ACCOUNTING CONSEQUENCES OF PHYSICAL DISTRIBUTION SYSTEM CHANGES

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
Ronald John Lewis
1965

THESIS

This is to certify that the

thesis entitled

ACCOUNTING CONSEQUENCES OF PHYSICAL DISTRIBUTION SYSTEM CHANGES

presented by

RONALD JOHN LEWIS

has been accepted towards fulfillment
of the requirements for

Doctor of Philosophy degree in Accounting

Gardner M. Jones
Major professor

Date July 26, 1965

O-169

ABSTRACT

ACCOUNTING CONSEQUENCES OF PHYSICAL
DISTRIBUTION SYSTEM CHANGES

by Ronald John Lewis

This thesis concerns the procedural effects and financial implications that a change in the physical distribution system has on the accounting system of a company. The term "physical distribution" refers to the marketing concept encompassing the activities involved in servicing demand, such as warehousing, transportation, material handling, packaging, inventory management and order processing.

The evidence collected consists mainly of three case studies. The first traces the procedural, financial and auditing effects on the accounting system from a change in the warehousing system of one division of a large Midwestern company.

The other two, representing changes in the transportation system and in the channel of distribution, point out how traditional accounting practices failed to provide the distribution manager with the total cost information he needed to control his activities. Improvements in a physical distribution system are frequently reflected, by traditional accounting practices, as apparent changes in net sales or in

production costs, rather than in distribution costs. Thus, the production manager's costs may have been reduced, or the sales manager's net sales may have increased, through an improvement made by the physical distribution manager. Credit for the improvement then falls upon the beneficiaries rather than upon the originator. The physical distributionists are determined to make accountants aware of these procedural and conceptual deficiencies.

The conclusions of this research project are:

1) There are unique, identifiable accounting implications and responsibilities in the functional marketing area of physical distribution within the general area of distribution cost accounting.

2) The recognition of physical distribution as an unique marketing concept by marketing executives and academicians demands a corresponding response from accounting executives and academicians.

3) There is a decided lack of awareness by accounting management, public accountants and academic accountants of the informational needs of the executives responsible for physical distribution activities. In the firms studied the accounting departments did not appear to be cognizant of the

physical distribution concept.

Among the six public accounting firms contacted not one was able to produce a change in the physical distribution system which they felt had accounting consequences. And the literature produced by academic accountants includes few specific references to the physical distribution problems referred to in this study.

4) The change in warehousing, inventory control and order processing systems resulted in the following procedural, financial and auditing effects on the accounting system:

a) Billing and invoicing, accounts receivable collection and inventory control methods were modified.

b) The costs of carrying inventory and accounts receivable were reduced.

c) Cash flow was considerable accelerated.

d) The role of the computer was substantially increased.

e) Some auditing procedures were affected.

Certain types of changes in physical distribution systems are more likely to produce procedural effects in

accounting systems, whereas other types will probably produce financial effects. For example, a change in order processing may affect invoicing and accounts receivable procedures. Materials handling equipment changes, however, will have financial effects rather than procedural effects.

5) The accounting system changes resulting from changes in the physical distribution system did not reflect any incremental conceptual understanding by the accounting departments. In each case studied the desired changes in accounting systems which indicate a conceptual understanding have been initiated by the physical distribution people.

6) With a few modifications of existing practices accountants could provide distribution managers with the total cost control data that they require. These modifications should include:

a) Improvements in the determination of bases and the methods of allocating costs for analytical purposes to physical distribution activities.

b) A reclassification of in-plant physical distribution accounts which are presently classified as production accounts.

c) A modification of the income statement to reflect the above reclassifications.

Implications of this study indicate that further research could be initiated concerning: (1) the auditing consequences of a distribution system change, and (2) the justification of price differentials which come under the scrutiny of the Robinson-Patman Act.

Also it is concluded that accountants have an opportunity from this challenge to enhance their professional stature.

ACCOUNTING CONSEQUENCES OF PHYSICAL DISTRIBUTION SYSTEM CHANGES

By

Ronald John Lewis

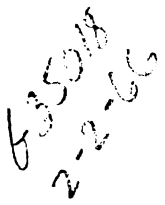
A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Accounting and Financial Administration

1965



ACKNOWLEDGEMENTS

Several people have contributed suggestions, ideas, time and skills to assist me in this endeavor. I would like to mention those who have given special guidance and made extraordinary contributions to this research.

The dissertation committee included:

Dr. Gardner M. Jones, Professor of Accounting, chairman of the committee, who adroitly directed my research efforts. His sincerity and personal interest from beginning to end are particularly appreciated.

Dr. Richard J. Lewis, Assistant Professor of Marketing and Transportation and Research Associate of the Bureau of Business and Economic Research, whose inspiration and fertilization of latent ideas were especially helpful, and are appreciated.

Dr. Edward W. Smykay, Professor of Marketing and Transportation, whose constructive suggestions and knowledge of the marketing aspects of the topic were indispensable.

Next, I wish to thank:

Mr. Kenneth Hessler, Manager, Distribution Research, International Minerals and Chemical Corporation, for his

enthusiastic cooperation in providing data and other information. Also, my appreciation goes to representatives of the other companies, who though preferring to remain anonymous, contributed valuable data to the study.

Finally, my gratitude is expressed to my wife, Margie, who provided typing and illustrative skills and who participated in the many anxieties associated with the task.

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Symptoms of the Need for the Study

Historical concentration by accountants and industrial engineers on production costs has resulted in detailed cost control and planning in production. In spite of a rising emphasis on marketing and product distribution, there is a paucity of accounting emphasis on the subject of physical distribution costs, both in practice and in accounting literature. Some attention has been given by accountants to selling costs, but conventional accounting methods and procedures do not provide adequate differentiation of costs under the jurisdiction of physical distribution management. There is little evidence of an effort by accountants to provide the information necessary to identify and isolate these physical distribution costs for centralized management and control. The lead in cost analysis has been taken by physical distribution specialists themselves.

Executives and academicians in the field of physical distribution have expressed a desire for the provision by

accountants of the data necessary to control and manage the costs of their activities. They have moved into cost analysis only by default. Specific references to this deficiency in current accounting concepts and procedures include the following remarks.

H. G. Miller, Distribution Manager, Diamond Crystal Salt Company, writes, "Traditional accounting methods tend to hide true distribution costs, create illusory savings and relocate costs rather than reduce them."[1]

Donald W. Drummond, Vice President, Olin Mathieson Chemical Corporation, compares the most commonly used method of accounting for physical distribution costs with a new method which he has devised. The purpose of his device is to pinpoint more precisely the costs which are the responsibility of the physical distribution managers. He comments, "The accounting department is generally working to the advantage of everyone except the marketing department. Only if this service function can be more fully utilized by this department (marketing) can their full contribution to profits be realized."[2]

---

[1]H. G. Miller, "Accounting for Physical Distribution," Transportation and Distribution Management, December, 1961, p. 7.

[2]Donald W. Drummond, "A Marketing Yardstick," Transportation and Distribution, February 1962, p. 13-16.

Richard J. Lewis, Assistant Professor, Michigan State University, points out several aspects of this accounting deficiency in his unpublished doctoral dissertation.[3] Dr. Lewis suggests that the conventional methods used in accounting for distribution costs ignore the geographical variability of costs. He asserts that by allocating total costs to the various activities of marketing on the basis of standards or standard costs, rather than building up the individual charges at the source of their incurrence, the accountant is completely ignoring the variability of marketing costs due to locational differences. He applies this hypothesis to the area of physical distribution and provides geographic cost control units for the accumulation of costs at their origin.

Edward W. Smykay, Frank H. Mossman and Donald J. Bowersox contribute to this same argument. Speaking of averages, such as those applied by standard cost techniques used in distribution cost analysis, they state, "If .... variations within the average are neglected, then a standard uniform cost is assessed against all geographic

---

[3]Richard J. Lewis, "A Business Logistics Information and Accounting System for Marketing Analysis." Unpublished doctoral dissertation, Michigan State University, 1964.

markets. Neglecting the variations of spatially separated markets will mean that no market is accurately measured as to the precise cost of servicing it."[4]

These are examples of executives and academicians in the field of physical distribution who are pointing to an area of serious deficiency in distribution cost accounting procedures and methods. Although accountants have definitely recognized some of the deficiencies in distribution cost accounting they have not indicated an awareness of the uniqueness of the physical distribution function and its demands for greater cost control. The foregoing references are presented as symptoms of the need for research on this subject.

Setting for the Study

Distribution Cost Accounting

Accounting for distribution costs has been the subject of accounting literature since at least 1926 when J. R. Hilgert's book, Cost Accounting for Sales was published. In 1927, four articles were published in the Accounting Review, one by Professor William Paton, on the subject of

---

[4]Edward W. Smykay, Frank H. Mossman, Donald J. Bowersox, Physical Distribution Management, New York: The Macmillan Company, 1961, p. 77.

distribution costs.

"Distribution costs" as used in accounting textbooks and in most other literature mean marketing costs. Marketing embraces two basic functions: the obtaining of demand for the product or services of a company and the servicing of that demand. Costs of obtaining demand include advertising, personal selling, merchandising, sales promotion and market research. Costs of servicing demand include warehousing, transportation, order processing, inventory holding costs, and customer servicing costs.

The definition of marketing functions by Longman and Schiff refers to the activities performed rather than to the goals of these activities. "A marketing function is an activity that is performed because it is individually necessary to business operation under existing policies (the plan of operation), not merely incidental to other activities, and that encompasses work of the same general kind."[5]

Marketing textbooks refer to these functions of obtaining and servicing demand in the broader social and

---

[5]Donald R. Longman and Michael Schiff, Practical Distribution Cost Analysis, (Homewood, Ill.: Richard D. Irwin, Inc., 1955, p. 107.

economic sense. The difference in accounting literature treatment versus marketing literature treatment of the functions is analogous to the accounting controversy over accounting postulates, principles, concepts, practices, methods and other similar terms. Although ostensibly insignificant, differences in the underlying conceptual framework may be the key to criticisms, by physical distribution writers, of unconventional accounting for distribution costs.

The recognition of the uniqueness of physical distribution as an integration of several different components of marketing is relatively recent. The treatment of the components separately dates back to the nineteenth century. Transportation, plant location, and inventory management have been taught as parts; now they are thought of as one whole.

Accounting for physical distribution costs has not yet been recognized in accounting literature apart from its inclusion in distribution costs. As far as can be determined, concern for the control of physical distribution costs has been voiced mainly in the marketing journals and books.

Critics of Distribution Cost Accounting

Several practitioners in the field of physical distribution have deprecated the concepts and procedures in current use in accounting for physical distribution costs. The main criticism hinges on the observation that current accounting practices are not adapted to the functional isolation of physical distribution costs. Since the emergence of physical distribution as an unique, identifiable organizational and functional concept is of recent origin, there is a lag in the recognition by the accounting field of the cost control implications of this concept.

In its burden of already attempting to satisfy many masters, accounting is reluctant to reshuffle its accounts without considerable persuasive evidence. The physical distributionists must first persuade top management of the need for better cost control. If this is accomplished perhaps accountants will make adjustments to satisfy the physical distributionists.

Critics such as H. G. Miller and Donald W. Drummond would make it a general accounting problem by asking for changes in the account classifications and the financial statements.

They contend that the customary accounting treatment

of distribution costs does not provide adequate information for the control of these costs. Accounting procedures are designed to serve the needs of financial officers, inventory valuation, the S.E.C., and tax officials, often with disregard for important internal control functions. Managers responsible for physical distribution costs are usually not provided with the figures they need to make enlightened decisions.

The criticism should not rest entirely upon accountants, however; all too frequently managers of distribution and of other functional areas cannot tell the accountants what it is they want; they only know that they are not happy with the accounting data that comes to them. Or they are not willing to undergo the burden of the detailed data-gathering which is necessary to produce useful accounting information for control.

Statement of Objectives

A range of unanswered questions is symptomatic of the need for research in this subject. The following questions lead directly to the setting of objectives for such a research study.

(1) Within the general subject area of distribution cost accounting are there unique, identifiable accounting

implications and responsibilities in the functional marketing area of physical distribution?

(2) Does the recognition of physical distribution as an unique marketing concept by marketing executives and academicians demand a corresponding response from accounting executives and academicians?

(3) Is there an awareness by the firm's accounting management, public accounting firms and academic accountants of the informational needs of the executives responsible for physical distribution activities?

(4) What actually occurs in the accounting system of a company which has substantially altered its physical distribution system? What are the procedural and financial effects and implications?

(5) Are there attempts to satisfy the informational needs of the distribution manager as evidenced by the modifications in the accounting system accompanying the changes in the physical distribution system?

(6) What can be done by accountants to satisfy the criticisms of physical distributionists and to provide them with total cost control?

In the preliminary research done on this subject these and similar questions are raised. In an attempt to answer

them, the objectives of the study stated below will be pursued:

(1) To attempt to clarify definitions and summarize for the reader the meaning of the physical distribution concept, as it has been conceived by the marketing people and as it is understood by the accounting profession. (This is done in Chapter Two).

(2) To examine thoroughly the accounting practices and responsibilities in the area of physical distribution costs; and to assess the awareness of accounting executives, public accountants and academic accountants of the cost informational requirements of the physical distribution managers. (This is attempted in Chapter Three).

(3) To trace the effects of a substantial change in the physical distribution system of a business on its accounting system; and to determine by the actual effects on the accounting system if there were significant procedural modifications and if there were important financial requirements alterations caused by the change in the physical distribution system. (This is the purpose of Chapter Four).

(4) To offer a response to physical distribution executives and academicians who have challenged the adequacy of the cost information provided them by accountants; and

to suggest how the accounting profession might respond to this critical need. (This is done in Chapter Five).

Methodology - Case-Studies

The purpose of the case-studies is to examine the effects of a major or minor change in a firm's physical distribution system on its accounting system. The impact on the accounting system could range from no significant effects to major procedural and financial consequences. It is intended in this project to examine the actual changes that have taken place in the physical distribution and accounting systems of three Midwestern companies.

The first case study will involve a single product marketed to the ultimate consumer. The company recently made major changes in its method of distributing this product to its customers. The decision to modify the physical distribution system was provoked by symptoms of both structural and financial deficiencies. The subsequent extensive revision of the physical distribution system was implemented to correct these deficiencies. The other two case-studies point out accounting practices which obscure physical distribution costs.

It is intended that the following questions will be answered as a result of these case-studies:

1. What was the role of accounting personnel in effecting the changes?

2. What changes in accounting procedures were brought about by the physical distribution changeover?

Eg. a) billing and order system

b) accounts receivable

c) inventories

3. What were the financial implications of the changeover?

Eg. a) cash flows and working capital

b) interest on receivables

c) carrying cost of inventories

4. What changes in the use of the electronic accounting devices were made?

5. Do traditional accounting practices tend to obscure costs under the control of the distribution manager?

6. Were any changes in the traditional concepts of reporting physical distribution costs made? That is, was there recognition by the accounting department of the need for isolation of those costs assignable to the physical distribution function, but not conventionally reported to facilitate such isolation?

The answers to these questions will be the localized

goal of the case-studies. It is not likely that sweeping generalizations will result from this type of study. The implications, however, may serve as evidence for further survey-type research.

CHAPTER II

THE PHYSICAL DISTRIBUTION CONCEPT

Marketing Definitions and Interpretations of "Physical Distribution"

It is necessary for the purposes of this report to clearly define physical distribution since there are some inconsistencies in the use of the term in marketing literature. In accounting literature the term suffers from lack of use in addition to some misuse.

In 1948, the American Marketing Association formulated an official definition for physical distribution: "The movement and handling of goods from the point of production to the point of consumption or use."[1] The interpretation of this definition can be gleaned from subsequent definitions found in marketing literature.

> "Physical distribution refers to the integration of all aspects of physically handling, storing, and transporting goods on their way to the market."[2]

---

[1] Definition Committee of the American Marketing Association. "1948 Report." The Journal of Marketing, October, 1948, p. 202.

[2] William Lazer, "A Systems Approach to Transportation," Distribution Age, September, 1960, p. 34.

> "Physical distribution can be broadly defined as that area of business management responsible for the movement of raw materials and finished products and the development of movement systems."[3]

> "Those functions involved in the physical movement of goods from the end of the manufacturer's production line into the buyer's point of use. The concept includes materials handling, packaging, storage and all transportation costs. It does not include selling or purchasing. It does cover both the inbound movement of raw materials and supplies and the outbound movement of products."[4]

> ".... The concern of physical distribution is the inbound movement of raw materials through a production unit, followed by an outbound movement through established channels to consumers. The key function of physical distribution is movement. Physical distribution is the planned movement of materials and products."[5]

These definitions interpret and perhaps expand the A.M.A. definition to include both movement of supplies and materials to a given firm and movement of finished products from the firm to its customers.

Another interpretation, although it forms a substantial contribution to the concept of physical distribution,

---

[3]Edward W. Smykay, Frank H. Mossman, Donald J. Bowersox, Physical Distribution Management, (New York: The Macmillan Company, 1961), p. 1.

[4]H. G. Miller, "Accounting for Physical Distribution," Transportation and Distribution Management, December, 1961, p. 6.

[5]Eugene Landis, "Marketing Management and Distribution Planning," Transportation and Distribution Management, July, 1962, p. 18.

changes the semantics used in the original definition. One set of authors has merely renamed the above concept of physical distribution, "business logistics." Their definition is as follows:

> "Business logistics will ....refer to the management of all activities which facilitate movement and the coordination of supply and demand in the creation of time and place utility in goods."[6]

They claim economic justification for this terminology (referred to as a new concept) in the need for distinguishing between the inflow of supplies and materials (which they call "physical supply"), and the outflow of products beyond the production facility (which they term "physical distribution.")[7] Just as a sale by one business entity is a purchase by another entity so physical distribution by one firm represents physical supply to another.

It is not within the scope of this report to discuss the relative merits of the use of relevant terms, but to establish the meanings intended herein. Thus, the term, "physical distribution," is intended to encompass movement both to and from a given firm. It is equivalent to the term

---

[6] J. L. Heskett, Robert M. Ivie and Nickolas A. Glaskowsky, Jr., Business Logistics Management of Physical Supply and Distribution, (New York: The Ronald Press Co., 1964), p. 21.

[7] Ibid.

"business logistics" used by the latter authors, rather than their use of the term "physical distribution." The terms "physical distribution" and "logistics" will be used synonymously herein. (See Figure 1).

