution function. He recommends that when marketing costs are incurred, they should be charged to an account entitled "Deferred Marketing Costs." These expenses will then be charged out of this account on the basis of a "per unit loading rate" when goods are actually shipped to the customer. With this approach, any over- or under-absorbed marketing expense at the end of the year is simply treated as a favorable or unfavorable variance.

The two other papers presented at the 1922 convention deserve at least passing notice because they serve to illustrate the wide range of approaches taken during the early development of distribution cost methodologies. James A. Reilly, an accountant with the American Writing Paper Company, presents an approach which seeks to include the cost of selling in the factory overhead rate.[14] Specifically, he suggests the inclusion of selling costs in the rate applied to direct machine hours. In this way the firm will be able to employ "the same method of accounting throughout the entire accounting system."[15] Reilly believes that it is impractical to allocate selling costs to sales districts or commodities since expenditures for particular districts or products invariably benefit other sales territories and commodities.

The final paper presented at the convention is significant because it appears to be the first suggestion that a return on investment analysis should be performed on product lines. Mr. R. H. Gregory, the comptroller of the Western Electric Company, strongly recommends the use of return on investment figures for product lines.[16] The major problem with such an approach is that an ROI calculation by product requires not only an allocation of costs but also a detailed allocation of assets to each product category. Gregory suggests that careful analysis of the accounting records will reveal reasonable bases upon which assets may be assigned to product lines. However, we find here, as in the allocation of marketing costs, that it is often difficult to identify rational bases of allocation.

Throughout the 1920s and on into the 1930s the interest in distribution cost accounting on the part of the NACA continued. The two publications of the association, the *NACA Yearbook* and the *NACA Bulletin,* carried many articles on the subject during this time period.* However, little that was new in terms of techniques or methodologies was added by the majority of these articles. Many were how-to-do-it approaches which simply described a particular method currently being used in a specific firm or industry.

The Department of Commerce Studies

During the 1930s, distribution cost analysis took a new direction as a result of the pioneering work by the Department of Commerce. Beginning in 1927, the Department's Bureau of Foreign and Domestic Commerce launched a study designed to improve the current methods of distribution cost analysis.[17] One of the participants in the project was Wroe Alderson, who was on the staff of the Department of Commerce from 1925 to 1934.[18] Alderson was largely responsible for the development of what has come to be known as the traditional approach to distribution cost analysis.** The work of Alderson and the Department of Commerce group is clearly the most important single contribution to the development of the field in the pre-1940 period. With only minor modifications, the basic approach developed by the Commerce Department is contained in many contemporary marketing and accounting textbooks.***

The Department began its study by carefully analyzing the profit and loss statements of a large number of firms in the wholesale and retail trade in an attempt to determine the relationship between the various distribution expense items and the firms' products and customers.[19] However, it was soon determined that it was necessary to use very arbitrary bases to allocate natural expense accounts to

*For a bibliography, see, Longman, pp. 259-68.

**See, for example, Alderson and Miller; Millard and Alderson; and Alderson and Haag. Apparently, the original idea for the methodology developed from a wholesale hardware firm which implemented a similar technique as early as 1918. See, Millard, p. 4.

***See, for example, Kotler, pp. 457-62; McCarthy, pp. 640-49; Stanton, pp. 548-51; Rayburn, pp. 98-125; Neuner and Deakin, pp. 499-521; Shillinglaw, pp. 396-419; Matz and Usry, pp. 704-16.

products and customers. As a result, attention was directed to the process by which the various costs were accumulated, and it was discovered that the costs of performing certain distribution activities tended to vary directly with the various types of products sold and customers served. These activities were grouped into "functions" on the basis of the degree of similarity of the cost variation with product and customer types. For example, Alderson, in an early study published by the Department, identifies three basic functions which are useful for cost allocation:[20]

1. Establishment or Maintenance—effort expended on commodities without reference to particular customers.
2. Contact—effort expended on customers without reference to particular commodities.
3. Movement—effort of assigning particular commodities to particular customers and therefore having direct reference to both.

