

# Logistical Management

*Donald J. Bowersox*

Second Edition

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*A Systems Integration of  
Physical Distribution Management  
and Materials Management*

Second Edition

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# Logistical Management

## Preface

For over two decades, I have had the good fortune to participate actively in the formative years of business logistics. During this time, I have come to have a deep respect for the complexity of logistical performance and for its importance to the maintenance and growth of the free-enterprise system. To have the opportunity to attempt to describe the current content and future direction of this dynamic aspect of professional management is both a deeply felt privilege and a responsibility.

The history of the preparation of *Logistical Management* goes back to 1958. As many readers are aware, the first edition (published in 1974) was actually my third effort to describe the direction and dimension of an emerging field. The first effort, published under a different title and presented in 1961, was a collaboration with two other authors and was the initial attempt to integrate corporate physical distribution activities in a single book. In 1968 the work, again a collaboration, was substantially rewritten as a new book because of the vast changes that had occurred in the field during the intervening seven years. The first edition of my *Logistical Management* itself contained a great deal of the material I contributed to the two earlier works. However, by 1974, the horizons of subject content had once again expanded so as to make a new and broader approach to subject matter development desirable. The viewpoint of total logistics has been further developed and refined in this second and heavily revised edition of *Logistical Management*.

*Logistical Management* is presented as a systems integration of physical distribution management, materials management, and internal inventory transfer. With the exception of manufacturing processing, business logistics is viewed as involving overall management of all aspects of physical movement to, from, and between facility locations that constitute the operating structure

of the enterprise. I hope that the text, as an introduction to logistics, has achieved two fundamental objectives. First, the selected materials present a comprehensive description of existing logistical practice within the private and public sectors of society. Second, a conceptual approach is provided that illustrates how the discipline is likely to mature during the initial years of the student's career.

It would be impossible to list all the individuals who have made significant contributions to the contents of this book. Special thanks are due to Professors Donald A. Taylor of Michigan State University, Thomas A. Staudt of Chevrolet Motor Division of General Motors Corporation, and Arthur E. Warner of the University of South Carolina, all of whom served as graduate chairmen for the author. In addition, for their specific aid with the manuscript, particular appreciation is due Professors Frank Mossman, John Hazard, Douglas Lambert, Robert Monczka, and George Wagenheim of Michigan State University, Bernard J. La Londe of The Ohio State University, Brian O'Neil of the University of Miami, Jim Johnson of the University of Tulsa, and Omar Keith Helferich of Cleveland Consulting Associates. I am also pleased to acknowledge the guidance over the years of three close friends who counsel freely: Walter L. Jeffrey, Vice Chairman of the E. F. MacDonald Company; Robert J. Franco, President of Spector Industries, Inc.; and Mark Egan, former Executive Director of The National Council of Physical Distribution Management; and the influence of two former mentors who are deceased: Edward A. Brand and George A. Ramlose.

I have been an active member of The National Council of Physical Distribution Management since its inception, and it would be impossible to elaborate the contributions of the many NCPDM members who have been of assistance in the preparation of this manuscript. In addition, over the past eleven years, those managers who have attended the annual Michigan State University Physical Distribution Executive Development Seminar have been exposed to the basic concepts developed in the text and have given freely of their time and experience.

The roll of those who teach various aspects of logistics around the world has expanded so as to make acknowledgment of key individuals impossible. To this group in general, and in particular to Professors E. Grosvenor Plowman of the University of Maine, Robert Pashek of Pennsylvania State University, Ernest Williams of Columbia University, and Lester Waters of Indiana University, I express sincere appreciation for their dedication to the objective we all serve. In addition, I am grateful for the support of my colleagues at Michigan State University whose advice and assistance made it possible to complete this manuscript.