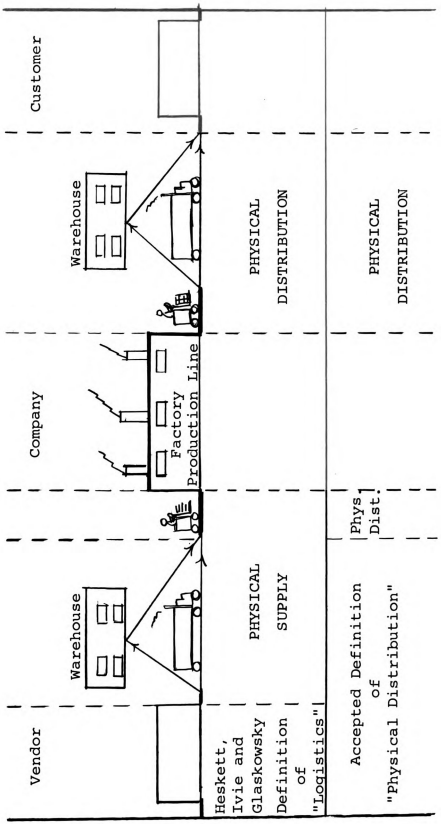
Development and Present Status of Physical Distribution Concept

The understanding of the concepts of physical distribution as an integrated body of marketing functions or activities is in its infant stages. Marketing writers have contributed to some confusion in the terminology. Business management has been slow in implementing needed organizational changes. Accountants have failed to recognize the need for cost control and analysis information beyond conventional distribution cost analysis.

These handicaps may be traced to the fact that some of the components of physical distribution have been treated separately since the nineteenth century. Plant location theory dates back to the early German writers, such as von Thunen and Weber. Transportation and warehousing are subjects in early marketing literature. Organizational patterns have long been established for separate control of these components. Assignment of responsibility has been spread in varying ways to different levels of management, both

FIGURE 1

COMPARISON OF "PHYSICAL DISTRIBUTION" AND
"LOGISTICS" DEFINITIONS



vertically and horizontally. Relationships among the components have been obscured by the established organizational framework.

Since World War II there has been increasing recognition of the uniqueness of physical distribution; and presently there is an accelerating awareness of the importance of the integrated approach to physical distribution analysis.

The present stage of business development emphasizes systems of internal control over operations based on mathematical and analytical methods.[8] Unlike the other side of marketing, demand obtaining activities such as direct selling and advertising, physical distribution activities are more easily quantified and subjected to mathematical analysis. Accounting for distribution costs has been hampered by the difficulties in determining bases for allocation and in developing standards for cost control and cost analysis. It has been recognized by many accountants that most of the difficulties apply to the demand-obtaining rather than to the demand-servicing activities. In this respect, physical distribution activities are more like the production activities than they are like the demand obtaining activities of marketing. H. G. Miller states that physical distribution

---

[8]Smykay, Mossman and Bowersox, Chapter 1.

functions, while divided managerially and physically, have closely interrelated cost implications. These functions, material handling, packaging, traffic, transportation, inventory control, terminaling and warehousing, are more closely related than production and sales as centers of cost. They connect geographically and temporally the span between the production line and the customer.[9]

It is important to stress that although failure to adjust organizational structure to new managerial demands is a severe handicap, it is the understanding of the new concept which is most imperative.

> "....we would venture to say that many companies which are not 'organized' for physical distribution management - either by chart or by use of the term - are in fact doing a first-rate physical distribution job because they understand the function, while other companies with beautifully drawn charts encompassing a physical distribution hierarchy are falling down on the job because they still haven't learned what physical distribution is all about."[10]

The Function and Activities of Physical Distribution

Use of the term "function" by authors of distribution cost accounting texts and articles has been subjected to

---

[9]Miller, p. 6.

[10]Editorial, "Organization vs. Function in Physical Distribution Management, "Transportation and Distribution Management, February, 1962, p. 3.

criticism by some marketing writers. For example, the definition of marketing functions by Longman and Schiff refers to the activities performed rather than to the goals of these activities, i.e., what the job is that is getting accomplished through the activities.

> "A marketing function is an activity that is performed because it is individually necessary to business operation under existing policies (the plan of operation), not merely incidental to other activities, and that encompasses work of the same general kind."[11]

Dr. Richard J. Lewis in his unpublished doctoral dissertation states in reference to this usage of the term:

> "....it is unfortunate that the breakdown of natural accounts to the various marketing activities has been termed functional cost analysis. The use of the term function to describe the activities of marketing is not consistent with the nature of distribution costs presented earlier in the chapter (Chapter III) where obtaining and servicing demand were listed as the functional costs of marketing."[12]

Professor Lewis emphasizes that there are two basic functions of marketing: obtaining demand for the products or services of a firm, and servicing and supplying this

---

[11]Donald R. Longman and Michael Schiff, Practical Distribution Cost Analysis, (Homewood, Illinois: Richard D. Irwin, Inc.), 1955, p. 107.

[12]Richard J. Lewis, "A Business Logistics Information and Accounting for Marketing Analysis." Unpublished doctoral dissertation, Michigan State University, 1964, p. 80.

demand. Personal selling, advertising, sales promotion, merchandising, and market research are activities the function of which is to "....make the customer aware of his needs and desires, demonstrate how the company's goods and services are the best need satisfiers available in the market place, and provide information to continually adjust the products and demand-inducing forces to changes in the market place."[13]

Warehousing, inventory (management), transportation and order processing and handling are activities the function of which is to "....coordinate supply with demand for its (the firm's) products and services. The coordination requires that the firm have the right products in the right place at the right time."[14]

What are the activities of physical distribution? Although different authors may assign different names to the same activity it should be possible to ascertain the activities which perform the function of physical distribution, i.e., servicing and supplying demand.

In order to accomplish this task the activities given by several marketing authors will be listed and compared.

---

[13] Ibid., p. 63.

[14] Ibid.

Those activities included by Professor Lewis have already been noted above:

warehousing
inventory (management)
transportation
order processing and handling

The activities included by Heskett, Ivie and Glaskowsky are:[15]

Movement Control

traffic and transportation
warehousing
materials handling

Demand - Supply Coordination

order processing and information flow
inventory management
supply scheduling

Smykay-Bowersox-Mossman do not list the activities as such, but would include all of the above by implication of their chapter content.

H. G. Miller includes:

material handling
packaging
traffic and transportation
inventory control
terminaling and warehousing[16]

Eugene Landis provides a list of physical distribution

---

[15]Heskett, Ivie and Glaskowsky, p. 22.

[16]Miller, p. 8.

functions (activities) which he calls just a starter.

traffic and transportation
warehousing
inventory control
order processing
material handling
production control
sales planning[17]

The variation in these descriptions of physical distribution activities is an indication that there are inherent semantic deterrents to defining a general all-purpose set of distribution activities. There are some activities such as traffic and warehousing which are unequivocally included in the serving of the logistics function, whereas there are others which may vary with the varying characteristics of different industries.

Organization of the Physical Distribution Function

It is not surprising that the organization of physical distribution activities is less well developed than its counterparts in finance and production and in the other half of marketing. The concept of physical distribution is still in its infant stages in many areas of business. Even when the concept is acknowledged by executives the implementation of organizational modifications meets resistances both of a

---

[17]Landis, p. 18.

human and structural nature. Each firm must be analyzed according to its particular needs and characteristics in the establishment of its organizational lines. No two firms are exactly alike in their organizational requirements. "Experience has shown that of the many companies which have embraced the idea of creating a distribution department or division, each has done so in quite an individual manner."[18]

Heskett-Ivie-Glaskowsky suggest guidelines for the appropriate organization of the logistics activities by asking these questions:

"1. Are the logistics activities in the firm of sufficient importance to warrant or require their formal organization at one or more places in the company's organization structure?

2. What activities logically might be included in a formally organized logistics function in this company? Which ones should be?

3. What should be the internal organization of the logistics function? What activities should be identified and groups as its sub-functions? What should be the authority relationships among these sub-functions?

---

[18] Ibid., p. 16.

4. What should be the position and relationships of logistics function relative to other functions in the firm?"[19]

One indicator of the importance of the logistics activities is their absolute and relative costs. The authors state: "There is only one meaningful standard: relative to other functional cost categories (e.g., production, advertising, public relations), does logistics 'rate' in this firm as a function warranting separate organization recognition from the standpoint of costs?"[20]

The other indicators are: the size of the firm, customer service standards, nature of the product and raw materials, whether goods are produced to order or for stock, the pricing policy of the company, and the structure of the shipping mix.

The second series of questions asks what activities would be included in the logistics function. There are activities which are readily identified with the physical distribution function: traffic warehousing, order processing, inventory maintenance, movement and production scheduling and others. There are nevertheless some

---

[19]Heskett, Ivie and Glaskowsky, p. 480.

[20]Ibid., p. 484.

activities which will not always require the same organizational treatment; and even those listed above, though conceptually they belong in logistics, may in practice more effectively be placed under other organizational jurisdiction.

The authors summarize that a desirable organizational plan is one that provides for and lubricates the machinery for proper use of specialist skills, coordination of tasks of managerial supervision, and effective planning.

The rest of the series of questions on the internal sub-functions and relationships can be answered by applying conventional management criteria such as deciding on the span of management, delegation of authority, authority relationships, and centralization or decentralization.

Mellman and Schiff's study to examine and evaluate the practices of a selected group of twenty-eight large companies (twenty-two of which were listed by Fortune Magazine in the top 500 manufacturing firms in 1960) reveals the variability in the organization of physical distribution activities. The study concerned physical distribution only incidentally as a part of the whole marketing picture but some salient implications for physical distribution were revealed. They developed a list of the range of marketing activities

assigned to the marketing department.[21]

1. Marketing Administration
2. Marketing Research
3. Product Administration
4. Personal Selling
5. Advertising
6. Sales Promotion
7. Physical Order-filling (warehousing, packaging and shipping, delivery)
8. Order Processing and Billing (clerical)
9. Credit and Collections

Few companies assigned all of these activities to the marketing department. Several firms assigned the last three elsewhere.

In the new marketing concept new activities such as product planning, production scheduling, inventory control and pricing have been added to marketing responsibility.

"Seldom noted is a concurrent reduction in one responsibility which is normally considered to be a part of marketing. This relates to physical distribution of goods which includes order handling, inventory control, shipping, loading, packing, traffic, receiving, warehousing and materials handling."[22]

Dividing responsibility between marketing and manufacturing has created problems. Five of the companies

---

[21]Michael Schiff and Martin Mellman, Financial Management of the Marketing Function, (New York: Financial Executives Research Foundation, 1962), p. 11.

[22]Ibid., p. 18.

studied established a separate physical handling department, but with varying practices of organization.

In a kind of ideal-type organization proposed by the authors, the order-filling activities would be assigned to manufacturing while the order processing and billing would be assigned to the accounting department. This represents the most typical method of handling physical distribution costs.[23]

To show the variations in the actual practices, six firms selling similar products to similar markets were selected from the twenty-eight. The order-filling activities were found to be handled in three different ways. The most frequent practice used by three companies, was to assign these activities to the manufacturing department, as in the model referred to above. One firm assigned the responsibility for field warehousing and order filling to the district sales manager and shipping at the plant site to the marketing vice-president. The remaining two firms assigned the bulk of the physical distribution activities to a separate unit reporting directly to the president.

Perhaps the most significant attempt to establish the

---

[23]Ibid., p. 12.

specific activities and responsibilities of the physical distribution function is the 1962 T&DM study of 50 firms with formally organized physical distribution departments.[24] The study covered only companies having either a "Distribution Department" or an individual with the corresponding title. The average gross annual sales of the responding firms was $208 million (with extremes deleted to prevent distortion). The modified mean of the number of plants operated was 16, and of the warehouses, 39. The average longevity (modified) of the formal existence of the distribution department was three years. The range of ages was three months to 48 years.

Of particular significance was the range of activities under the jurisdiction of the department. Ninety per cent of the 50 responding firms reported that the transportation activity was the responsibility of the distribution department. Responsibility for shipping and receiving activities was reported by 86% of the firms. Inventory control was reported by 72% of the firms, warehousing 66%, material handling 64%, protective packaging 40%, production planning 36% and order processing 12%.[25]

---

[24]Warren Blanding, Ed., "Profile of P.D.M.", Transportation and Distribution Management, June, 1962, p. 13.

[25]Ibid., p. 14.

The wide discrepancies and inconsistencies in marketing literature regarding what functions and activities lie within the "physical distribution concept" can be more readily understood when the interpretation of the above figures is undertaken. When such a wide variation of responsibilities even under the formally designated (physical) distribution department exists, what might exist where no formal department is identified with the concept?

The Total Cost Approach

The total cost approach to the logistics function is well documented in current marketing literature.[26] It is in effect an extension of marginal cost analysis in Economic theory. Assuming perfect competition, a perfect allocation of all resources occurs where:

$$\frac{MPPa}{Pa} = \frac{MPPb}{Pb} = \cdots \frac{MPPn}{Pn} = \frac{1}{MCx} = \frac{1}{Px}.$$

MPP = marginal physical product
P = price
MC = marginal cost
a,b,..n = resources or inputs; eg. labor, machines.
x = Product or output

At this stage a dollar's worth of any single resource is exactly equal to a dollar's worth of all other resources.

---

[26]See: Richard J. Lewis, p. 66; Heskett, Ivie and Glaskowsky, p. 454; Smykay, Bowersox, and Mossman, p. 77.

Prior to reaching this state of equilibrium, applications of either A or B or substitutions of A for B or B for A are in order to attain the above balance.

In the total cost approach to physical distribution problems, the various logistics activities are analogous to A and B, the resources. Any incipient combination of the logistics activities may be assumed to be out of balance, that is, where a change in an activity could improve the revenue less cost picture. The drive toward perfect balance (although perhaps unattainable in the real world) would be attempted by trading off costs where necessary as long as the net effect is favorable. A speedier but costlier transportation mix would be implemented if it reduced pipeline inventory costs and warehouse costs more than the transportation cost increase. This is an example of an intra-function cost trade-off. A change of this type could also affect other marketing costs or revenues or it could affect manufacturing or finance costs.

> "The illusory trade-off is one resulting from improper organization of accounting information which leads one function in a firm's organization to believe it has brought about an economy by its action only to find that an offsetting diseconomy is the result for a sister function. One of the most common examples of the illusory trade-off is the accumulation of inventories on a seasonal basis to allow level production scheduling... . The basic

> nature of the trade-off, that of increased inventory holding costs for decreased manufacturing costs, is often obscured by the failure of most accounting systems to identify the cost of capital invested in such inventories."[27]

The recognition of cost trade-offs in physical distribution has been deterred by the traditional segmented control over the various activities. Recognition and understanding of the total cost approach is imperative for optimum control of logistics costs. Otherwise, as stated eloquently, "...the popular corporate pastime of relocating rather than reducing costs,"[28] will persist.

> "Distribution costs, in total, are rather elusive things because they involve many order-getting costs ...which are difficult, if not impossible, to allocate to specific products or orders. On the other hand, the physical distribution function is much more tangible and would lend itself to the use of well-established cost accounting techniques. We feel, therefore, that the use of the 'total cost' concept as applied to the physical distribution function would have at least three advantages: (1) it would concentrate management attention on an area well worth the time and effort in potential savings; (2) it would furnish the data necessary to make a sound judgment about alternative forms of transportation, warehousing, etc.; (3) it would be a very real start on getting facts on one portion of the total cost of distribution."[29]

---

[27] Heskett, Ivie and Glaskowsky, p. 453.

[28] Miller, p. 12.

[29] Howard T. Lewis, James W. Culliton and Jack D. Steele, The Role of Air Freight in Physical Distribution, (Boston: Harvard University, Division of Research, 1956), p. 64.

As viewed by Heskett, Ivie and Glaskowsky, total cost analysis is one of the three underlying principles of logistics. They are:

> "1) viewing the movement of goods and the coordination of demand and supply not as an activity carried on by or for one firm, but by and for firms at two or more levels in a channel of logistics,
>
> 2) analyzing all costs resulting from the use of alternate methods of accomplishing a logistics task, and
>
> 3) designing a system involving the use of men, machines, and information in such a way that the parts are closely integrated to create greater productivity in the system than that produced by the sum of its component parts."[30]

The first principle stresses the inter-firm relationships of physical distribution; that the final price of a product includes not only the effect of the final seller's physical distribution costs but the effect of the whole stream of physical distribution costs of the final seller's suppliers and their suppliers. This concept is called "the logistics of macrodistribution systems" by Mossman-Morton.[31]

The second principle represents the total cost analysis approach described above. The main problems encountered in the total cost analysis are:

---

[30]Heskett, Ivie and Glaskowsky, p. 445.

[31]Frank H. Mossman and Newton Morton, Logistics of Distribution Systems, (Boston: Allyn & Bacon, 1965), p. 4.

"1) separating and identifying logistics costs,

2) establishing accounting cost centers which are capable of providing the type of information necessary for continuing logistics cost analyses, and

3) analyzing the results of changes in the performance of a system after new concepts have been implemented."[32]

Solutions to these problems require the services of the accounting department. But the physical distribution people need more than just accounting services. They are demanding recognition and understanding by accountants of these physical distribution principles, particularly the total cost approach.

"Physical distribution must become an accounting concept as well as an organizational concept."[33]

"To fully benefit long range from treatment of all physical distribution operations as a unified system, the organization must be backed up by an accounting system that permits recognition, accumulation and control of these costs."[34]

The following chapter will discuss to what extent the

---

[32]Heskett, Ivie and Glaskowsky, p. 455.

[33]Miller, p. 7.

[34]Ibid., p. 6.

accountant understands the physical distribution concept, how he presently applies his systems, procedures and tools to account for costs generated by physical distribution activities, and what can be done by the accountant to solve the problems so prolifically penned by the physical distributionists.

CHAPTER III

ACCOUNTING FOR PHYSICAL DISTRIBUTION COSTS

To appreciate fully the accountant's comprehension of the physical distribution concept it is necessary to refer occasionally to principles and procedures of conventional distribution cost accounting. Because of the accessibility of literature on the subject of distribution costs, responsible knowledge and comprehension by the reader will be assumed. Thus a burdensome review of the whole field of distribution cost accounting will be obviated. Effort can then be focused on the elements of distribution cost accounting which are relevant to this study.

This chapter will attempt to present the accountant's understanding of the marketing concept, "physical distribution," to evaluate the existing accounting principles, methods and procedures applied to logistics activities; and to explore the possibility of modifying and improving the present state of conceptual and implemental development to satisfy the criticisms of the physical distributionists.