Each of the three basic functions is associated with two major types of costs:

1. Establishment or Maintenance
   a. Investment cost—interest on merchandise owned, plus similar financial charges involved in carrying merchandise.
   b. Storage costs—the rent of warehouse and similar costs of maintaining the space required by inventory.
2. Contact
   a. Promotion costs—including all costs which partake of the nature of institutional advertising, covering in some instances costs not usually so classified such as a portion of sales effort and the prestige value of site.
   b. Reimbursement cost—including all effort involved in obtaining reimbursement for goods sold, whether a cash or credit system is followed.
3. Movement
   a. Handling cost—including all physical labor of getting the commodity to the customer and other costs arising directly in facilitating this flow of goods.
   b. Checking cost—including all phases of clerical and routine selling activity that are involved in determining what the customer wants and making sure that the order is filled.[21]

Once the various functional cost groups have been determined, the next step is to allocate the natural expense accounts contained in the general ledger to the functional groupings. The table on the following page is one which was used by Alderson to illustrate this process. Alderson states that in using this form "the accountant considers each of the customary expense items separately, dividing the total amount of each item into the parts that apply to the several functions and entering each amount so obtained in the appropriate column."[22] Some of the allocations can be made on a fairly rational basis. Wages and salaries, for example, can be allocated by determining each employee's total wage cost and allocating it to the function in which the employee is engaged. On the other hand, some expense items, taxes and insurance for example, may require somewhat arbitrary bases of allocation. In Alderson's view, "The selection of arbitrary factors calls for intimate knowledge of the business and a nicely balanced judgement."[23]

Once the ledger accounts are fully allocated to functional groupings, the next step is to allocate the functional totals to product or customer classes. Here we can see the real contribution of the Commerce Department approach. It is clear that costs which are classified by functions are easier to allocate than costs which are classified in natural accounts. For example, it is quite obvious that a reasonable basis for the allocation of the storage costs of a firm is the space occupied by each product class. It would be much more difficult to find appropriate allocation bases for all of the components of the storage function if they were classified in their natural groupings. The key to this step of the analysis is the identification of "appropriate units of measurement for the sort of work performed in the process of carrying on each activity."[24] These units of measurement may then serve as bases of allocation.

Throughout the 1930s and 1940s the Commerce Department continued to publish distribution cost studies.* Although these studies expanded upon the original work which was done in the late twenties, the basic methodology remained the same. The Department's studies became the most widely known and influential studies in the distribution cost area. The essence of the Aldersonian approach, the two-step allocation to functions and then to products or customers, became the model for many future studies in the field. From an historical standpoint, the significant contribution of these studies was that they clearly showed that the straight applica-

*For a bibliography, see Sevin, pp. 55-56.

Natural Account Allocation

Customary Expense Accounts	Totals	FUNCTIONAL-COST GROUPS							
		Storage	Inventory Investment	Physical Handling	Order Routine	Promotional Selling	Advertising	Credit Routine	Collections
Salaries and wages	27,100	2,000	—	5,000	3000	10,100	2000	2000	3,000
Interest	700	70	600	20	5	—	—	5	—
Rent	5,700	4,500	—	200	200	200	200	200	200
Delivery	19,500	—	—	19,500	—	—	—	—	—
Sales expense	28,200	—	—	—	2000	22,600	3600	—	—
Insurance	1,500	1,200	—	150	20	100	—	10	20
Taxes	3,000	2,000	200	600	20	120	10	10	40
Office supplies, postage, etc.	3,400	600	—	400	1000	400	400	500	100
Depreciation	700	400	—	200	5	75	—	5	15
Bad debts	5,700	—	—	—	—	—	—	—	5,700
Heat, light, etc.	1,400	800	—	200	200	25	25	125	25
Telephone, telegraph	300	—	—	50	100	100	25	—	25
Collections	1,500	—	—	—	—	—	—	—	1,500
Miscellaneous	1,300	100	—	200	200	200	200	200	200
Totals	100,000	11,670	800	26,520	6750	33,920	6460	3055	10,825

Table 1: Source — R. S. Alexander, Frank M. Surface, Robert F. Elder and Wroe Alderson, *Marketing* (New York: Ginn & Co., 1940), p. 576.

tion of production cost accounting techniques was inappropriate in the marketing area.