It is difficult to pinpoint the continuous contribution that a teacher receives from his students over the years. In many ways, the final day of judgment of a professional career comes in the seminar room. I have been fortunate to have the counsel of a great many outstanding young scholars who currently are making their marks upon the academic and business worlds. In particular, I

wish to acknowledge the assistance of all the doctoral students who participated in simulation research dealing with LREPS and SPSF over the past decade. Two graduate assistants, John T. Mentzer and Jeffrey Sims, have provided substantial assistance in the preparation of this revision.

I wish to single out the contribution of Felicia Kramer, who once again has served as coordinator of manuscript preparation. Felicia, who typed, edited, and prepared the manuscript art carried a burden over and above her normal assignment that is deeply appreciated. David Closs made a substantial contribution to the manuscript through preparation of mathematical and statistical examples. His contribution is particularly notable in Chapters 11 and 12.

Finally, every author has an understanding family, or the preparation of a manuscript would be impossible during the demanding years of life. In my particular case, this book is dedicated to Carol for reasons she full well understands.

With so much able assistance, it is difficult to offer any excuse for the shortcomings that might follow. However, the faults are solely my responsibility.

D. J. B.

# The Logistician

Logisticians are a sad and embittered race of men who are very much in demand in war, and who sink resentfully into obscurity in peace. They deal only in facts, but must work for men who merchant in theories. They emerge during war because war is very much a fact. They disappear in peace because peace is mostly theory. The people who merchant in theories, and who employ logisticians in war and ignore them in peace, are generals.

Generals are a happily blessed race who radiate confidence and power. They feed only on ambrosia and drink only nectar. In peace, they stride confidently and can invade a world simply by sweeping their hands grandly over a map, pointing their fingers decisively up terrain corridors, and blocking defiles and obstacles with the sides of their hands. In war, they must stride more slowly because each general has a logistician riding on his back and he knows that, at any moment, the logistician may lean forward and whisper: "No, you can't do that." *Generals fear logisticians in war and, in peace, generals try to forget logisticians.*

Romping along beside generals are strategists and tacticians. Logisticians despise strategists and tacticians. Strategists and tacticians do not know about logisticians until they grow up to be generals—which they usually do.

Sometimes a logistician becomes a general. If he does, he must associate with generals whom he hates; he has a retinue of strategists and tacticians whom he despises; and, on his back, is a logistician whom he fears. This is why logisticians who become generals always have ulcers and cannot eat their ambrosia.

—Author unknown

Made available by Major William K. Bawden, RCAF.



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PART One

*Integrated Logistical  
Management*

CHAPTER 1

Logistical Management

CHAPTER 2

Logistical Systems

CHAPTER 3

Logistical Operations

CHAPTER 4

Logistical Coordination



# Logistical Management

## Toward Integrated Logistics

1956–1965—A Decade of Crystallization

Development of Total Cost Analysis  
Development of the Systems Approach  
Increased Concern for Customer Service

Revised Attention to Distribution Channel Arrangements

1965–1970—A Period of Testing for Relevancy

1970–1978—A Period of Changing Priorities

Beyond 1978—Toward Integrated Logistics

Integrated Logistics

Logistical Operations

Logistical Coordination

Integrated Logistics—An Overview

The Logistical Mission

Logistical Performance

Logistical Cost

Logistical System Balance

Summary

The subject of this book, logistical management, is unique because it is one of the oldest and also one of the newest enterprise activities.<sup>1</sup> Logistical activities—facility location, transportation, inventory, communication, and handling and storage—have been performed since the beginning of commercial specialization. It is difficult to visualize any marketing or manufacturing that would not require logistical support.

The newness of logistics stems from a totally different and integrated approach to management that began to emerge during the 1950s. *Modern logistics* is defined as

the process of strategically managing the movement and storage of materials, parts, and finished inventory from suppliers, between enterprise facilities, and to customers.<sup>2</sup>

<sup>1</sup> The term *logistics* is not qualified specifically as business or military. The basic concepts of logistical management are applicable throughout private and public enterprise activities. Over the years, common titles used to describe all or parts of the material discussed in this text have been *business logistics*, *physical distribution*, *materials management*, *physical supply*, *logistics of distribution*, *marketing logistics*, *rhochrematics*, and *total distribution*.