Accounting Interpretation of Physical Distribution Concept

The marketing academicians and executives who are desirous of promoting the "physical distribution" concept have emphasized the lack of adequate cost control information. In stressing the total cost approach, emphasis is concomitantly placed on obtaining "appropriate" cost data. By selecting a few relevant comments by these authors and executives, virtual agreement on this one point can be reasonably substantiated: that adequate information for cost control and cost analysis necessary in the total cost approach to the physical distribution concept is not satisfactorily provided by presently applied conventional accounting methods and procedures.

> "To fully benefit long range from treatment of all physical distribution operations as a unified system, the organization must be backed up by an accounting system that permits recognition, accumulation and control of these costs."[1]

Mr. Miller indicates a firm conviction that traditional accounting procedures do not provide adequate data for the total cost approach to physical distribution cost control.[2]

---

[1] H. G. Miller, "Accounting for Physical Distribution," Transportation and Distribution Management, December, 1961, p. 6.

[2] Ibid., p. 7.

> "What is needed in business today is not another 'Parkinsonian Empire.' Rather, the complex demands of modern business management require:
>
> (1) An over-all corporate sensitivity to the needs for highest inter-departmental coordination between the many specialized areas of management influential in successful distribution management.
>
> (2) A functional method of distribution cost accounting capable of adjusting inter-departmental cost trade-offs on a corporate wide basis."[3]

> "The accounting system most widely used is set up to serve the president, financial officers, the SEC, and the Internal Revenue Service."[4]

> "The accounting department is generally working to the advantage of everyone except the marketing department."[5]

It is evident from these comments that the advocates of the total cost approach to the physical distribution function are requesting assistance and cooperation from the accounting staff. They do not necessarily expect immediate panaceac changes in conventional systems, but rather request modifications of present methods in order to obtain more useful cost data for their objectives. Actual changes necessary to provide this information may be minor; in some

---

[3]Donald J. Bowersox, "The Forces Influencing Finished Inventory Distribution," Transportation and Distribution Management, January 1962, p. 11.

[4]Donald W. Drummond, "A Marketing Yardstick," Transportation and Distribution Management, February, 1962, p. 13.

[5]Ibid., p. 16.

cases the present electronic data processing equipment may make this information available at little or no extra cost.

The main obstacle is bringing the need for this information to the attention of the accounting department, rather than the cost of obtaining it. The physical distribution executives will probably have to convince the upper levels of management of the crucial need for the desired cost data in order to effect changes in the accounting system.

> "Physical distribution cost accounting will more than likely receive increasing attention from top management in 1964, and although there's little chance you'll be able to make over your company's accounting system exactly as you'd like it, there is a good possibility that the way will be cleared for developing far more meaningful and accurate cost figures than ever before."[6]

> "Don't expect the impossible. Remember that management has many uses for its existing accounting - a number of them required by law - and comptrollers and accountants are notoriously reluctant to change their systems and therefore lose the continuity of year-to-year figures which enable them to make comparisons and spot trouble. And top management will usually back them up."[7]

It could be stated that leaders in the field of accounting do not formally recognize the "physical distribution" concept as it is interpreted in this study. This statement

---

[6]Editorial, "Distribution Management Tips," Transportation and Distribution Management, January 1964, p. 4.

[7]Ibid.

can be justified by the almost complete absence of any reference to the concept in any of the leading accounting textbooks, monographs, journals and research studies. The concept as contemplated by the marketing executive and academician has apparently not been equivalently contemplated by his accounting counterpart insofar as it is not reflected in the latter's major media of formal intellectual communication.

But it is non sequitur to assume that the accounting department within a given company does not recognize the concept. Several accounting departments in firms which apply the total cost approach to physical distribution have already modified their systems to satisfy the needs of the physical distribution function. But these firms are relatively few in number. If the marketing managers have not implemented the new concept into their organizational and responsibility framework it is unlikely that the accounting department has initiated any changes.

> "In many firms attempts have been made to establish accounting cost centers to coincide with the scope of authority of various members of a company's management. These recent attempts have benefited logistics cost analysis only where organizational recognition is given to the functional importance of logistics. If costs are difficult to obtain in the course of system analysis, it is likely that the appraisal of the result of system change will be

> just as taxing unless the original study which initiated the system change is able to bring about, as a by-product, a temporary or permanent change in cost reporting and accounting procedures. The only substitute for adequate cost information is estimation based on an analysis of other types of company records and field observation."[8]

Why has the literary endowed accountant apparently failed to recognize this area of marketing which has received so much attention in some marketing media in recent years? The answer may be that the accountant interprets the activities of physical distribution as a part of total distribution cost accounting and not as a system with unique characteristics. Leading textbooks of distribution cost accounting treat physical distribution as consisting separately of transportation and warehousing and handling costs.

The new concept as it has evolved in marketing literature treats physical distribution as an integrated system. There is a lag in the communication of the integrated concept to the conscious mind of the accountant, if we judge by the accounting literature.

Extremely important to the comprehension of the "physical distribution" concept is the difference in the measurement of physical distribution costs and the

---

[8] J. L. Heskett, Robert M. Ivie and Nicholas A. Glaskowsky, Jr., Business Logistics Management of Physical Supply and Distribution, (New York: The Ronald Press Co., 1964), p. 455.

measurement of the costs of the other marketing activities. Recognition by the accountant that physical distribution activities are closer to production activities in terms of cost measurement than they are to promotional activities is an important step to more precise measurement attempts.

> "....the problems of physical distribution are, in essence, not unlike other areas of the marketing operation in that the selection of operation methods among alternatives and the planning, controlling, and evaluating of performance is essential to management. Yet, the intangible nature of the personal and impersonal selling efforts and the resultant impact on measurement and evaluation do not plague the physical functions. To this extent it would be reasonable to expect a wide application of the use of quantitative analysis in this area."[9]

That costs of physical distribution activities are more amenable to precise measurement is an advantage for the implementation of a successful physical distribution cost accounting system.

Present State of Accounting for Physical Distribution Costs

Physical distribution accounting falls within the scope of distribution cost accounting, a sub-division of industrial cost accounting. Cost accounting is considered a specialized branch of accounting the purpose of which is to measure

---

[9] Michael Schiff and Martin Mellman, Financial Management of the Marketing Function, (New York: Financial Executives Research Foundation, 1962), p. 53.

the total costs of producing and distributing products and services for control and analysis by management.[10]

In the economic system, distribution refers to the activities involved in the creation of time, place and ownership utility while production refers to the activities involved in the creation of form utility. Most business firms carry on activities which perform both production and distribution functions, but usually specialize in one or the other. Physical distribution activities are performed by all complex firms which sell goods rather than services.

Distribution Costs - Definitions

There is evidence of some variation in accountants' definitions of "distribution costs." In the broad sense, "distribution" refers to all activities engaged in both obtaining demand for the product and in servicing this demand. That is, those activities engaged in promoting and selling the product and those activities engaged in the physical distribution of the product to the customer.

> "Distribution costs are the costs of all business activities necessary to effect transfers in the ownership of tangible goods and to provide for

---

[10]Donald R. Longman and Michael Schiff, Practical Distribution Cost Analysis, (Homewood, Illinois: Richard D. Irwin, Inc.), 1955, p. 24.

their physical distribution."[11]

Longman and Schiff describe distribution costs as the "....expenses which follow the gross profit figure in the accountant's profit and loss statement."[12] In substance this is the same concept, but as pointed out by H. G. Miller and Donald Drummond this definition obscures many of the elements necessary for adequate physical distribution cost control.

In the narrow sense, "distribution" has been defined in two different ways by accountants. The Accountant's Handbook states that distribution costs are those expenses related to the promotional activities controlled by the sales manager.[13]

The Marketing Handbook and at least one accounting author have described "distribution" in the narrow sense to mean the "physical" distribution activities.

> "In its broadest sense, distribution includes the following functions: shipping, freight and delivery, warehousing, selling, advertising, ordering and credit."

---

[11] J. Brooks Heckert and Robert Miner, Distribution Costs, (New York: Ronald Press Company, 1952), p. 1.

[12] Longman and Schiff, p. 69.

[13] Robert Miner, "Distribution Costs," Accountant's Handbook, Edited by Rufus Wixon, (New York: The Ronald Press, 1956), p. 9·1.

> "In a narrower sense, distribution means getting the merchandise from the production departments to the customer."[14]

Use of the term "distribution costs" in this study will refer to the broader sense as described in the Accountant's Handbook. Thus, all costs allocable to selling, physical movement, financial and administrative activities which are engaged in getting the product from the terminal point of the production line into the consumer's hands are "distribution costs." (See Figure 2).

The Nature of Distribution Cost Accounting

The principles and techniques of distribution cost accounting are patterned after those of production cost accounting. There are unique characteristics, however, in the nature of distribution costs, some of which have negated the application of many techniques useful in production cost accounting. Consequently, there has been limited progress in the field of distribution cost accounting. These characteristics are summarized in the Accountant's Handbook from several of the leading cost accounting texts.[15]

---

[14]Lyle M. Farmen, "Accounting for Distribution Costs by Product Groups," Cost and Management (Canada), September, 1960, p. 317.

[15]Miner, p. 9·4.

MARKETING ACTIVITIES INVOLVING DISTRIBUTION COSTS

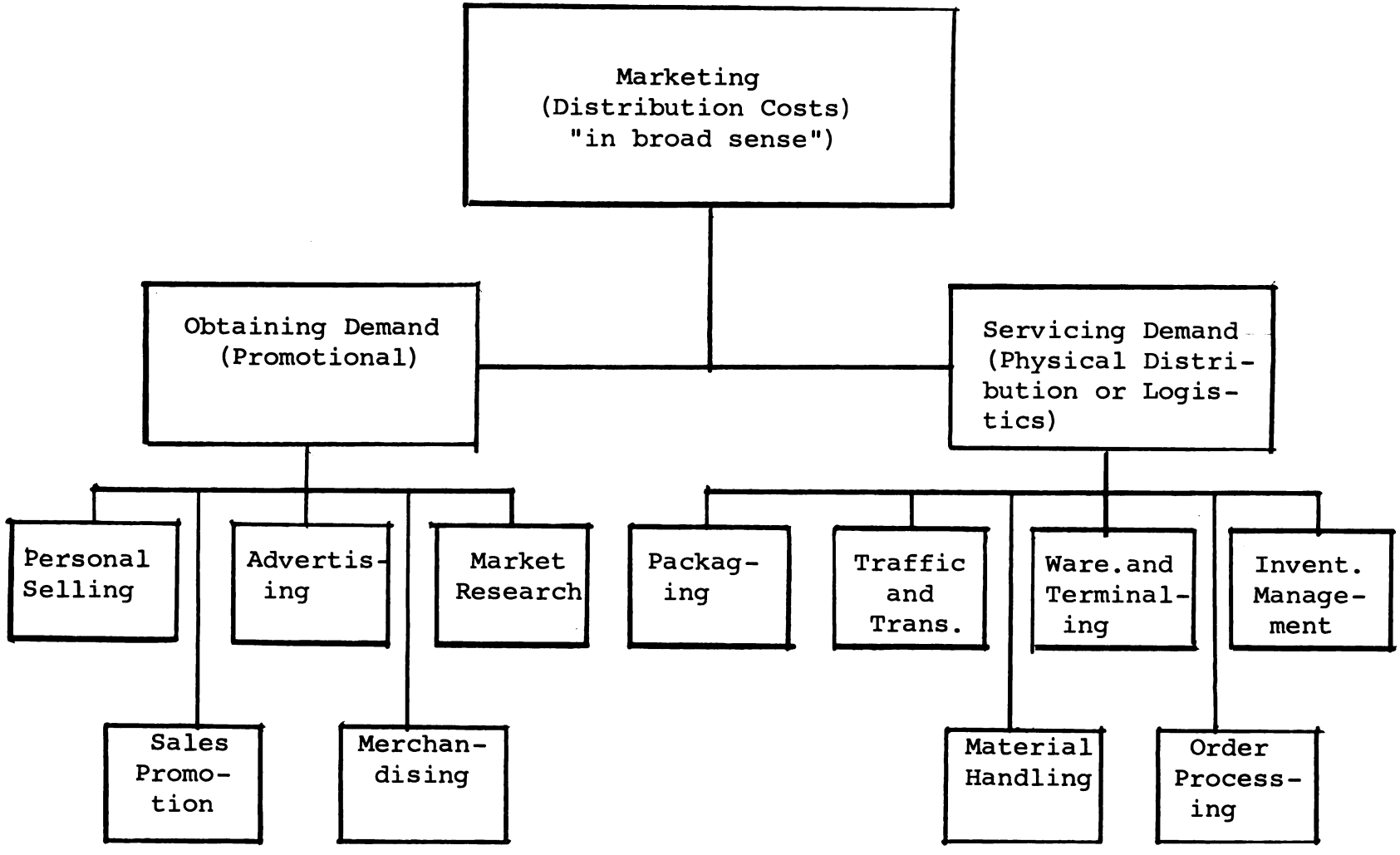


FIGURE 2

1. Distribution costs are not usually tied into the financial accounts. They tend to be used more for informal and statistical purposes than for formal incorporation into the accounts.

2. Distribution costs are not centered at the place of production. They may occur at geographically scattered centers.

3. They are applied to functions and to segments of the business rather than to the product alone. The purpose is to assign to products, sales territories, customers or order sizes the variability in costs which may be controlled by management.

4. Distribution costs are considered period costs rather than product costs. Factory overhead costs are product costs and are capitalized in inventory.

5. Standard cost systems are not widely used in distribution cost accounting, because of the difficulty in establishing standards for many of the promotional type activities.

6. There is more flexibility in the choice of alternative methods of distribution than of production. This implies that managerial emphasis should be placed on distribution cost analysis.

"A company has two primary reasons for ascertaining distribution costs:

1. To provide a basis for profitable management.
2. To promote the observance and administration of federal and state laws."[16]

Distribution cost control serves these management problems concerning:

1. Commodities to be sold.
2. Prices to be charged.
3. Extent of territory to be served.
4. Classes of trade to be cultivated.
5. Distribution channels and agencies to be used.
6. Profitable size of order to handle.
7. Profitable size of unit of sale.
8. Credit terms to be granted.
9. Favorable time to expand.
10. Size of inventories to be carried.
11. Control of individual distribution operations and cost items.
12. Results to be obtained from selling expenditures.[17]

There is general agreement that there are three bases for classifying distribution costs. These three bases are:

---

[16]Theodore Lang, "Distribution Costs," Marketing Handbook, Edited by P. H. Nystrom, (New York: The Ronald Press Company, 1958), p. 1147.

[17]Heckert and Miner, p. 12.

1. By nature of cost item or object of expenditure, generally called the primary account basis.

2. By functions performed, usually referred to as the functional basis.

3. By manner of application, such as product group, territories or customers.[18]

There are two methods used in (3) above:

1. Unit functional analysis

2. Primary account analysis

Under unit functional analysis all costs are first allocated or charged to specific functions and then a unit rate for each function is developed in terms of the function's factor of variability. Under the primary account analysis method functional classification is obviated. Costs are divided into three groups, direct, semi-direct, and indirect. Individual items of costs collected in the primary expense accounts are applied to each segment, such as a territory or a customer. The process in both unit functional analysis and primary account analysis is not continuous and is made after the data is accumulated, not in connection with their collection. This practice is the

---

[18] See Lang, p. 1148 and Heckert and Miner, p. 17.

reason for much of the current criticism of distribution cost accounting.

Research on Distribution Cost Practices

The findings of a study of the distribution cost accounting practices used by seventy companies were published in 1951 by the National Association of Cost Accountants.[19]

This study emphasized the analysis of distribution costs for decision making.

> "The processes of cost accounting have been developed most extensively for the purposes of producing cost figures needed in preparing periodic financial reports and for aiding management in its exercise of control over costs. Substantially less attention has been given to the determination of costs for decisions which fall in the realm of policy making. This study is concerned with the latter field - ...."[20]

In applying distribution cost analysis to decision making in the areas of planning and policy formulation the following types of problems are indicative of those considered in the study:

1. Products to be sold, relative quantities, and their prices.

---

[19] Analysis of Non-manufacturing Costs for Managerial Decisions, N.A.C.A. Research Series 19, 20 and 21, (New York: National Association of Cost Accountants, 1951).

[20] Ibid., p. 1.

2. Geographic areas to be covered.

3. Classes of customers to be serviced.

4. Channels of distribution, alternate modes of transportation.

5. Services to be offered customer.

6. Relative emphasis placed on each product, customer or territory.

The study began with the premise that some products, territories and customers bring in more profit than others. Only by using cost studies employing adroit cost analysis techniques can the contribution of each component of a business segment be measured accurately.

The seventy companies interviewed indicated that the principal segments for which these measurements are wanted are products and sales territories. The study concentrated on these two segments.

The study concluded that there was much variation in the development of techniques used to analyze distribution costs, but that there is a trend toward acquiring information more useful to management.

> "A substantial number of companies group all non-manufacturing costs into a few broad classes and allocate them on the basis of sales volume or factory cost of goods sold. The resulting segment costs are averages which tend to obscure the very differences which management needs to know. On

the other hand, the study disclosed a comparatively limited number of companies which had progressed well beyond the majority in methods for analyzing nonmanufacturing costs. The principal features of methods followed by these latter companies are:

1. Through coding and classification, costs are charged directly to products, territories, and other segments wherever this is practicable.

2. Methods used in allocating indirect costs have been carefully studied to minimize arbitrariness. Functions (which correspond to the cost centers in which manufacturing costs are accumulated and applied) are defined in such a way that each includes only like activities. This makes it easier to find a basis for cost allocation which is demonstrably related to the costs being allocated.

3. Allocations of order getting costs follow effort expended rather than actual results obtained. This leads to use of budgeted sales or budgeted distribution of salesmen's time in place of actual sales or actual time as bases for allocating related costs.

4. Recognition is given to the fact that differences between costs and income margins are sufficient to guide decisions involving choice between alternatives. Allocation of costs which will be the same in total regardless of which alternative is chosen are unnecessary in arriving at costs for such purposes. Similarly, where cost control is the major objective, as it often is in dealing with territories, costs assigned to a given responsibility include only those costs controllable within the bounds of the specific responsibility."[21]

Another notable study made about a decade later corroborated some of the conclusions of the N.A.C.A. research.

---

[21] Ibid., p. 93.

Indications are that scant progress was made in practice to obtain better distribution cost control and analysis.

> "It can be assumed, considering the fact that the examination of the practices of twenty-eight companies revealed only five special studies, that either the companies were reluctant to exhibit such data, or, as we believe, communication between accounting and marketing executives has not reached the state currently enjoyed by accounting and production executives."[22]

A conclusion reached from the field study of twenty-eight companies, twenty-two of which were included in the 1960 Fortune Magazine list of the top 500 manufacturing companies, indicated that practices in the analysis of distribution costs were falling behind the need as indicated by the rapidly changing marketing scene. The study revealed that:

1. Customer, channel, salesman and order size analyses are not widely prepared.

2. Product studies were generally done without regard to the interrelationships with customers and territories. Product analyses were separate, not integrated, analyses.