Pre-War Landmarks

In the years 1940 and 1941, three books were published which were landmarks in the development of distribution cost analysis. The first, published in 1940, was J. Brooks Heckert's *The Analysis and Control of Distribution Costs.*[25] Later editions of *Distribution Costs* with Robert B. Miner as co-author became classics in the field of distribution cost accounting.[26]

Also in 1940, Alexander, Surface, Elder, and Alderson published their book entitled *Marketing.*[27] The significance of this book is that it is the first marketing textbook to contain a detailed description of the traditional approach. Chapter 23, which was written by Alderson, gives a detailed outline of the Commerce Department approach.

The third important work to be published at this time was Donald R. Longman's *Distribution Cost Analysis.*[28] As with Heckert's book, later editions of *Practical Distribution Cost Analysis* with Michael Schiff became classics.[29] Both Longman's and Heckert's work were standard reference books in the area for many years. Together they are probably the best examples of the traditional approach to distribution cost analysis. This is true despite the fact that Longman's book is something of a reaction against many of the methods employed in the traditional approach. However, Longman's criticisms of the traditionalists do not reflect fundamental conceptual differences. He is more concerned with improving certain aspects of contemporary cost analysis methods rather than attempting to develop an entirely new approach.

Longman's main contribution was to identify and attempt to correct some of the problem areas in the field. Heckert, on the other hand, was more important as a popularizer of the traditional methodologies. Heckert's work was essentially a how-to-do-it approach to distribution costing. Little in his book was new, but it was well written and very easy to understand. One could easily use Heckert's book as a guide to implementing a distribution costing system.

Finally, the field of distribution cost accounting owes a great deal to Wroe Alderson. Alderson, of course, was primarily responsible for the development of the traditional approach. In addition, his role is significant because he helped make the marketing and accounting professions aware of the nature and importance of distribution cost analysis. Alderson was convinced that accurate distribution cost data were important tools for marketing decision making. He believed that their proper role was that of a supplement to "managerial judgement." As he stated in 1940, distribution cost analysis "must remain in its proper sphere—that of affording a factual background against which that judgement can be exercised intelligently. It will pay rich dividends to the business whose executives use it consistently in this manner."[30]

FOOTNOTES

[1]Church, 1901, pp. 367-76.
[2]Church, 1908.
[3]Church, 1908, p. 100.
[4]Church, 1908, pp. 111-12.
[5]Church, 1908, p. 106.
[6]Church, 1908, p. 108.
[7]Frazer, pp. 25-43.
[8]Frazer, p. 31.
[9]Frazer, pp. 31-32.
[10]Basset, pp. 103-15.
[11]Longman, p. 65.
[12]Castenholz, pp. 127-40.
[13]Castenholz, p. 127.
[14]Reilly, pp. 143-50.
[15]Reilly, p. 147.
[16]Gregory, pp. 116-26.
[17]Alexander, et al., p. 573 and Millard.
[18]Smith, p. 64.
[19]Longman, p. 50.
[20]Millard and Alderson, pp. 40-49.
[21]Paton, p. 1335.
[22]Alexander, et al., p. 571.
[23]Alexander, et al., pp. 572-73.
[24]Alexander, et al., p. 576.
[25]Heckert, 1940.
[26]Heckert and Miner, 1953.
[27]Alexander et al.
[28]Longman, 1941.
[29]Longman and Schiff, 1955.
[30]Alexander et al., p. 593.