<sup>2</sup> In 1976 the National Council of Physical Distribution Management modified its 1962 definition of *physical distribution management* as follows: “Physical distribution management is the term describing the integration of two or more activities for the purpose of planning, implementing and controlling the efficient flow of raw materials, inprocess inventory and finished goods from point of origin to point of consumption. These activities may include, but are not limited to, customer service, demand forecasting, distribution communications, inventory control, material handling, order processing, parts and service support, plant and warehouse site selection, procurement, packaging, return goods handling, salvage and scrap disposal, traffic and transportation, and warehousing and storage.” Although this definition does not incorporate the specific managerial titles used in this text, it does reflect the need for total movement management from point of materials procurement to location of finished product distribution.

The objective of logistics is to deliver finished inventory and material assortments, in correct quantities, when required, in usable condition, to the location where needed, and at the lowest total cost. It is through the logistical process that materials flow into the vast manufacturing complex of an industrial nation and products are distributed through channels of distribution for consumption.

Logistical performance provides time and place utility. Such utility represents an important aspect of business as well as governmental operations. All forms of organized behavior require logistical support. Value, in the form of timely availability, is added to either materials or products as a result of the logistical process. Such value is costly to achieve. Although difficult to measure precisely, the annual logistical expenditure of the United States exceeds 20 per cent of the total gross national product. In other words, for every trillion dollars of GNP, the national logistical bill exceeds \$200 billion annually.<sup>3</sup>

This book is concerned with logistical management. In the broadest sense, the scope of logistical management involves everything that moves to, from, and between the operating facilities of an enterprise. To achieve an orderly flow of products to the marketplace, managerial attention must be directed to the design of a logistical system and then to its operation. Therefore, *logistical management responsibility* is defined as

The managerial responsibility to design and administer a system to control the flow and strategic storage of materials, parts, and finished inventory to the maximum benefit of the enterprise.

The goal of logistical performance is to achieve a predetermined level of manufacturing-marketing support at the lowest possible total cost expenditure. The logistical manager has the fundamental responsibility for planning and administering an operating system capable of realizing this goal. Within this broad responsibility of system planning and administration, a multitude of detail and complex tasks exist. The hallmark of logistics is integration of the varied dimensions and demands for strategic movement and storage.

This initial chapter introduces and defines the basic concepts involved in logistical management. Attention is first directed to a brief review of forces contributing to the development of contemporary logistics. Then an overall perspective of integrated logistics is presented. The final section offers a specific statement of the logistical mission. The chapter summary provides a synthesis of subjects developed in subsequent chapters.

## **Toward Integrated Logistics**

Prior to 1950, the typical enterprise treated the process of logistical management on a fragmentary basis. Although a great many authors acknowledged

<sup>3</sup> Author's estimate based on figures provided by U.S. government publications and industry reports.

the fundamental importance of logistics to marketing and manufacturing, no formalized or integrated managerial concept prevailed.<sup>4</sup>

From the beginning of the Industrial Revolution, our national capacity to mass-produce and mass-market far outstripped our capacity to mass-distribute. The advent of the marketing concept intensified the chaotic nature of logistical operations. The priority which modern marketing placed upon (1) extensive line-item proliferation, (2) selling identical products through a wide variety of marketing channels and different types of retailers, and (3) the widespread offering of product-contained services, combined to create a *need* for a new and less expensive approach to the physical support of marketing. The following quote from a 1954 speech of the late Paul D. Converse provides a general appraisal of the situation prevailing during the early 1950s.

. . . in the study of marketing and the operation of marketing departments and businesses a great deal more attention is paid to buying and selling than to physical handling. In fact, the physical handling of goods seems to be pretty much overlooked by sales executives, advertising men, and market researchers. . . problems of physical distribution are too often brushed aside as matters of little importance. I have for years been reading business and economics magazines. Such publications over the years have devoted relatively little space to physical distribution.<sup>5</sup>

The neglect and subsequent late development of logistics can be logically attributed to at least two major forces. First, prior to the time that computers were commonplace and before quantitative techniques were widely available, there was no reason to believe that the overall integration of logistical activities would improve performance. The 1950s were destined to witness a major change in logistical management practices. Neither computers nor quantitative techniques were to be denied the fertile area of logistical applications. There is little doubt that computers and quantitative techniques have been as effectively utilized in logistics as in any other management area.