3. Central service costs were generally omitted from territorial analyses, because of the simplicity of including

---

[22]Martin Mellman, "Marketing Cost Analysis-Development and Current Practices," Accounting Review, January, 1963, p. 123.

only the traceable costs.

4. Fixed and variable, controllable and non-controllable cost distinctions were either absent or inadequate.

5. Standards and standard costs were not used by the companies.

Evaluation of Accounting for Physical Distribution Costs

The current interest in the magnitude of costs associated with the physical distribution activities has stimulated an interest in the control and analysis of these costs. The new physical distribution concept cuts across traditional accounting classifications and defines many activities whose costs are charged to manufacturing as part of the physical distribution function. Generally accepted accounting practices may camouflage many of the true costs of physical distribution. The physical distributionist claims that in order to apply the total cost approach for optimum control and analysis, he must be aware of all costs assignable to the logistics activities.

What the physical distribution executives are asking of the accounting executives can be summarized as follows:

1. Recognition and comprehension of the physical distribution concept and the total cost approach.

2. Modifications in present accounting techniques and

practices to:

(a) provide more precise measurements of logistics costs,

(b) isolate logistics costs presently charged to other functions, and

(c) identify all costs associated with logistics activities by some type of coding system.

3. Cooperation in implementing these changes where they will satisfy the overall objectives of the firm.

The research studies cited in the preceding section pointed out many of the deficiencies in practice in accounting for distribution costs. Some of the most serious handicaps in distribution cost accounting do not apply to the logistics (physical distribution) costs. Thus, there is an optimistic outlook for the solution of the problems of the physical distributionists.

Proposed Solutions

Three contributions to the solution of some of the problems in accounting for logistics costs are described below. The first was described by Donald W. Drummond in his article entitled, "A Marketing Yardstick." The purpose of his proposal is to disclose some of the costs of marketing obscured by conventional accounting procedures. His analysis is confined to a single product or a small group of

products, and must contain all relevant marketing cost elements. He compares the present method of presenting income statement information with his suggested new method. These two methods are shown in Tables 1 and 2, respectively.

The present method starts with net sales, subtracts cost of goods sold to show gross profit. Operating expenses, other income and deductions and state taxes are accounted for to obtain earnings before income tax. It is argued that by beginning with net sales, as in Table 1, many significant cost elements relevant to the total cost analysis of the various marketing segments may be overlooked. Examples given are deductions for freight equalization or allowances, price allowances, and sales commissions.

Mr. Drummond further points out that some of the costs conventionally charged to cost of goods sold are actually physical distribution or promotional costs. He mentions shipping, warehousing, tank car rentals and bad debts as examples.

The proposed method starts with gross sales which he defines as the maximum revenue that could be realized for the product. (See Table 2). From this figure the cost of goods sold is subtracted, but this is not the conventional cost of goods sold. All elements of physical distribution

TABLE I

DRUMMOND - PRESENT METHOD

Net Sales	$
Cost of Goods Sold	
Manufacturing Profit	
Operating Expenses:	
General and Administrative	
Selling Expenses	
Research and Development	
Advertising and Sales Promotion	
Other Income and Deductions	
State Taxes	
Pre-Tax Profit	$

TABLE 2

DRUMMOND - NEW METHOD

Gross Sales	$
Cost of Goods Sold:	
Raw Materials	
Operating Expenses	
Plant Overhead	
Manufacturing Profit	$
Operating Expenses Excluding Sales Controllable	
General and Administrative	
Research and Development	
Other Income and Deductions	
State Taxes	
Profit Before Selling	$
Sales Controllable	
Shipping	
Freight Equalization or Allowance	
Sales Commission	
Price Allowances	
Cash Discounts	
Tank Car Rentals	
Warehousing	
Direct Sales Costs	
Sales Administration	
Advertising and Promotion	
Bad Debts	
Pre-Tax Profit	$

or other marketing activites are extirpated to leave only true production costs. The result is called manufacturing profit. From this figure operating expenses excluding those considered sales controllable are deducted; state taxes and other income and deductions are subtracted (or added) and the result is termed "profit before selling."

The purpose of arriving at this figure is to reveal the true diminution of the revenue, obtained by the segment (eg. product) under observation, attributable to costs controllable by the executives assigned the responsibility. Those items that follow "profit before selling" in Table 2 should be controllable by marketing executives, such as a sales manager, or a physical distribution manager or the equivalent.

Complementary to Mr. Drummond's new method of presenting income statement information to isolate controllable marketing costs is a model of physical distribution cost account descriptions categorized by point of occurrence. This model, reproduced in the Appendix, was devised by Mr. H. G. Miller of the Diamond Crystal Salt Company.[23]

Mr. Miller establishes four categories of physical distribution costs by point of occurrence:

---

[23]See Miller, p. 10.

1. Costs at production point.
2. Cost of moving materials to the customer.
3. Cost of outside storage and warehousing.
4. Costs of the customers.

Many of the charges for activities placed in the first category are included in production costs. Those included in the second group are normally charged to freight on sales or netted against gross sales. Costs of outside storage and warehousing may be charged to cost of goods sold, to selling expense or to a distribution account.

The purpose of Mr. Miller's model which is designed for industrial marketing is to assign all of the physical distribution costs to common accounts. This system of classifying physical distribution costs would combine management responsibility with accountability. The manager would be relieved of being accountable for costs of activities over which he has no decision-making control; and the activities which he controls would be assigned their appropriate accounting charges.

The third contribution to the solution of one of the problems in accounting for physical distribution costs is provided by Dr. Richard J. Lewis in his unpublished doctoral dissertation entitled, "A Business Logistics Information and

Accounting System for Marketing Analysis."

One of the vociferous criticisms of the current practices in distribution cost accounting is that the allocation methods used tend to obscure the variability found at the origin of the costs. Total costs are accumulated and then allocated to the segments on the basis of averages.

Dr. Lewis provides a new basis for cost control at the source of cost incurrence. This basis is geometrically patterned geographic blocks which become the cost centers. Thus, he introduces geographic cost variation to the traditional variations of product and customer. Geographic variability of the costs of servicing demand can be determined for each spherical grid block. This was done in a study by Dr. Lewis. He found that the costs which vary geographically were the majority of the total physical distribution costs of the industrial goods firm studied. The use of these spherical grid blocks as cost incurrence centers would enable the accounting department to obtain physical distribution costs at their origin to construct total costs rather than to allocate a portion of the total costs to the segments by averaging techniques.

The three contributions described above have been proposed to solve some of the problems which plague managers of

marketing activities. The loss of the identity of variability at cost incurrence centers and the separation of accounting responsibility from decision-making responsibility are prevalent in distribution cost accounting systems. By combining these three proposed modifications to the current methods of collection of data, classification of accounts and presentation of the summarized information the physical distribution manager, as well as other marketing managers, would be assured of a more reliable basis for decision-making.

CHAPTER IV

CHANGES IN PHYSICAL DISTRIBUTION SYSTEMS AND THEIR ACCOUNTING CONSEQUENCES: EVIDENCE FROM COMPANY EXPERIENCES

Introduction

The purpose of this chapter is: (1) to describe the different kinds of changes made in the physical distribution systems of industrial firms and why they are made; (2) to present case studies describing the actual changes made by firms in their physical distribution systems in order to, (3) trace the procedural, financial, auditing and other effects on the accounting system.

To accomplish these objectives this chapter will examine three examples of actual changes in physical distribution systems. The effects of these changes on the total intra-firm costs will be traced and their accounting implications will be evaluated. The original intent of this study to examine intensively the accounting system of only one firm which had recently made changes in its physical distribution system was modified to include three less intensive case studies. Although some of the questions contemplated early in this study will be left for later attempts

at research in this subject area, answers to many important ones will be pursued herein.

Case One describes a major change in the physical distribution system of a division of a large company. The division produces and markets a consumer good. Without the use of detailed figures, Case One provides an exemplary description of the changes in the physical distribution system and the resulting accounting implications. Cases Two and Three, describing the physical distribution changes made by a second company, provide the detailed quantitative data to show cost trade-offs within the company's own cost control centers and how they may be obscured by traditional accounting methods. The amounts, though modified somewhat, are based on the firm's records.

Changes in Physical Distribution Systems

Cost Trade-offs

Changes in physical distribution systems may affect only the company's own divisions or departments (intra-firm) or they may affect the company's vendors or customers (inter-firm). A cost trade-off which is strictly intra-firm either in the short-run or in the long-run is, according to

Heskett, Ivie and Glaskowsky, illusory or ineffective.[1]

Cost trade-offs must have an effect on either the vendors or customers to be effective. To explain this statement these authors classify all logistics costs into three categories: operating costs (physical movement), possession costs (inventory holding), and service costs (lost supply, production and/or sales). The above authors' diagram illustrates the possible kinds of trade-offs.[2]

Operating costs are those associated with the physical movement of goods. Possession costs are those associated with the holding of tangible goods over time. Service costs are probably the most difficult to measure; they involve lost sales due to poor logistics arrangements, high production costs due to inefficient logistics or foregone cost reductions in the supply area because of poor logistics service.

The illusory cost trade-off is described by the authors as involving the accounting procedures. Conventional accounting handling of costs allows one segment of the firm to realize a cost reduction while it obscures a commensurate

---

[1] J. L. Heskett, Robert M. Ivie and Nicholas A. Glaskowsky, Jr., Business Logistics of Physical Supply and Distribution (New York: The Ronald Press Co., 1964), p. 453.

[2] Ibid.

cost increase in another segment. The trading of operating costs within the company would lend itself to such an illusion. This is possible, particularly where the trade-off involves inventory levels, since inventory holding costs are not usually accounted for formally in the records.

To be effective the change in the physical distribution system must have external implications; that is, it must result in improved customer service or bring about an eventual downward revision in product price (or forestall a price increase) rather than merely swapping costs within the firm.

Examples of Changes in Physical Distribution Systems

Based on industry experience there are many changes in costs which can be expected from changes in physical distribution systems. The magnitude of the cost increases or decreases cannot be determined but the direction of the change in costs can be anticipated. For example, if a firm changes from the use of public warehousing facilities to the use of its own private warehouses several changes in costs can be anticipated. Increases in costs can be expected in the following areas: local delivery at destination, the company's materials handling costs, inventory taxes while en route in carrier's equipment and the fixed costs of the private

warehouses. Cost decreases would occur only in variable costs for the public warehousing facilities.

The following table, based on a table from Heskett, Ivie and Glaskowsky, traces the cost effects of several typical physical distribution system changes.[3] The system changes are:

1. Use of premium methods of transportation for outgoing finished products (accompanied by a reduction in warehouses, overhaul of communications).
2. Purchasing and shipping supplies and components by means of fewer orders of greater quantity.
3. Consolidation of shipments from supply points (allowing smaller, but requiring better timing of, purchases).
4. Increase in the number of distribution warehouses (reducing service times to customers).
5. Establishment of distribution warehouses as mixing points for shipments between plants and customers (allowing volume shipments to customers).
6. Shifting packing and/or packaging operations from plant to distribution warehouse (allowing shipment in bulk).

---

[3] Ibid., p. 448-51.

7. Use of faster communications and mechanized procedures in handling orders from customers.

(Note: The numbers in the caption of Table 3 refer to the above seven types of changes.)

TABLE 3

EXAMPLES OF EFFECTS ON COSTS BY CHANGES IN PHYSICAL DISTRIBUTION SYSTEMS

	Type of Change						
	1	2	3	4	5	6	7
Long Distance Transportation From:							
Vendor to Facility (Plant or Warehouse)		-		+			
Intra-Facility	-	+			-	-	
Facility to Customer	+			-	-		
Local Delivery at Destination(s):							
Materials Handling:							
Vendor		-					
Company	-	-					
Customer's:							
Equipment	-						
Labor	-						
Supplies	-						
Inventory Holding In:							
Vendor's Facilities		+	-				
Company Assembly Warehouses		+	-				
Company Factories				-	-		
Company Distribution Warehouses	-			+	+	+	-
Customer's Facilities	-			-	-		-
Carrier's Equipment (En Route):							
Obsolescence							-
Pilferage and Damage							
Inventory Taxes							
Rehandling						-	
All of above	-	+	-				-

+ Increase in costs
- Decrease in costs

TABLE 3 (continued)

	Type of Change						
	1	2	3	4	5	6	7
Warehousing:							
Vendor		+					
Company Assembly		+	+				
Company Distribution	-			+	+		
Customer	-			-	-		
All of Above							
Fixed - Private Facilities							
Variable - Public Facilities							
Packing:							
Vendor Packing		-	+				
Company Packing - Unpacking							
Customer Unpacking	-						
Order Processing:							
Vendor			-	+			
Company	+		-	+			
Customer	+						
Manufacturing (If Applicable):							
Fixed							
Labor Variable				+			
Equipment Variable							
Sales Losses Due to Logistics:							
Customer Service Deficiencies					-	-	- -
Market Territory Restrictions	-				-	-	-

\+ Increase in costs
\- Decrease in costs

Case Studies of Changes in Physical Distribution Systems

Case One - Change in Warehousing System

The purpose of this case study is to describe, without the use of detailed figures, the changes in the warehousing

facilities of a division of the International Minerals and Chemical Corporation in order to trace the effects on the accounting system of the firm. The changes in the physical distribution system are described in an article written by Kenneth W. Hessler, Manager of the Distribution Research Department.[4] The company recently made a major change in its method of distributing its product to its customers. The decision to modify the physical distribution system was provoked by symptoms of both structural and financial deficiencies. The subsequent extensive revision of the warehousing and billing system was implemented to correct these deficiencies.

I. Reasons for Change

The physical distribution system of the subject company as it existed before the changes had many deficiencies. Those that management was becoming aware of were:

a) poor inventory control

b) vague communication links

c) inefficient order processing control

d) over-investment in unbilled accounts

e) slow cash collections

---

[4]Kenneth W. Hessler, "Assignment: Design and Phase-in a New Distribution System," Transportation and Distribution Management, January, 1965, p. 35-43.

The symptoms were high distribution costs and an unfavorable cash position in spite of satisfactorily low manufacturing and sales costs. The most obvious deficiency in the physical distribution system was the use of 44 warehouses to provide one or two days service nationwide. Other firms with similar marketing coverage were using fewer warehouses.

The second obvious deficiency was in the billing system; invoices were being mailed five to ten days after shipment. The computer was not being fully exploited. The result was a less than optimum use of cash balances. The awareness of these symptoms by management precipitated the desire for a "physical distribution breakthrough."

II. Description of Old System

A. The Product and its Movement

The product under study is sold for ultimate consumption. It is produced in San Francisco, shipped in 200 pound drums to Chicago, where it is packaged in containers ranging from one ounce to ten pounds. These containers are shipped to 44 public warehouses, from where they are distributed to the final customer. These warehouses, overlapping in coverage, offered one to two days service. (See Figure 3).

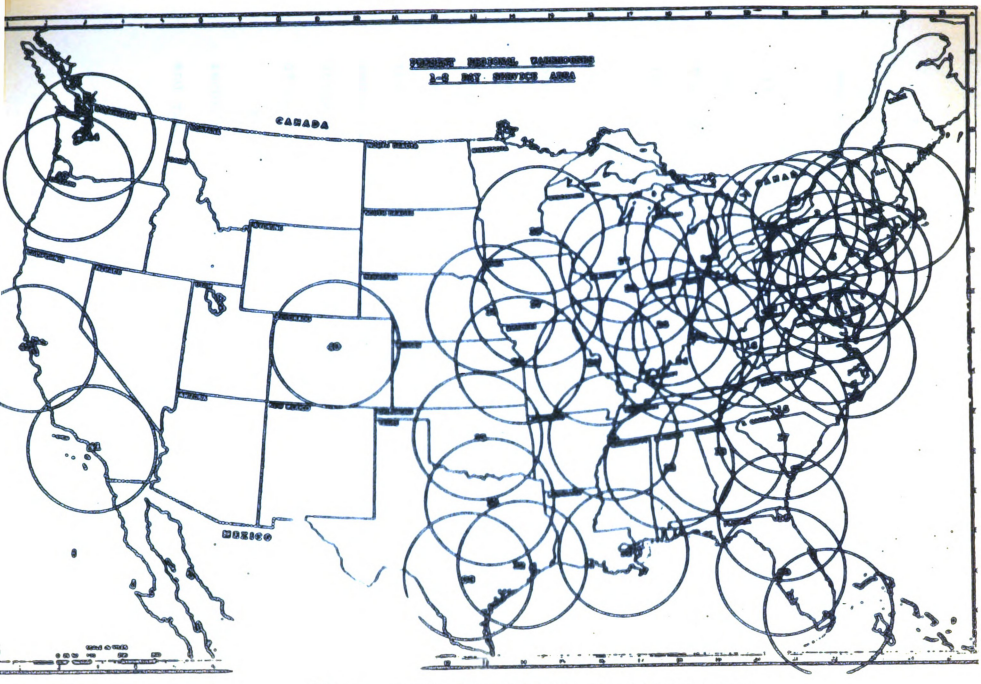


FIGURE 3

BEFORE: WAREHOUSE LOCATIONS AND SERVICE AREAS

B. The Order Processing and Billing System

Broker orders are sent to the warehouse for shipment. Upon shipment, the warehouse sends the broker a copy of the bill of lading and forwards a copy of the order to home office by mail. The order is coded, key punched, and processed through the computer; the customer is then billed. The time lag from shipment to billing ranges from five to ten days. (See Figures 4 and 5).

C. Inventory Control System

Each size package is assigned a maximum stock level and order point, based on quarterly sales information from the warehouses. In each territory, the warehouse sends weekly inventory reports to the broker. When the stock of any size package is below the order point, the broker informs the home office by mail. The home office inventory analyst requests the Chicago packaging plant to ship a replenishment stock to reach the maximum stock level (which is two-thirds of the quarterly sales).

Each month the warehouse sends the home office complete records of inventory levels, transactions, customer's name and quantity, and package size for accounting reconciliation.