BIBLIOGRAPHY

1. Alderson, Wroe and Frederick Haag, Jr., *Problems of Wholesale Electrical Goods Distribution*, U.S. Department of Commerce, Washington, D.C., 1931.
2. Alderson, Wroe and Nelson A. Miller, *Problems of Wholesale Dry Goods Distribution*, U.S. Department of Commerce, Washington, D.C., 1930.
3. Alexander, R. S., et al., *Marketing*, Ginn and Co., New York, 1940, pp. 569-93.
4. Anderson, Paul F., "The Development of Distribution Cost Analysis Methodologies, 1901-1941," in *Collected Papers of the American Accounting Associa-*

tion's Annual Meeting, American Accounting Association, Sarasota, FL, 1978, pp. 505-30.
5. Basset, William R., "Sales and Administrative Costs," *NACA Yearbook,* National Association of Cost Accountants, New York, 1922, pp. 103-15.
6. Castenholz, William B., "The Application of Selling and Administrative Expense to Product," *NACA Yearbook,* National Association of Cost Accountants, New York, 1922, pp. 127-40.
7. Church, A. Hamilton, *The Proper Distribution of Expense Burden,* The Engineering Magazine, New York, 1908.
8. Church, A. Hamilton, "The Proper Distribution of Establishment Charges," *The Engineering Magazine,* December, 1901, pp. 367-76.
9. Frazer, George E., "The Pro-rating of Distribution Expense to Sales Orders," *Journal of Accountancy,* January, 1912, pp. 25-43.
10. Gregory, R. H., "Cost of Distribution," *NACA Yearbook,* National Association of Cost Accountants, New York, 1922, pp. 116-26.
11. Heckert, J. Brooks, *The Analysis and Control of Distribution Costs,* The Ronald Press Co., New York, 1940.
12. Heckert, J. Brooks and Robert B. Miner, *Distribution Costs,* The Ronald Press Co., New York, 1953.
13. Kotler, Phillip, *Marketing Management,* 3rd ed., Prentice-Hall, Englewood Cliffs, NJ, 1976.
14. Longman, Donald R., *Distribution Cost Analysis,* Harper and Brothers, New York, 1941.
15. Longman, Donald R. and Michael Schiff, *Practical Distribution Cost Analysis,* Richard D. Irwin, Homewood, IL, 1955.
16. Matz, Adolph and Milton F. Usry, *Cost Accounting,* 6th ed., South-Western Publishing Co., Cincinnati, OH, 1976.
17. McCarthy, E. Jerome, *Basic Marketing,* 6th ed. Richard D. Irwin, Homewood, IL, 1978.
18. Millard, J. W., *Analyzing Wholesale Distribution Costs,* U.S. Department of Commerce, Washington, D.C., 1928.
19. Millard, J. W. and Wroe Alderson, *Costs, Markets and Methods in Grocery Retailing,* U.S. Department of Commerce, Washington, D.C., 1931.
20. Neuner, John J. W. and Edward B. Deakin, III, *Cost Accounting,* Richard D. Irwin, Homewood, IL, 1977.
21. Paton, W. A., et., *Accountants Handbook,* 2nd ed., The Ronald Press Company, New York, 1934.
22. Rayburn, Gayle L., *Financial Tools for Marketing Administration,* AMACOM New York, 1976.
23. Reilly, James A., "Sales and Administrative Costs," *NACA Yearbook,* National Association of Cost Accountants, New York, 1922, pp. 143-50.
24. Sevin, Charles H., *Distribution Cost Analysis,* Economic Series No. 50, U.S. Department of Commerce, U.S. Government Printing Office, Washington, D.C., 1946.
25. Shillinglaw, Gordon, *Managerial Cost Accounting,* 4th ed., Richard D. Irwin, Homewood, IL, 1977.
26. Smith, Wendell R., "Leaders in Marketing—Wroe Alderson," *Journal of Marketing,* January, 1966, p. 64.
27. Stanton, William J., *Fundamentals of Marketing,* 5th ed., McGraw-Hill Book Company, New York, 1978.