<sup>4</sup> Numerous early references to logistics can be located in the literature. Arch W. Shaw, *An Approach to Business Problems* (Cambridge, Mass.: Harvard University Press, 1916), pp. 101–10, discussed the strategic aspects of physical distribution. Other early references are found in Fred E. Clark, *Principles of Marketing* (New York: Macmillan Publishing Co., Inc., 1922); Theodore N. Beckman, *Wholesaling* (New York: The Ronald Press Company, 1926); Ralph Borsodi, *The Distribution Age* (New York: Appleton-Century-Crofts, 1929); and Richard Webster, "Careless Physical Distribution: A Monkey-Wrench in Sales Management Machinery," *Sales Management*, Vol. 19 (July 6, 1929), p. 21. For a comprehensive review of early literature, see Bernard J. La Londe and Leslie M. Dawson, "Early Development of Physical Distribution Thought," in *Readings in Physical Distribution Management* (New York: Macmillan Publishing Co., Inc., 1969), pp. 9–18. The historical review presented in this introduction is updated from an article by the author originally published in 1969; see Donald J. Bowersox, "Physical Distribution Development, Current Status, and Potential," *Journal of Marketing*, Vol. 33 (January 1969), pp. 63–70.

<sup>5</sup> Paul D. Converse, "The Other Half of Marketing," *Twenty-sixth Boston Conference on Distribution*, Boston, 1954, p. 22.

A second major force contributing to modification of traditional practices was the existence of a prolonged, volatile economic climate. The extended profit squeeze of the early 1950s, characterized by recessions, created a managerial environment conducive to the development of improved cost control. Integrated logistics offered a fertile area for realizing cost reduction.

Thus technology, as well as need, changed abruptly during the 1950s. The development of integrated logistics is reviewed in three time periods during which revised attitudes and practices emerged regarding movement and storage management.

### *1956 to 1965—A Decade of Crystallization*

The period from 1956 to 1965 was the decade during which the integrated logistical concept crystallized after years of relative obscurity. Four major developments solidified this crystallization: (1) development of total cost analysis, (2) development of the systems approach, (3) increased concern for customer service, and (4) revised attention to distribution channel arrangements. A brief discussion of each follows.

**DEVELOPMENT OF TOTAL COST ANALYSIS.** In 1956 a specialized study of air freight economics provided a significantly new integrative concept.<sup>6</sup> The study, in an effort to explain the economic justification for high-cost air transport, introduced the concept of total cost analysis. Total cost was presented as a measure of *all* expenditures required to accomplish a logistical mission. The authors illustrated that the high freight rates characteristic of air transport could in selected situations be more than offset by reductions in inventory holding and warehouse operation costs.

The concept of total cost, although basic, had not previously been applied to logistical economics.<sup>7</sup> Probably because of the economic climate of the times, the result was increased attention to the total cost evaluation of logistical problems. Subsequent refinements provided a comprehensive identification of cost components and further developed the measurement techniques of functional cost analysis.<sup>8</sup>

<sup>6</sup> Howard T. Lewis, James W. Culliton, and Jack D. Steel, *The Role of Air Freight in Physical Distribution* (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1956).

<sup>7</sup> The total cost concept, developed in greater detail in Chapter 8, is a specialized form of break-even analysis. For some early applications, see J. Brooks Heckert and Robert B. Miner, *Distribution Costs* (New York: The Ronald Press Company, 1940), Chap. 15; and Donald R. Longman and Michael Schiff, *Practical Distribution Cost Analysis* (Homewood, Ill.: Richard D. Irwin, Inc., 1955), pp. 35–37.