FIGURE 4

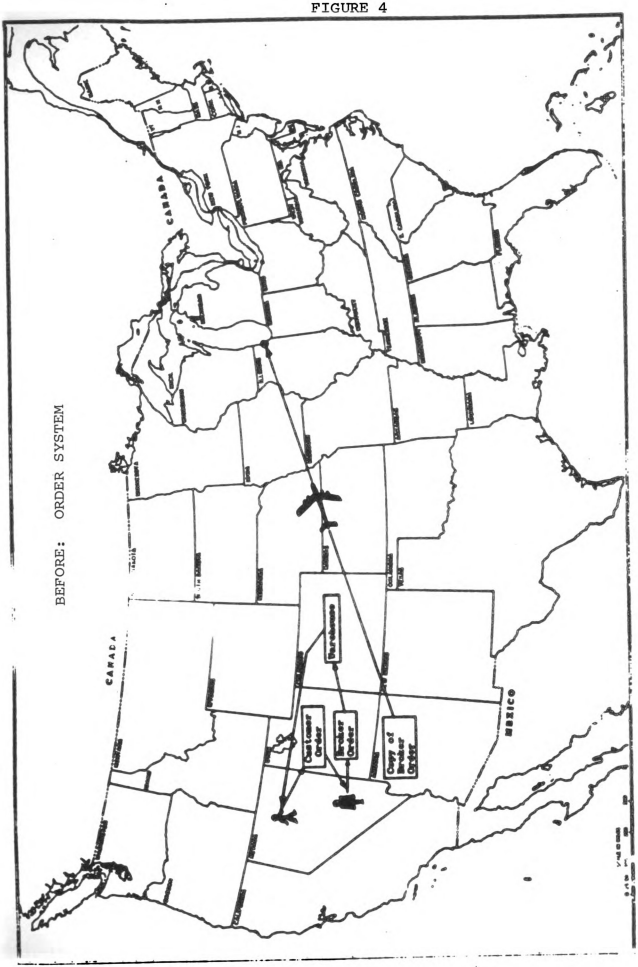
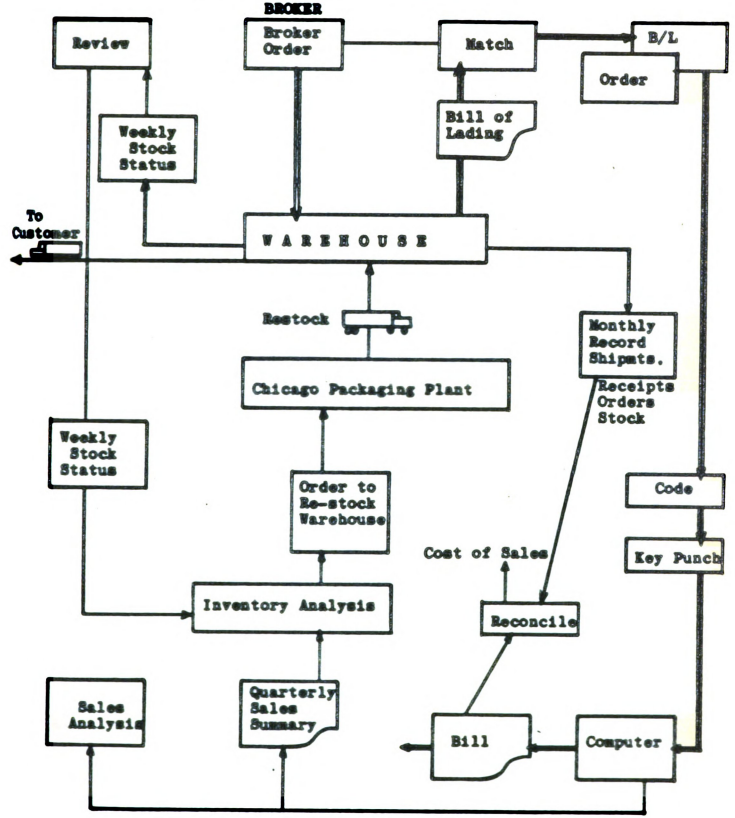

BEFORE: ORDER SYSTEM
CANADA
MEXICO
Customer Order
Broker Order
Copy of Broker Order
Warehouse

FIGURE 5

PRODUCT INFORMATION FLOW - PRESENT



III. Revisions of Physical Distribution System

A. The Product and its Movement

The number of warehouses was substantially reduced to less than one-third the original number, from 44 to thirteen. This new figure was based on an analysis of service time to customers and variable costs of maintaining inventories at warehouses. For the desired service time, one to two days, the reduction in warehouses meant that more than 85% of the customers could still be serviced in this time. Formerly, over 95% of the customers could be serviced in one to two days. A widespread overlapping of service coverage was eliminated by reducing the number of warehouses. (See Figures 6-9 and Table 4).

B. Order Processing, Billing and Accounts Receivable

Under the new system the computer became the center of the information flow. Billing, formerly done by hand, is now done by the computer. Broker orders upon receipt by the warehouses are relayed to the computer at the home office immediately where they are recorded. The orders are first edited by the accounting department for prices, accuracy, etc. From there they are forwarded to data processing for key punching and to the computer. (See Figure 10-12).

All shipments made by the warehouse are teletyped to

FIGURE 7
VARIABLE SYSTEM COSTS AND
INVENTORY VS. NUMBER OF WAREHOUSES

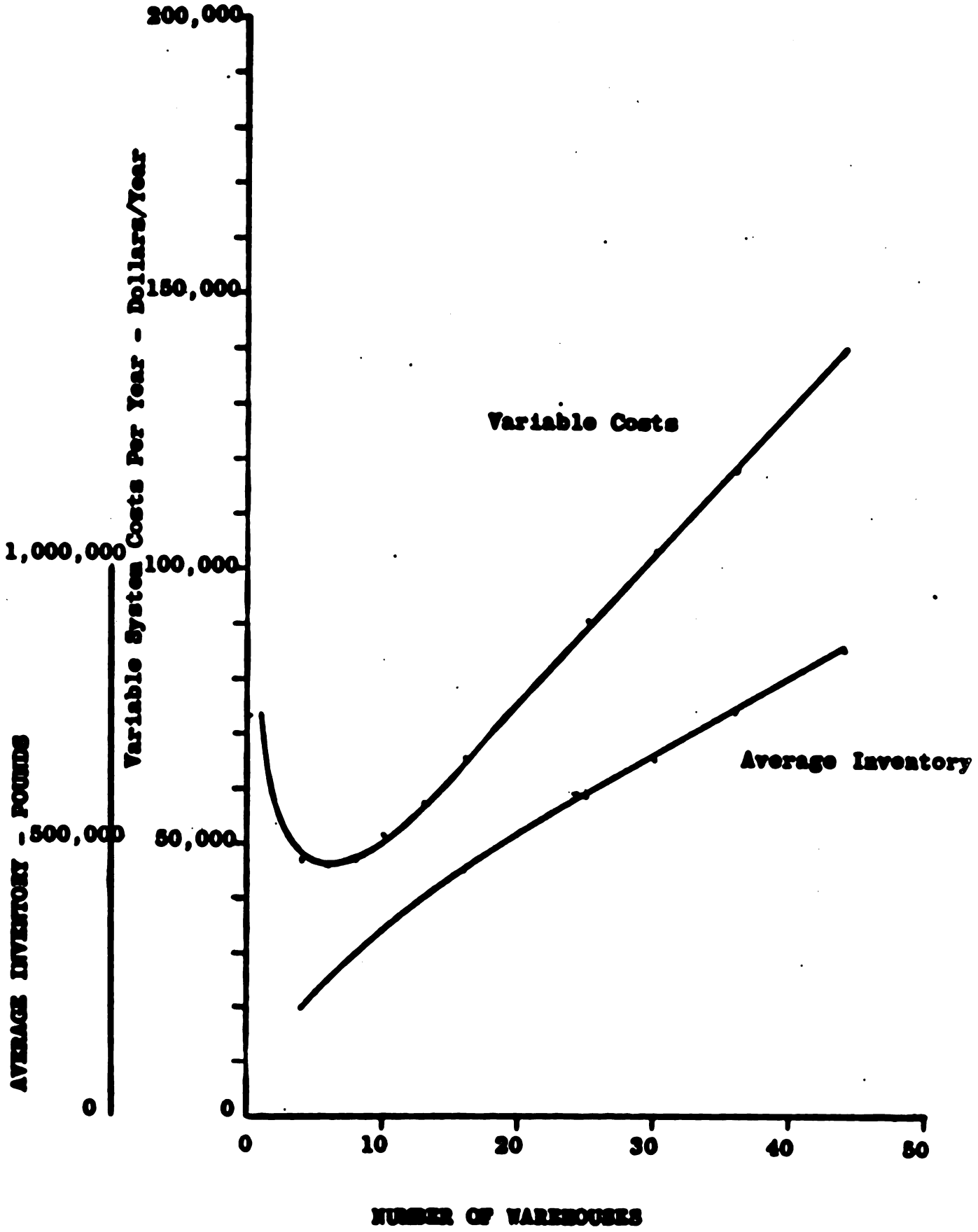


FIGURE 8

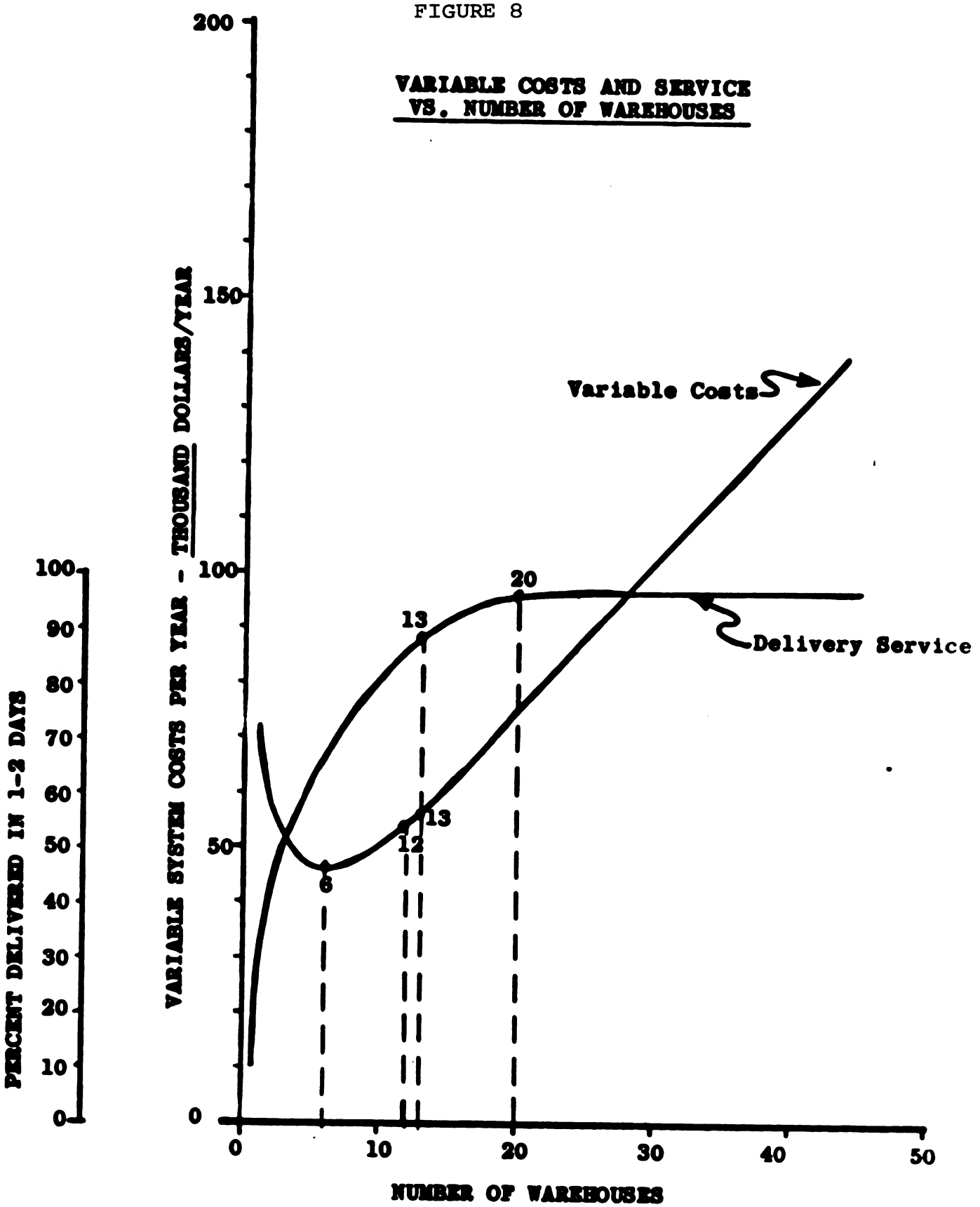

VARIABLE COSTS AND SERVICE
VS. NUMBER OF WAREHOUSES
VARIABLE SYSTEM COSTS PER YEAR - THOUSAND DOLLARS/YEAR
PERCENT DELIVERED IN 1-2 DAYS
NUMBER OF WAREHOUSES
Variable Costs
Delivery Service
200
150
100
50
0
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
6
12
13
13
20

FIGURE 9

DELIVERY SERVICE CAPABILITY

VS. NUMBER OF WAREHOUSES

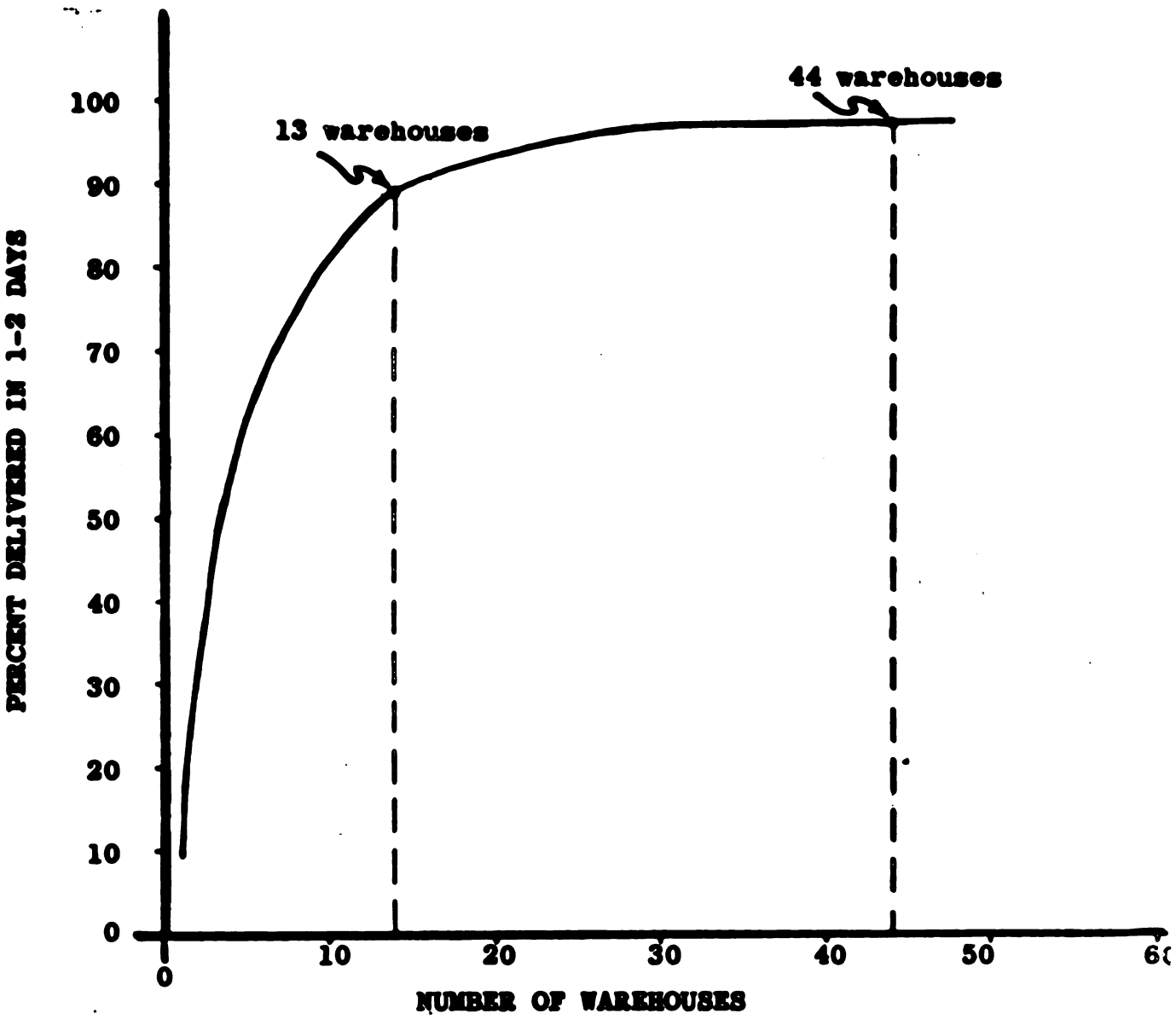


TABLE 4

ESTIMATE OF 1-2 DAY DELIVERY SERVICE CAPABILITY
FROM VARIOUS NUMBERS OF REGIONAL WAREHOUSES

REGION:	Percent Within 200 Miles Of Warehouse	
	44-Warehouse System	13-Warehouse System
New England (6 states)	100%	92.6%
Middle Atlantic (5 states + D.C.)	100%	97.3%
East Central (5 states)	100%	85.8%
South East (8 states)	100%	82.4%
Central (12 states)	95.2%	81.0%
Southwest (5 states)	98.5%	56.6%
Pacific (7 states)	88.5%	84.5%
TOTAL:	97.0%	87.5%

FIGURE 10

PRODUCT INFORMATION FLOW - REVISED

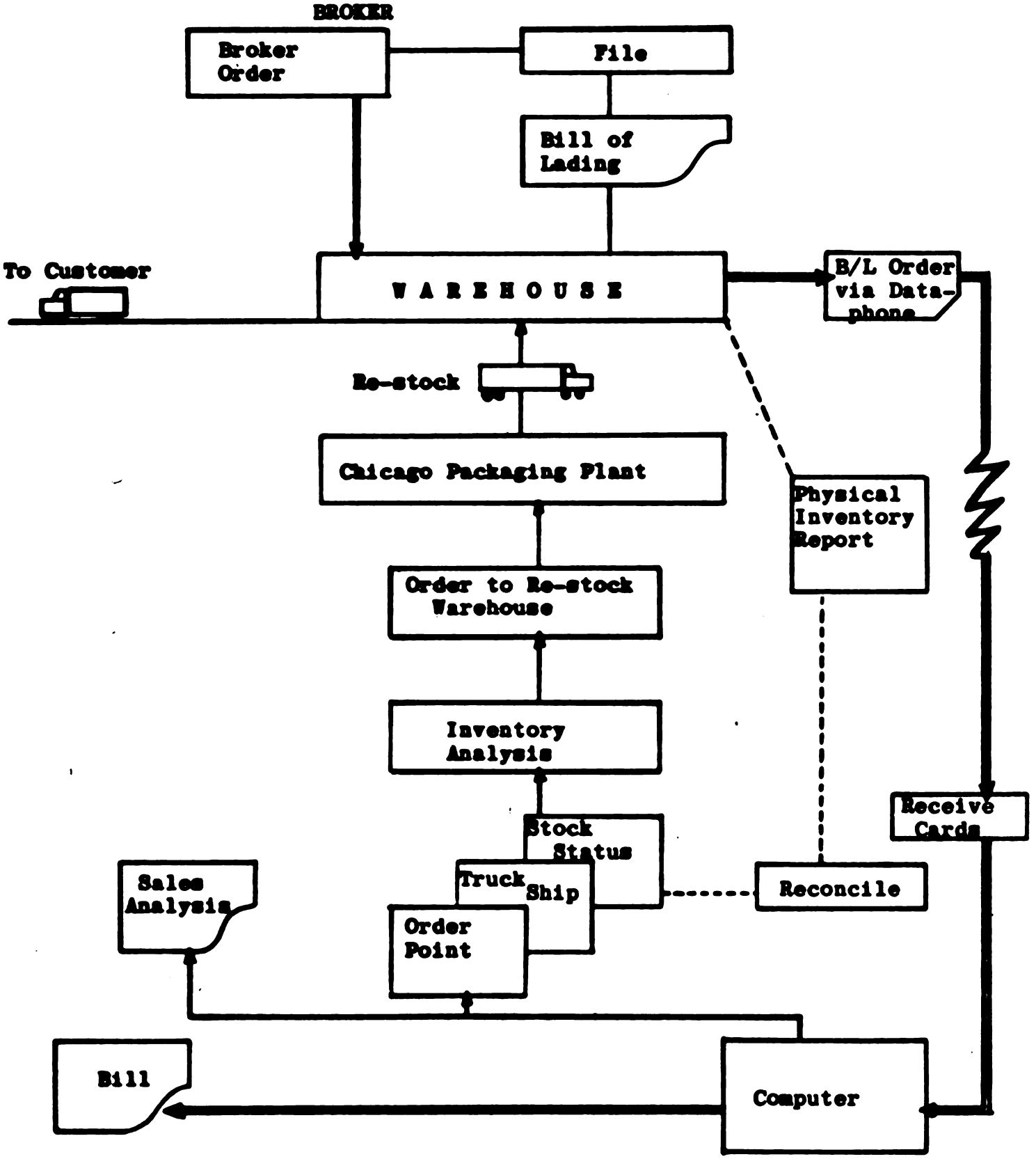


FIGURE 11

INVENTORY CONTROL - BILLING - SALES ANALYSIS

PRODUCTION AND SHIPPING SCHEDULING

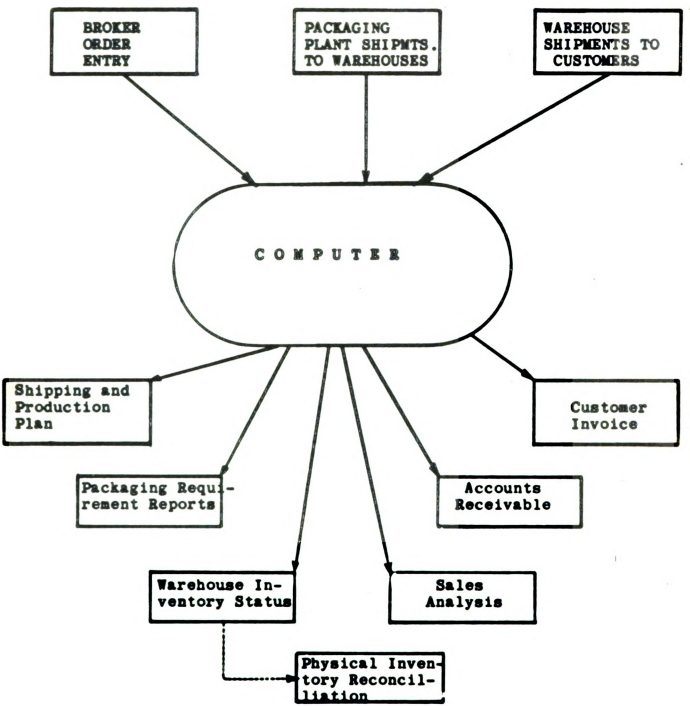
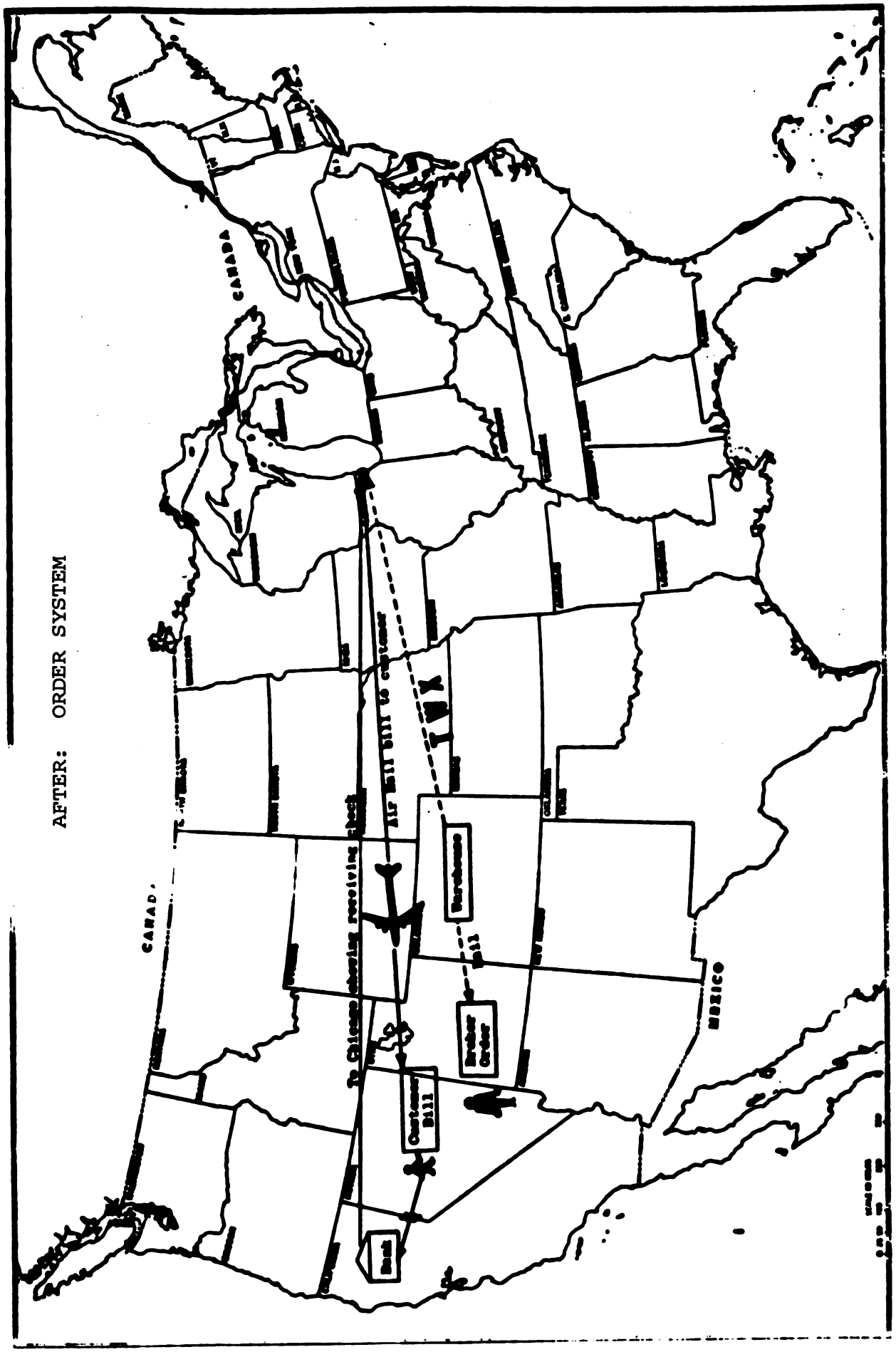


FIGURE 12


AFTER: ORDER SYSTEM
CANADA
MEXICO
Purchases
Broker Order
Customer Bills
Bank

the home office daily. The computer matches the information with the recorded order data and immediately prepares the invoice, using the shipping advice as the authority to bill. The computer provides a check on accuracy and prevents most of the potential errors.

The accounts receivable entries are automatically prepared and later reconciled with cash receipts. As each invoice is prepared an entry to the accounts receivable ledger is originated by punch card output. These cards are processed daily by data processing equipment as part of the customer accounting procedures and are held pending notification of payment. Customers are instructed to remit directly to strategically located banks to speed up cash flow.

C. Inventory Control System

A self-adjusting centralized inventory control system was accomplished via the computer. The result was optimum inventory levels with reduced costs of maintaining inventory.

IV. Effects on the Accounting System and Financial Implications

A. Procedural Effects

As described above changes occurred in:

1. billing and invoicing
2. accounts receivable

3. inventory control

B. Financial Statements

No change in the financial statements was reported.

C. Financial Effects

1. Significantly less inventory carrying cost.

2. Significantly less accounts receivable carrying cost.

3. The cash flow is considerable improved; there is a five day average acceleration in billing over the old method.

D. Role of the Computer and Auditing Effects

The computer has become the heart of the new system. Its use and importance has been substantially increased in billing, accounts receivable and inventory control. Some of the effects which have auditing implications are:

1. Matching of accounts receivable punch cards with cash receipts information received from the collection point banks.

2. The matching of shipment information against customer order information by the computer, replacing some manual reconciliations.

3. Correction of the inventory by the computer once the warehouse sends the variable information on the shipment made.

4. Centralization of inventory records at one point.

Case Two - Change in Transportation Method

Case Two represents a change mainly in the method of

shipping the product to the customer. Before the change the product was packaged in 55 gallon drums at the plant and shipped to customers by carload rail shipments. The new method was to ship the product by barge to a terminal (not company owned). The product is packaged in 55 gallon drums at the terminal and shipped by truckload to the customers.

The effects of the change in the distribution system are:

Without Accounting Implications

1. Improved service to customers.

With Accounting Implications

2. Order processing and billing - adds terminal to the order system and thus causes an increase in interdivision orders to get the product shipped to the terminal.

3. An inventory control system is needed at the terminal.

4. The total inventory on hand (at the plant plus the terminal) is increased.

5. Working capital requirements are decreased.

6. Physical distribution expenses (as indicated by traditional accounting methods) are increased.

7. Total costs are decreased.

Table 5 shows the comparison of the costs which are affected by the change. They are categorized into production plant cost, transportation cost and terminal expense

TABLE 5

CASE TWO: CHANGE IN DISTRIBUTION SYSTEM FROM SHIPPING DIRECT RAIL TO SHIPPING THRU TERMINAL CLOSER TO CUSTOMERS THAN PLANT (PRICE IS A DELIVERED PRICE)

Pounds of product per year - 50,000,000

	Rail Direct	Barge-Terminal-Truck
	Cost/cwt.	
1. Production Plant Cost		
Packaging	$2.80	$ .03
Storage and handling	.40	.15
Financial costs of inventory	.10	.30
Administrative	.15	.05
	$3.45	$ .53
2. Transportation Cost		
To customer (incl. stopoffs)	3.00	.50
To terminal	--	.50
3. Terminal Expense		
Barge unloading	.00	.07
Storage and handling	.00	.40
Financial cost of inventories	.00	.10
Packaging	.00	3.00
Administrative incl. labor	.00	.15
	$ .00	$3.72
Total Cost per Cwt.	$6.45	$5.25
Total Cost 50,000,000 lbs/yr.	$3,225,000	$2,625,000
Saving per Year	$600,000	

for analytical reasons. The costs are quoted per hundred weight for the fifty million pounds of the product per year.[5] The two methods under comparison are labeled: (1) rail direct and (2) barge-terminal-truck. The change is from the former to the latter.

The change in the physical distribution system resulted in a reduction of production plant cost from $3.45 to $ .53. Packaging represents the major cost change in this category, from $2.80 to $ .03. Storage and handling was reduced from $ .40 to $ .15, and administrative costs were reduced from $ .15 to $ .05. In this same group the financial costs of inventory were increased from $ .10 to $ .30.

The next group is transportation costs, which were reduced from $3.00 to $1.00. Transportation costs to the customers (including stopoffs) were reduced from $3.00 to $ .50 while additional costs to the terminal of $ .50 were created.

The third group of related expenses is at the terminal. These expenses were all added, summing to $3.72. They are comprised of barge unloading $ .07, storage and handling $ .40, financial costs of inventories $ .10, packaging $3.00

---

[5]See H. G. Miller, p. 10, for a similar example of this type.

and administrative (including labor) $ .15.

The total cost (per cwt.) for rail direct sums to $6.45 while that for barge-terminal-truck sums to $5.25. For the annual product of fifty million pounds per year the savings arising from the new system is $600,000.

This case illustrates the intra-firm cost trade-offs. By improving customer service it also produces inter-firm or external effects. Increasing gross sales or forestalling lost sales could be an objective of such an action. Of particular interest to this study, however, is the way in which the traditional accounting methods of handling the charges obscure the figures needed by the distribution manager for his total-cost analysis of the physical distribution system change.

Table 6 shows the effects of the change on the accounting system. Traditional accounting methods would include some of the herein defined physical distribution costs in production costs. If the distribution manager were not aware of this he would observe above that his transportation costs plus terminal costs after the change would be $4.72/cwt. as compared with $3.00/cwt. before the change. Also the reader of the accounting statements would observe that distribution costs were increased by the change. The production costs on

TABLE 6

CASE TWO: EFFECTS ON ACCOUNTING SYSTEM

	Rail Direct	Barge-Truck
	Cost/cwt.	
1. Production Costs (Plant)		
All costs except physical distribution	$12.00	$12.00
Physical distribution	3.45	.53
Total production cost	$15.45	$12.53
Decrease in production costs		
2. Transportation Costs		
Gross sales price	$20.00	$20.00
Freight cost	3.00	1.00
Net sales	$17.00	$19.00
Increase in net sales		
3. Terminal Costs	$ .00	$ 3.72
Substantial increase in terminal costs		

the other hand were reduced substantially by the change. The production manager gets credit for a reduction in costs over which he has no control whereas the distribution manager receives an increase in costs under his jurisdiction. Therefore his incentive to initiate a change resulting in a reduction in total costs and an improvement in customer

service may be stifled by the method of reporting the financial results. Even though he can cogently explain the results to upper management levels he will still appear inefficient in the records.

A paradox in the changeover is its effect on reported net sales. For any given gross sales price ($20.00/cwt. in the example) this change in the physical distribution system causes a reported increase in the net sales figure. This increase in net sales ($2.00/cwt. in the example) is due only to the accounting practice of subtracting freight costs from gross sales.

Case Three: Change in Channel of Distribution

Case Three represents a change mainly in the channel of distribution, from shipping via tank truck (bulk) directly to the customer to shipping via tank truck (bulk) to a terminal. As in Case Two a reduction in total costs was obtained with improved customer service as a co-objective. Table 7 shows the savings per year obtained by the new method along with the detailed figures substantiating the savings.

The product per year amounts to three million pounds or 360,000 gallons. A delivered price system is in effect.

TABLE 7

CASE THREE: CHANGE IN DISTRIBUTION SYSTEM FROM BULK SHIPMENT DIRECT TO BULK SHIPMENT THROUGH A TERMINAL
(Pricing is Based on Delivered Price)

Pounds of Product per year 3,000,000
Gallons of Product per year 360,000

	Cost Basis	Units (000's)	$ Cost Per Year
A. Direct from Production Plant			
1. Frt. via tank truck (incl. loading)	$ 3.16/Cwt.	30	$94,800
Total cost			$94,800
B. Via Terminal Stock Point			
1. Loading cost	$10.00/Trk.	.09	$ 900
2. Frt. via tank truck to terminal	1.47/Cwt.	30	44,100
3. Bulk terminal costs: Throughput	.00625/Gal.	360	2,250
Terminal and in transit product loss	.02/Cwt.	30	600
4. Frt. from terminal to customer	.61/Cwt.	30	18,300
5. Administrative cost	1.00/Ton	.18	180
6. Inventory cost	.0144/Cwt.	30	432
Total cost			$66,762
Savings per year over direct shipment			$28,038

The costs per year under the old system, direct from production plant, involves only one item: freight via tank truck (including loading). Total cost is $94,800 per year.

Under the new system, via terminal stock point, several items of costs are included, they are: (1) freight via tank truck to terminal $44,100, (2) freight from terminal to customer $18,300, (3) bulk terminal costs $2,850, (4) loading cost $900, (5) inventory cost $432 and (6) administrative cost (including labor) $180. The total of these items is $66,762, a reduction of $28,038 per year over the old system.

Table 8 shows the accounting implications. In this case production costs have been increased slightly because of the change in physical distribution, rather than decreased as in Case Two. Again, reported net sales have increased substantially after the change. These two effects are due to accounting practices rather than to the change in the distribution system. If the accounting practices obscure the physical distribution charges ($900) in the production costs and bury the net freight costs in the net sales figure, the result is an increase in terminal charges of $3,462. This is the only charge controlled by the physical distribution manager. Thus, he shows an increase in his controllable

TABLE 8

CASE THREE: EFFECT ON ACCOUNTING SYSTEM

	Direct	Via Terminal
Production costs (3,000,000 lbs.)	$300,000	$300,000
Physical distribution costs	0	900
Total company defined production costs	$300,000	$300,900
Transportation cost		
To customer	$ 94,800	$ 18,300
To terminal	0	44,100
Total	$ 94,800	$ 62,400
Terminal costs	0	3,462
Total cost	$394,800	$366,762
Gross Sales Price	$500,000	$500,000
Net Freight Cost	94,800	62,400
Net Sales	$405,200	$437,600

costs, along with the production manager, while in fact total costs are reduced by the change.

The following chapter will; (1) present additional evidence of the need for some changes in the existing methods of functional distribution cost accounting, and (2) will propose modifications to these methods in the form of a simplified model accounting system for physical distribution. Chapter Six will then present a summary of the conclusions and implications of the case-studies and of the evidence found in the entire research project.

CHAPTER V

SOME PROPOSED ACCOUNTING MODIFICATIONS

The purpose of this chapter is to propose some modifications to conventional distribution cost accounting methods which will answer the criticisms made by the physical distributionists by providing them with improved information for total cost control.