<sup>8</sup> In particular, see Marvin Flaks, "Total Cost Approach to Physical Distribution," *Business Management*, Vol. 24 (August 1963), pp. 55–61, and Raymond LeKashman and John F. Stolle, "The Total Cost Approach to Distribution," *Business Horizons*, Vol. 8 (Winter 1965), pp. 33–46. For a more recent application, see Douglas M. Lambert and Bernard J. La Londe, "Inventory Carrying Costs," *Management Accounting*, August 1976, pp. 31–35.



DEVELOPMENT OF THE SYSTEMS APPROACH. It is difficult to trace the exact origins of the systems approach.<sup>9</sup> However, the concept of total integrated effort toward the achievement of predetermined goals was ready-made for logistical analysis. Whereas total cost analysis offered a method for evaluating alternative combinations of logistical activities, the systems concept provided an analysis framework.

The first general articles on logistics relied heavily upon the systems approach.<sup>10</sup> In particular, the systems approach highlighted the deficiency of treating logistical activity centers as isolated performance areas.

When evaluated from a systems viewpoint, integrated logistics creates a new requirement for compromise between and among traditional managerial policies. For example, manufacturing desires long production runs and low procurement costs. In contrast, logistics raises questions concerning the total cost commitment of these practices. The traditional financial position favors low inventories, a practice that could force the arrangement of logistical activities into a less than satisfactory total cost structure. With respect to marketing, traditional preference is for finished goods inventory staging and broad product assortments in forward markets. Such anticipatory logistics may be in direct conflict with the most economical total system evaluation. The significant point made by the above illustrations is that logistical considerations must be included in total system planning. The basic belief that integrated system performance produces superior end results in comparison to noncoordinated activity became a primary focal point of logistical planning.

INCREASED CONCERN FOR CUSTOMER SERVICE. By the mid-1960s, the horizons of integrated logistics began to expand. During this period, management emphasis shifted from cost to customer service performance.<sup>11</sup> The result was a more realistic evaluation of logistical service with respect to manufacturing

<sup>9</sup> For an early discussion of the systems approach to problem solving, see Geoffrey Gordon, *System Simulation* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969), Chaps. 1 and 2; Jay W. Forrester, *Principles of Systems* (Cambridge, Mass.: Wright-Allen Press, 1969); Stanford L. Optner, *Systems Analysis* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1960); Stanely F. Stasch, *Systems Analysis for Marketing Planning and Control* (Glenview, Ill.: Scott, Foresman and Company, 1972); Van Court Hare, Jr., *Systems Analysis: A Diagnostic Approach* (New York: Harcourt Brace Jovanovich, 1967); and/or Robert H. Kupperman and Harvey A. Smith, *Mathematical Foundations of Systems Analysis* (Reading, Mass.: Addison-Wesley Publishing Company, Inc., 1969).

<sup>10</sup> For example, see Harvey N. Shycon and Richard B. Maffei, "Simulation—Tool for Better Distribution," *Harvard Business Review*, Vol. 38 (November–December 1960), pp. 65–75; Donald D. Parker, "Improved Efficiency and Reduced Cost in Marketing," *Journal of Marketing*, Vol. 26 (April 1962), pp. 15–21; J. L. Heskett, "Ferment in Marketing's Oldest Area," *Journal of Marketing*, Vol. 26 (October 1962), pp. 40–45; and John F. Magee, "The Logistics of Distribution," *Harvard Business Review*, Vol. 40 (July–August 1962), pp. 89–101.

<sup>11</sup> For examples, see Peter Drucker, "The Economy's Dark Continent," *Fortune*, Vol. 72 (April 1962), pp. 103–104; William Lazer, "Distribution and the Marketing Mix," *Transportation and Distribution Management*, Vol. 2 (December 1962), pp. 12–17; and Wendell M. Stewart, "Key to Improved Volume and Profits," *Journal of Marketing*, Vol. 29 (January 1965), pp. 65–70.