Evidence of Need for Modifications

Evidence obtained in the preceding chapters, particularly Cases Two and Three in Chapter Four point out the need for improvements in selected accounting procedures and concepts. Additional evidence is presented in the first part of this chapter to substantiate the need for accounting action in this direction. The following data was obtained from a Midwestern firm. This firm is progressive in the area of distribution. It has an advanced understanding of the physical distribution concept; it has a separate department which controls the activities defined herein as physical distribution functions. Yet, its accounting system, when analyzed by an outside consulting firm revealed, by

its expense allocation practices,an absence of understanding of the control needs of the distribution manager.

Table 9 presents a list of accounts showing twelve-month actual operating costs as recorded in the accounts. These are the total costs of manufacturing, excluding raw materials, for the entire plant operation. It was shocking to learn that a full three-fourths of these costs were charged to overhead. In the existing method of recording the expenses $53,390 or 25% of the total operating expenses was charged to direct labor and $161,229 (75%) was charged to overhead.

Redistributed functionally it was found that $145,209 or 68.1% of the total operating expenses could be charged to manufacturing and shipping leaving only 31.9% for overhead. (Figures 13 and 14). The 68.1% is further broken down into manufacturing $53,385 or 24.8%, shipping $51,751 or 24.6%, handling in process $30,227 or 14.1%, and unloading raw materials $9,846 or 4.6% of the total.

By having these accounts redistributed functionally the distribution manager is able to identify and control 43.3% of the total operating expenses as in-plant materials move-ment. Before, with the existing accounting system, he could isolate none of these physical distribution costs for

TABLE 9

A MIDWESTERN COMPANY - FUNCTIONAL
REDISTRIBUTION OF PLANT COSTS

Actual Operating Statement Prepared for a 12-Month Period

DIRECT LABOR:	Amount	Per Ton	Std.
Mfg. Super	$10,359	.41	.29
Mfg. Base	8,343	.43	.34
Mix. & Bag.	12,974	.52	.49
Shp. Bulk	4,458	.28	.26
Shp. Bag.	15,150	.66	.49
Mfg. Gran. Base	2,106	.56	.58
TOTAL:	$53,390		
OVERHEAD EXPENSE:			
33 Supplies	$ 6,143		
42 Indirect Labor	20,663		
43 Premium Time	2,950		
44 Salaries	34,240		
45 Off-Duty Comp.	5,606		
46 Asso. Payroll Costs	15,940		
51 Depreciation	15,060		
55 Taxes & Insurance	19,658		
56 Repair Materials	18,194		
57 Repair Labor	11,930		
58 Electrical Power	4,315		
59 Fuel	4,171		
60 Defects & Losses	1,689		
85 Other Expense	12,231		
86 Standard Prorates	0		
87 Chgs. From Others	0		
89 Chgs. To Others	(11,561)		
TOTAL:	$161,229		
GRAND TOTAL:	$214,619		

TABLE 9 (continued)

Cost Redistribution Functionally

MANUFACTURING & SHIPPING:		
Unloading	$ 9,846	
Handling In Process	30,227	
Shipping	52,849	
Delivery	(1,098)	
Manufacturing	53,385	
TOTAL:	$145,209	
OVERHEAD EXPENSE:		
Custodial	$ 9,942	
Administrative	22,468	
Misc. Overhead	37,000	
TOTAL:	$ 69,410	
GRAND TOTAL:		$214,619

managerial control.

In an interview with the firm's physical distribution manager it was found that before this functional analysis he could not attempt to control the expenses under his jurisdiction since none was assigned functionally to his activities. Yet, these figures represent the total plant costs, exclusive of raw materials. He was aware that some of the charges for supplies, indirect labor, premium time and depreciation, for example, were assignable to unloading,

FIGURE 13

A MIDWESTERN COMPANY
FUNCTIONAL COST ACCOUNTING METHOD REVEALS:
PHYSICAL DISTRIBUTION COSTS = 43.3% OF TOTAL OPERATING CHARGES

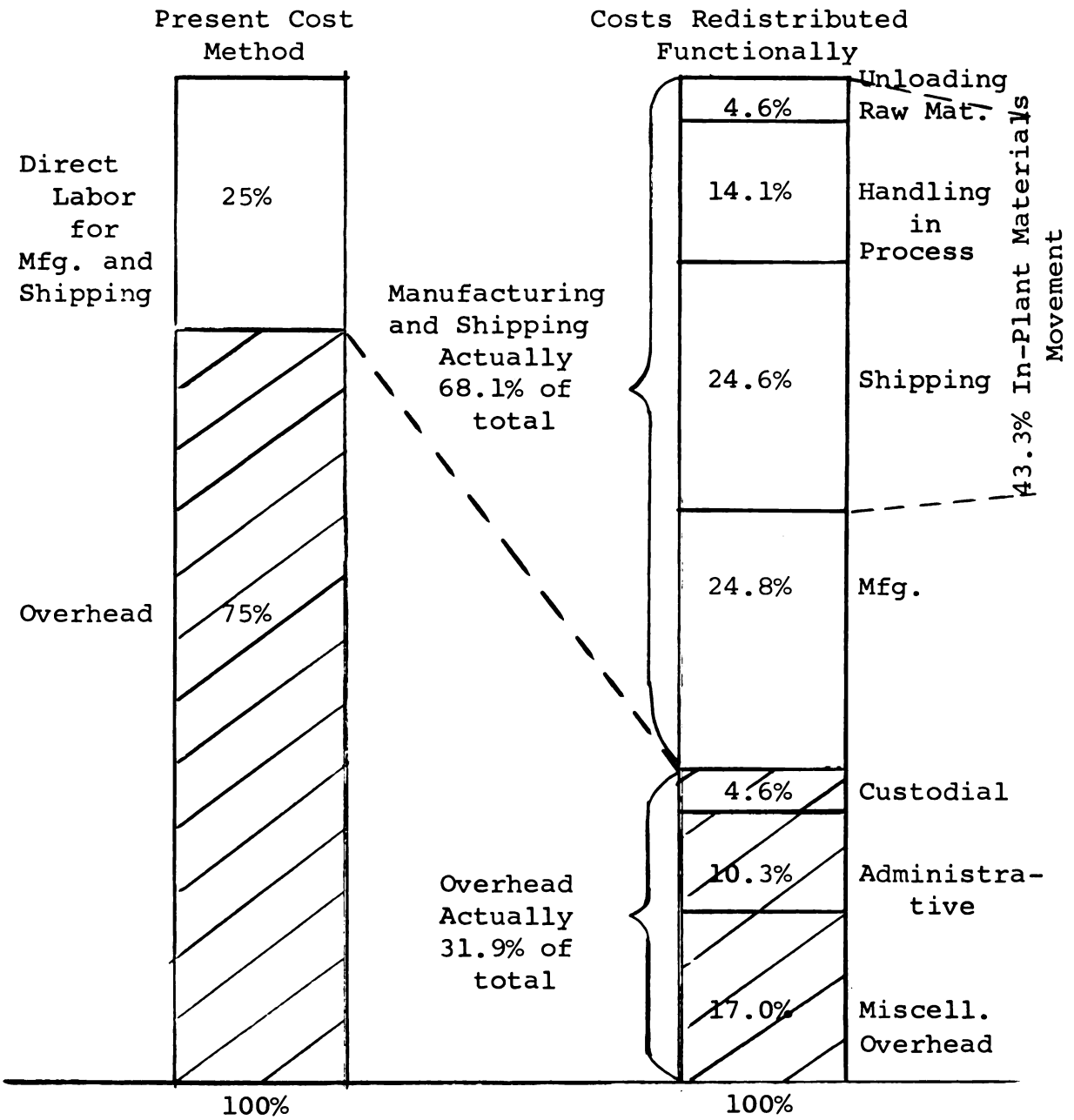
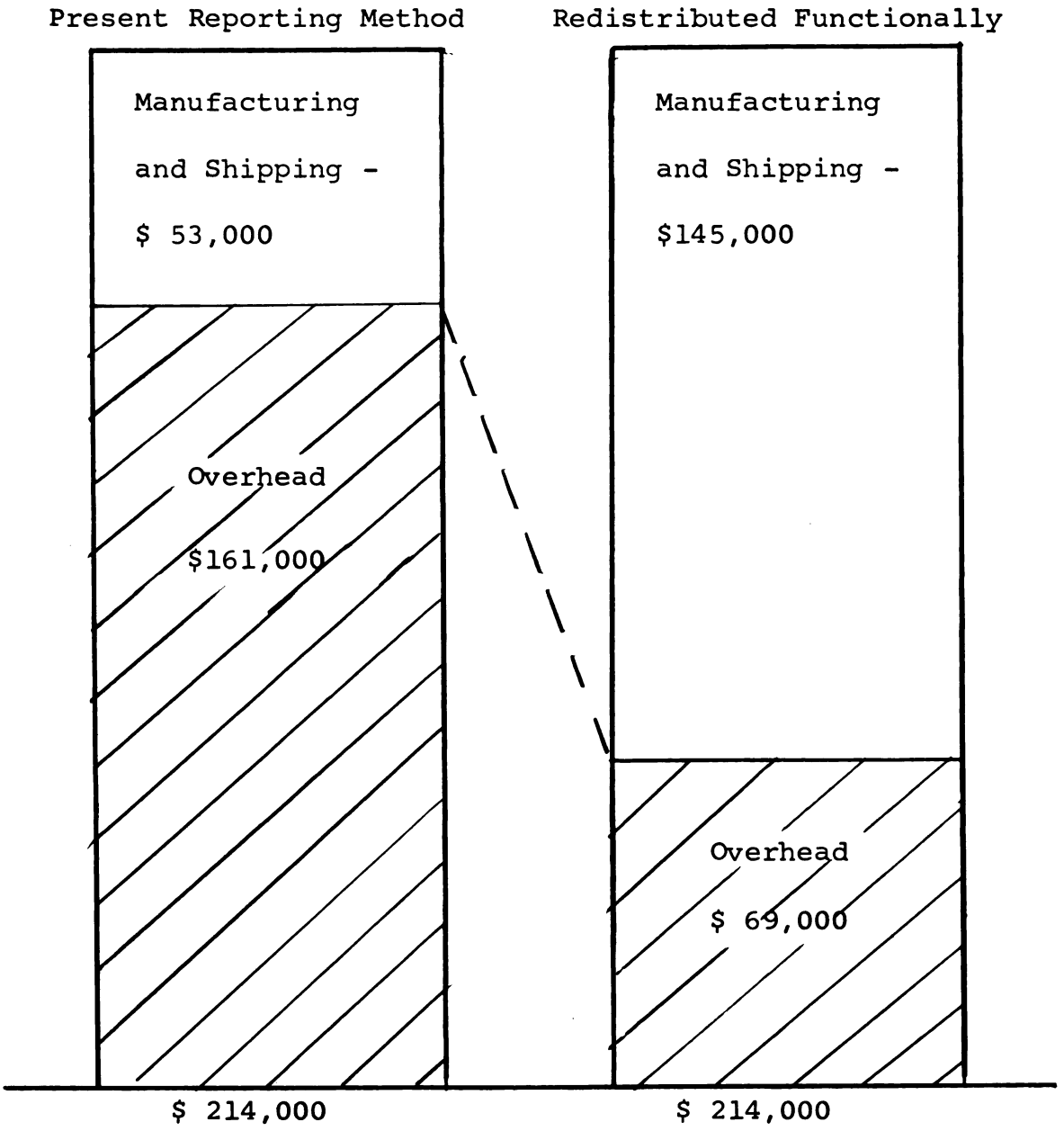


FIGURE 14

A MIDWESTERN COMPANY - ANNUAL
OPERATING COST REDISTRIBUTION



handling in process and other physical distribution activities; but the existing accounting system did not provide him with the allocations.

Even after the analysis (presented in Figure 13) seventeen per cent of the total plant costs shown are allocated to miscellaneous overhead. The firm's analyst agreed that this was too large an amount to be unidentified and that further investigation would probably reveal more physical distribution costs in the miscellaneous overhead category.

This actual case points out the importance of recognition by the accounting people of the requirements of the distribution managers if they are to perform their tasks adequately.

Proposed Modifications

The second part of this chapter presents proposed modifications of existing distribution cost accounting systems. These modifications are based on the evidence presented in the study which indicates that some changes should be made by accountants to eliminate the deficiencies revealed.

It is recommended that the following model system for physical distribution cost accounting be considered by the accounting profession as a possible solution to the problems

placed before them by the managers of physical distribution activities.

A Model Accounting System for Physical Distribution Costs

In describing a model accounting system for physical distribution costs it is well to keep in mind Heskett, Ivie and Glaskowsky's summary statement cited in Chapter Two, p. 35. The main problems found in total cost analysis are:

> "1) separating and identifying logistics costs,
>
> 2) establishing accounting cost centers which are capable of providing the type of information necessary for continuing logistics cost analyses, and,
>
> 3) analyzing the results of changes in the performance of a system after new concepts have been implemented."

The main obstacles expressed by distribution executives contacted in this study center around these three problems. They want an accounting system which allows complete control of distribution costs and allows comparisons between various year's performances and with similar type installations.

An accounting system for physical distribution costs must incorporate characteristics which will overcome these obstacles, yet remain simple and operable. It must start at the point of separating and identifying physical distribution costs; this is where the most important changes must be

adopted. Traditional accounting procedures would be affected mainly in three different areas:

1) Bases and methods of allocating costs

2) Classification of accounts

3) Financial statements

The model described herein is designed for a manufacturing firm in the chemical industry and could be modified to apply to other industries.

Bases and Methods of Allocating Costs

In the unit functional analysis method used in distribution cost accounting the expenses are originally accumulated in the natural accounts, eg. auto expense, commissions, and then assigned to functions (activities) eg. selling expense. Then a unit rate for each function is developed in terms of the function's factor of variability and the total expense is allocated by manner of application, eg. product, customer, territory. This process of cost analysis is followed to identify profitable or unprofitable customers, products, sizes of orders or territories.

The bases for allocating these expenses by manner of application (segments) are often arbitrary. That is, the basis may not be representative of the factor of variability. Also the unit rate is in effect an average. The use of an

average without statistical analysis is an example of spurious accuracy. An average of 50 may be obtained by 40 and 60 or by 5 and 95. Where the use of averages is desirable in assigning unit costs by manner of application, eg. product, customer, a measure of dispersion such as the standard deviation could be applied to the data. Thus, wide dispersion might indicate that the use of an average would result in inappropriate allocations.

Another major deficiency in distribution cost methods as presently applied is their assumption of independent causation by each of the segments analyzed, eg. product, customer, order size and territory. The segments are analyzed independently; that is, inferior customers are isolated, then inferior products are isolated. There is no attempt to assess the interdependence of these four segments. For example, customer A may be found unprofitable when total costs are allocated by customer alone. But, customer A may order in large sizes, may order only the most profitable product lines, and may be located in a low cost territory.

These four segments are interrelated and should be considered concomitantly for the cost analysis to be fruitful. The objective would be to show that: customer A buying product A, with order size C in territory C would be

unprofitable; whereas, customer A buying product A with order size D in territory B would be profitable.

Professor Richard Lewis has experimented with a system which is an attempt to solve some of the problems inherent in physical distribution cost analysis methods. (See Chapter III, p. 61). The system would obviate the arbitrary bases for allocation and the averaging techniques. It would accumulate costs at homogeneous geographical cost centers identified by customer, product, etc. at the source of incurrence. Homogeneous geographical grid blocks are coded for the entire United States. These control unit numbers are reported on the various marketing records, eg. sales order, showing the location numbers for the origins and destinations of shipments. The control unit location number for each manufacturing point, distribution point and customer must be determined.

Electronic data processing equipment makes a continuous flow of information possible from the coded documents. Professor Lewis' system was applied to the area of physical distribution and if incorporated into an accounting system it would provide the cost centers for accumulating the geographically variable physical distribution costs. Identification of the customer, the product he buys, the size of

his order, and the geographical control unit could all be interrelated with this system. At present it has been applied only to geographically variable logistics costs, such as freight and pipeline inventory, but has additional applications relevant to distribution cost accounting.

Classification of Accounts

The second accounting practice which requires modifications to satisfy the needs of distribution executives is the traditional method of classifying accounts. The bases for allocating charges to the functional accounts in servicing demand are more precise than in the marketing area of obtaining demand. Professor Lewis' system is designed to control geographical variability primarily. Within the production and warehousing facilities there are logistics activities with no geographical variability. The main criticism in this area is that many accounts which reflect logistics activities are charged to production (or cost of sales) accounts.

In a model accounting system modifications to current practices would be required. The model set of physical distribution accounts which follows represents a system which is already in the process of being implemented. It is not merely hypothetical or a theoretical ideal; it is soon to

become a reality.

Accounts to be Assigned to Physical Distribution Control

A. Presently assigned to production department control

1. Packaging labor
2. Packaging material
3. Material handling equipment depreciation (or rent) and maintenance
4. Handling labor
5. Warehouse space cost (depreciation, maintenance, taxes)
6. Taxes and insurance on inventories
7. Order handling costs at the plant
8. Transportation equipment cost-net rental on shipper owned or leased equipment (such as tank cars, barges, ships) plus cleaning and maintenance

B. Accounts controlled by the Distribution and Traffic Department

1. Terminal and warehousing expenses outside the plant - this includes the analogue of accounts 1-7 in A above.
2. Freight - plant to customer (or terminal) and terminal to customer. This includes miscellaneous charges such as demurrage, pump and line costs for tank trucks and barges, tolls, insurance, and others.
3. Administration of distribution function.

To complete the system the physical distribution manager would require:

1. Customer absorbed freight.

2. Supplemental information of the same type on inbound purchases (vendor-absorbed and vendee-absorbed) along with such information as origin, commodity, tonnage, type shipment, etc., for a complete inbound analysis.[1]

Financial Statements

Some distribution managers do not foresee any advantage in altering the formal financial statements. They feel that the information they require can be obtained from supplementary reports. Others feel that the present financial statements are misleading by reporting in such a way that some physical distribution costs are assigned to production and cost of goods sold.

In a model system of accounting for physical distribution costs two changes would be made in the income statement:

1. Freight should be shown as an expense rather than netted against gross sales. This would eliminate the possibility of net sales increasing or decreasing due to a change in the logistics system. (See Chapter IV, Cases Two and Three).

---

[1]For a more detailed chart of physical distribution accounts see Appendix.

2. The accounts listed in A above, normally charged to production, would become distribution expenses, thus changing the face of the income statement.

In summary a model accounting system for physical distribution would be the present accounting system with these recommendations and modifications:

A. General Recommendations

1. Refinements in selecting bases for functional cost allocation where necessary.
2. An analysis of present plant overhead charges to isolate functionally costs of either production or physical distribution which may be buried there.
3. Application of more sophisticated statistical tests to averages used in allocating costs, where appropriate.

B. Specific Innovations

1. Implementation of Professor Lewis' system of collecting cost information for the geographically variable costs, such as freight and pipeline inventory time.
2. Revision of present account classification to remove physical distribution activities from the production accounts.
3. Revision of the income statement to reflect the above refinements, eg. freight.

CHAPTER VI

CONCLUSIONS AND IMPLICATIONS OF STUDY

In Chapter I several questions were raised, the answers to which are included in the conclusions of this study.

(1) Within the general subject area of distribution cost accounting are there unique, identifiable accounting implications and responsibilities in the functional marketing area of physical distribution?

From the evidence presented in Chapters Two and Three there is little doubt that there is a separate, unique area of physical distribution within the broader realm of distribution which has accounting implications and requires responsible action.

(2) Does the recognition of physical distribution as an unique marketing concept by marketing executives and academicians demand a corresponding response from accounting executives and academicians?

In order to solve the problems which many distribution managers are encountering which originate in traditional accounting practices, the accounting people must recognize and understand the marketing concept of physical distribution

and its accounting consequences. Evidence presented in the cases in Chapter Four and in the first part of Chapter Five indicates that serious obstacles to the correct interpretation of decision-making cost information are embodied in existing accounting procedures and practices.

The classification of accounts which does not coincide with cost control centers may lead to misleading managerial interpretations. Also the preponderant lumping of physical distribution charges to overhead at the plant level provides insufficient information for total cost control.

Where the correction of these deficiencies is feasible and does not result in serious loss of comparability and consistency it behooves the accountant to respond to the demand of the physical distributionists. Accounting serves the needs of the whole firm as well as interests outside the internal structure of the firm. Their informational demands must be balanced. This requires considerable discretion on the part of accounting management. It appears here that accounting executives and academicians can improve this balance by a response to the requests of the physical distribution people.

(3) Is there an awareness by the firm's accounting management, public accounting firms and academic accountants

of the informational needs of the executives responsible for physical distribution activities?

The awareness of accounting management as indicated by the research referred to in Chapter Three is scarce. Literature cited, however, indicates an increasing awareness by accountants of this management control area. In one of the companies from which data was received for this study the observation that the accounting management was not cognizant of the needs of the distribution manager is based on intra-company communications. Furthermore, in a second firm in this study, the accounting department did not provide satisfactory information to the managers of physical distribution activities.

In regard to public accounting firms, preliminary observations indicate that few public accounting firms are aware of any problems in the area of physical distribution. Among six branch offices of well-known public accounting firms contacted for this study, only one could produce or even acknowledge the existence of a change in a physical distribution activity which resulted in a change in accounting procedures or required attention by the public accounting firm. Yet, this kind of a change in distribution systems

frequently occurs.[1] It can be deduced from this evidence that the public accountants are not aware of the concept, perhaps being too occupied with other demands to acknowledge it; or the marketing people are not making them aware of their problems.

Academic accountants are not ostensibly concerned with this marketing problem. This observation is based on the almost complete absence of literature in accounting journals dealing specifically with the physical distribution concept.

The accounting profession at all levels has failed to emphasize or even to recognize in some cases this problem area for the distribution manager. Understandably the accounting profession cannot shift emphasis at the command of each functional area of the business firm. This major decision is made only at the top management level. Thus, apparently the distribution manager's message has yet not been effectively communicated to top management. When such communication has been accomplished the accounting profession may respond with a solution.

In summary, the accountant:

---

[1]See Arthur Andersen & Co., Operations Research in the Firm, (February, 1961), pp. II-7, II-14, II-23 and II-32, for examples of physical distribution changes which engaged the attention of Certified Public Accountants.

a) is not familiar with the physical distribution concept, as presently developed, and

b) faces many specialized areas in the firm: tax, auditing, financial, legal reporting, manufacturing, product costing, administrative budgets by jurisdiction. Distribution costing - in the sense comprehended here - is just another specialized area, and not one making as pressing demands as tax and financial accounting.

(4) What actually occurs in the accounting system of a company which has substantially altered its physical distribution system? What are the procedural and financial effects and implications?

The list of physical distribution activities in Chapter Two includes material handling, packaging, traffic and transportation, warehousing and terminaling, inventory management and order processing. Others may be included but there is less agreement on their inclusion. Changes in warehouses, transportation equipment, material handling equipment, packaging equipment and inventory levels are more likely to have financial implications than procedural effects. Changes in order processing and inventory control systems are more likely to have procedural effects on accounting systems.

In Case One a major change was made in warehousing, the inventory control system and order processing. In a change of this magnitude both procedural and financial effects would be anticipated and did occur. Billing and invoicing, accounts receivable collection and inventory control methods were modified. The costs of carrying inventory and accounts receivable were reduced, and cash flow was considerably accelerated. Changes in auditing and the role of the computer were effected also.

In the second case order processing and inventory control systems and inventory levels were changed. These changes affected billing procedures, increased inventory carrying costs and decreased working capital requirements.

The role of accounting personnel was minor in these changes. The changes were initiated by the physical distribution management with the cooperation of other involved departments. In one case the accounting department appeared not to be fully cognizant of the accounting implications of the changes.

The cases also show that traditional accounting procedures can and in these examples do obscure the costs under the control of the distribution manager. A change in his jurisdictional area to improve customer service at a lower

total cost was reflected by accounting methods in both net sales and production costs. For managerial control purposes, considering that managerial accounting is gaining in importance, the accounting practices here fall short of expected performance.

(5) Are there attempts to satisfy the informational needs of the distribution manager as evidenced by the modifications in the accounting system accompanying the changes in the physical distribution system?

These modifications in physical distribution and accounting systems did bring about substantial reductions in total costs. The accounting systems changes did not, however, reflect any conceptual changes by the accounting department. That is, the improved flow of information to the distribution manager was not a result of a more sophisticated comprehension of the physical distribution concept by the accountants. In each case studied, the desired changes in accounting systems which indicate a conceptual understanding have been initiated by the physical distribution people.

(6) What can be done by accountants to satisfy the criticisms of physical distributionists and to provide them with total cost control?

Accountants will make changes in their practices and procedures where the advantages are clear and no prohibitive handicaps are present. It is suggested from the evidence in this study that the accounting profession should modify procedures and financial reporting methods to provide the physical distributionists with more tractable cost information. This can be done without major handicaps or disadvantages by implementing the proposed modifications described in the preceding chapter. Some of these modifications are being tested in progressive companies right now. Professor Lewis' system has been tested with positive results. It has been received with enthusiasm. The reclassification of accounts proposed to separate the physical distribution activities charged to production accounts is now in the process of being tested by a large firm.

Changes in the financial statements, such as that suggested by Mr. Donald Drummond in Chapter Three, would require sweeping changes in the face of the income statement. Comparability would be sacrificed for a specialized purpose which is one among many. The changes proposed in the preceding chapter would reflect a more precise classification of the accounts, and yet would not require burdensome alterations to the income statement.

Additional Implications and Suggestions For Further Research

Auditing Implications

This study has left an untapped reservoir of potential research projects to be explored. There are many accounting implications which could not be thoroughly researched in this study. There are undoubtedly additional auditing implications arising from a change in the physical distribution system of a company, which did not become apparent from the data collected. It is suspected that these auditing consequences in the change-in-warehousing case probably occurred even though not specifically detected:

1) A reduction in the extent of the audit job via (a) a reduction in the number of locations and (b) by having current inventory lists to test with physical counts.

2) Improved ease of testing accounts receivable balances of customers by their being current. Probable reductions in discrepancies requiring reconciliation.

3) Reduction of the total auditing requirements by virtue of improvement in the quality of internal control over accounts receivable and inventories.

Robinson-Patman Act

Another research provoking aspect of this subject area -

distribution cost accounting - is the relevant portion of the Robinson-Patman Act. Price discrimination provisions of the Act make it imperative to defend price differentials in specified circumstances. Refinements in the methods of accounting for all distribution activities are necessary for more reliable justification of cost differentials and their corresponding price differentials.

Opportunity for Accounting Profession

The accounting profession has been confronted with a challenge by colleagues from a functional segment of marketing. The challenge may be overlooked or it may be viewed as an opportunity. There is a void in the flow of needed information that is being partially filled by marketing people themselves. What is significant is that, taken up, this opportunity could enhance the professional image of the accountant.

The challenge elicits a response of an analytical, not technical, nature. The stature of the accounting profession rests on its analytical ability. The technical activities are ephemeral; they will be gradually absorbed by mechanical and electronic processes. The more analytical are the tasks of accounting, the more inviting will be the profession to really capable young men and women.

The opportunity to extend the usefulness of accounting will stimulate the interaction between accounting and marketing colleagues. A closer relationship can be attained if accountants recognize this analytical opportunity and accept it. The alternative is to allow other existing or newly formed departments to perform these accounting functions. It is hoped that accountants will take this opportunity to broaden their horizons and expand their professional image as viewed by colleagues.

APPENDIX

PHYSICAL DISTRIBUTION COST CATEGORIES
- INDUSTRIAL MARKETING -

By H. G. Miller

Summary By Point Of Occurrence

I. COSTS AT PRODUCTION POINT
(Normally included in production cost by accounting)

A. Packaging
1. Package cost
a. Drums, bags or other single trip containers. Purchase cost plus freight and receiving.
b. Tank cars, barges, ships and other returnable containers.
(1) Ownership or rental costs.
(2) Maintenance and insurance.
(3) Record keeping and scheduling.
2. Materials handling and filling costs
a. Loading or packaging labor.
b. Cleaning and inspection of containers.
c. Ownership costs of filling equipment.
d. Quality control and analysis.
e. Losses in filling.

B. Storage And Handling Costs
1. Labor costs for material handling, order assembly and loading.
2. Equipment cost - materials handling equipment.
3. Space cost - rental or amortization, maintenance and taxes on facilities.

C. Financial Costs On Finished Goods Inventories
1. Cost of working capital.
2. Taxes and insurance on inventories.
3. Loss from deterioration or obsolescence.

D. Administrative
   1. Order processing and inventory control.
   2. Supervision of physical distribution functions.
   3. Communications and travel.

II. COST OF MOVING MATERIALS TO CUSTOMERS
(Normally included in Freight On Sales. May be deducted from Gross Sales to get Net Sales Dollar Figure used in Profit and Loss Statement)

A. Freight - From Plant To Terminal Or Customer And From Terminal To Customer
   1. Freight payments to carriers, or
   2. Cost of operating private transportation facilities (trucking, marine operations).
   3. Charges for return of containers.

B. Transportation Equipment Cost
   1. Rental or ownership cost of transportation equipment furnished by shipper.
      (Note - While this is covered in item I.A.1.b. as part of manufacturing cost in accordance with standard accounting practice, thre are strong arguments for considering transportation equipment as part of the freight or transportation cost.)
   2. Include cost for round trip transit time plus normal lost time from scheduling and delays at terminals or customer's plant.

C. Product Loss
Losses in transit not recovered from carriers or insurance.

D. Miscellaneous Costs
   1. Insurance on product while in transit.
   2. Stevedoring, dockage, wharfage and similar charges on marine movements.
   3. Demurrage payments for delay of carrier's equipment.

III. COST OF STORAGE AND WAREHOUSING OUTSIDE OF PLANT
(May be included in Cost of Goods Sold, Selling Expense or Distribution Account)

A. Packaging Expense (If packaging performed at terminal or redistribution point)

Same items as I.A.

B. Storage And Handling Costs
Same basic cost categories as item I.B. On public facilities same element applies but payments will be contract charges for rental, handling and other services.

C. Financial Costs Of Finished Goods Inventories

Same as item I.C.

D. Administrative
Same as item I.E. The following may also be applicable:
1. Office and laboratory space rentals.
2. Utilities.
3. Quality control costs.

E. Premium Freight Incurred As Result Of Improper Location Of Stocks
Since exact area forecasting of markets is generally not possible, some cross hauling is generally necessary to relocate stocks where they are needed.

IV. CUSTOMER'S COSTS

A. Transportation Cost
If customer absorbs part or all of freight.

B. Storage And Handling Costs
1. Labor costs to inspect, receive, store and move product to production unit.
2. Equipment cost - materials handling equipment.
3. Space costs - rental or amortization, maintenance and taxes on receiving, handling and storage facilities.

C. Financial Costs On Raw Materials Inventories

Same as item I.C.

D. Rental Or Demurrage Charges On Carrier Or Supplier Furnished Returnable Containers

BIBLIOGRAPHY

Books and Monographs

Analysis of Non-manufacturing Costs for Managerial Decisions. N.A.C.A. Research Series 19, 20 and 21, New York: National Association of Cost Accountants, 1951.

Arthur Andersen & Co. Operations Research in the Firm, 1961.

Castenholz, Wm. B. The Control of Distribution Costs and Sales. New York: Harper Brothers, 1930.

Culliton, J. W. The Management of Marketing Costs. Boston: Harvard University, 1948.

Crisp, Richard D. How to Reduce Distribution Costs. New York: Funk & Wagnalls Co., 1948.

Heckert, J. Brooks and Miner, Robert B. Distribution Costs. 2nd ed. New York: The Ronald Press Co., 1953.

Heskett, J. L., Ivie, Robert M., and Glaskowsky, Nicholas A. Business Logistics Management of Physical Supply and Distribution. New York: The Ronald Press Co., 1964.

Lang, Theodore. "Distribution Costs," Marketing Handbook. Edited by P. H. Nystrom. New York: The Ronald Press Co., 1958.

Lewis, Howard T., Culliton, James W. and Steele, Jack D. The Role of Air Freight in Physical Distribution. Boston: Harvard University, Division of Research, 1956.

Longman, Donald R., and Schiff, Michael. Practical Distribution Cost Analysis. Homewood, Ill.: Richard D. Irwin, Inc., 1955.

Miner, Robert. "Distribution Costs," Accountant's Handbook. Edited by Rufus Wixon. New York: The Ronald Press Co., 1956.

Mossman, Frank H. Differential Distribution Cost and Revenue Analysis: An New Approach. MTA Paper No. 10 East Lansing, Mich.,: Bureau of Business and Economic Research, Michigan State University, 1962.

Mossman, Frank H. and Morton, Newton. Logistics of Distribution Systems. Boston: Allyn and Bacon, 1965.

Schiff, Michael and Mellman, Martin. Financial Management of the Marketing Function. New York: Financial Executives Research Foundation, 1962.

Sevin, Charles H. Distribution Cost Analysis. Economic Series No. 50. Washington: U.S. Dept. of Commerce, 1946.

Sevin, Charles H. How Manufacturers Reduce their Distribution Costs. Economic Series No. 72. Washington: U.S. Department of Commerce, 1951.

Sevin, Charles H. Marketing Productivity Analysis. New York: McGraw-Hill Book Co., 1965.

Smykay, Edward W., Bowersox, Donald J., and Mossman, Frank H. Physical Distribution Management. New York: The Macmillan Co., 1961.

Periodicals

Beckett, John A., "The Art and the Science of Distribution Costing,"N.A.C.A. Bulletin, April, 1951, 893-906.

Blanding, Warren, (Ed.), "Profile of P.D.M." Transportation and Distribution Management, June, 1962, 13-17.

Bowersox, Donald J., "The Forces Influencing Finished Inventory Distribution," Transportation and Distribution Management, January, 1962, 11-14.

Cates, H. W., "Formula for Distribution and Transportation Costs," Cost and Management (Canada), May, 1961, 195-201.

Definition Committee of the American Marketing Association. "1948 Report," The Journal of Marketing, XIII (October , 1948), 202.

Drummond, Donald W., "A Marketing Yardstick," Transportation and Distribution Management, February, 1962, 13-16.

Editorial, "Distribution Management Tips," Transportation and Distribution Management, January, 1964, 4.

Editorial, "Organization vs. Function in Physical Distribution Management," Transportation and Distribution Management, February, 1962, 3.

Edwards, James Don, "Distribution Costs and Marketing Decisions," Business Topics, Spring, 1960, 15-20.

Elliott, N. J., "Other Distribution Costs," Journal of Accountancy, June, 1961, 80-1.

Farmen, Lyle M., "Accounting for Distribution Costs by Product Groups," Cost and Management (Canada), September, 1960, 317-20.

Fox, Harold W., "Don't Neglect Half the Costs," Cost and Management (Canada), October, 1960, 323-31.

Hessler, Kenneth W., "Assignment: Design and Phase-in a New Distribution System," Transportation and Distribution Management, January, 1965, 35-43.

Jaedicke, Robert K., "Marketing Cost Analysis - A Reply," N.A.A. Bulletin, July, 1962, 57.

Kelley, E. W., "Distribution Cost Control," N.A.C.A. Bulletin, April, 1951, 907-22.

Landis, Eugene, "Marketing Management and Distribution Planning," Transportation and Distribution Management, July, 1962, 15-19 and 41-2.

Lazer, William, "A Systems Approach to Transportation," Distribution Age, September, 1960, 33-5, 64-5.

Mellman, Martin, "Marketing Cost Analysis - Development and Current Practices," Accounting Review, January, 1963, 118-123.

Mellman, Martin, "Marketing Cost Analysis - Its Relationship to Factory Costing Methods," N.A.A. Bulletin, January, 1962, 25.

Miller, H. G., "Accounting for Physical Distribution," Transportation and Distribution Management, December, 1961, 6-13.

Mossman, Frank H., "Distribution Costs - Where are They?" Controller, May, 1962, 203-5.

Schiff, Michael, "Bases for Allocating Distribution Costs," Journal of Marketing, XVI (No. 4), 461-62.

Snyder, Richard, "Physical Distribution Costs," Distribution Age, January, 1963, 45-56 and December, 1963, 35-42.

Watson, Robert H., "Bases for Allocating Distribution Costs," Journal of Marketing, XVI (July, 1951), 29-42.

Reports and Other Sources

Hessler, K. W., "A Physical Distribution Case Study," presentation before the Milwaukee Association of Commerce, October 20, 1964.

Lewis, Richard J., "A Business Logistics Information and Accounting System for Marketing Analysis," Unpublished thesis for the degree of D.B.A., Michigan State University, 1964.

Longman, Donald R., "Recent Developments in Distribution Cost Analysis," Proceedings: Conference of Marketing Teachers from Far Western States. Edited by Delbert J. Duncan. Berkeley: University of California, 1958.