Physical Distribution:
Key to Improved
Volume and Profits

DISTRIBUTION is the sale and movement of goods to customers. The term “physical distribution” refers to that portion of the total distribution activity devoted to the addition of time and place utility to the form utility provided by manufacturing.

Physical distribution has been variously described as “The Economy’s Dark Continent,”¹ and the last frontier of cost reduction in American business. “You can’t cut prices, labor or material. The only fat left in this business is (physical) distribution.”²

These typical comments highlight a condition which is receiving greatly increased management attention in today’s highly competitive industrial marketing economy: the fact that improvements in distribution technology have not kept pace with improvements in manufacturing efficiency and marketing effectiveness.

Much has been spoken and written on the subject. Four trade publications devoted exclusively to physical distribution are published each month: Distribution Age, Handling & Shipping, Traffic Management and Transportation & Distribution Management.

It is the purpose of this article to place the subject of distribution in proper perspective for marketing management. Also described herein is a suggested approach to the development of improved physical distribution operations.

What is Physical Distribution?

In essence, physical distribution is the “science” of business logistics whereby the proper amount of the right kind of product is made available at the place where demand for it exists at the time it exists. Viewed in this light, physical distribution is the key link between manufacturing and demand creation. As such, it has a profound effect on the success of both activities, and consequently on the basic profitability of the enterprise.

Physical distribution is a system of interrelated activity “cogs,” all centered around the key “inventory management” cog. The individual cogs comprising a typical system are shown in Figure 1.

Responsibility for individual activity cogs has traditionally been allocated to various company departments—as shown in Figure 2—with the result that the final responsibility for integrating these activities into an economical flow of goods to customers has rested with the chief executive officer, or someone in a general management position.

The present trends toward unification of these activities under a single manager of distribution is nothing more than recognition of the need for specialized management of an increasingly important and costly corporate responsibility—that of developing satisfied customers.

**How Much Does Physical Distribution Cost?**

In the United States the storage and movement of products from plants to markets is estimated to cost between $50 and $75 billion annually, with some estimates running as high as $100 billion when inventory carrying and order processing costs are included.

An analysis of physical distribution costs in various industries indicates that these costs range from a low of approximately 10% of sales in the machinery industry to a high of almost 30% in the food industry. See Table 1.

Another study shows that the all-industry average amounted to 21.8% of sales, spread between

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TABLE 1

<table>
<thead>
<tr>
<th>Industry</th>
<th>% of sales^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and food products</td>
<td>29.6</td>
</tr>
<tr>
<td>Machinery</td>
<td>9.8</td>
</tr>
<tr>
<td>Chemicals, petroleum, and rubber</td>
<td>23.1</td>
</tr>
<tr>
<td>Paper and allied products</td>
<td>16.7</td>
</tr>
<tr>
<td>Primary and fabricated metal</td>
<td>26.5</td>
</tr>
<tr>
<td>Wood products</td>
<td>16.1</td>
</tr>
</tbody>
</table>

^Source: Same reference as footnote 3.
^bAverage during 1960-62.

Attention on Physical Distribution

A number of other reasons appear to be behind the focusing of increased management attention on physical distribution.

1. The trend toward a short-order economy

Inventory-carrying costs, which now amount to between 18 and 24% of the value of the goods, have stimulated management in all kinds of businesses to improve their control over inventories. At the same time rapid advances in computer capabilities have facilitated this effort.

The result is a general trend toward the more frequent ordering of smaller quantities, with increased demands for customer service on each order, in order to improve inventory utilization. More frequent ordering by customers forces manufacturers to handle a greater number of orders to achieve the same volume of business.

More orders, each moving more rapidly through the distribution system, have caused many manufacturers to realize that their present systems cannot efficiently produce the levels of service now required of them.

2. The rapid expansion in SKU's

In addition to more frequent ordering of smaller quantities, customers are demanding a continually increasing variety of models, styles, colors, packages, and price variations in the goods they buy.

This increase in product variation means more stock keeping units (SKU's) in inventory, with correspondingly less movement in each. This condition tends to move geometrically in a multiple-warehouse situation to create obsolescence and stock availability problems, as well as imbalance in inventories.

3. The revolution in marketing

Beginning with the discount house there has been a modern-day revolution in the marketing of consumer goods, which has carried over into the distribution of industrial goods. Pressure for lower prices has forced the development of new, more direct, and more efficient channels of distribution.

This represents a major force behind the trend in many industries away from traditional methods of physical distribution. The need for individual companies to make a complete review of their distribution systems has never been greater.

4. Limits on pricing flexibility

Significant limitations now exist on basing-point and zone-pricing systems, and on delivery discount structures.

Price differentials and discounts must now be cost-justified more completely than ever before. This is forcing many companies to determine, perhaps for the first time, their actual distribution costs on individual product groups moving to individual markets and classes of trade, rather than to rely on broad national cost averages.

5. Physical distribution as a tool of competitive marketing strategy

Competitive strategies were at one time centered largely around product features and prices. This list has now been expanded to include physical distribution. Many companies are creating strong competitive advantages for themselves by out-performing their competition on customer service and product availability.

Moreover, by helping to lower the customer's inbound freight, receiving, and inventory costs, an even stronger advantage can be gained. The realization that a highly responsive, reliable physical distribution system can facilitate marketing efforts and actually help to generate additional sales volume is spreading rapidly.

How Can Physical Distribution Generate Sales?

There are a number of ways in which a properly designed physical distribution system can help to
generate additional sales volume. The following are some of the more obvious:

1. Minimize out-of-stock occurrences. By minimizing out-of-stock occurrences through more accurate inventory placement and control, sales lost due to being out of stock will be minimized. This has the double advantage of increasing both actual sales volume and the level of customer satisfaction.

2. Reduce customer inventory requirements. A responsive distribution system can mean shortened customer order cycles, and, consequently, reduced customer inventories. To the extent that one company can develop a more responsive distribution system than its competitors, it will be possible for customers of that company to obtain an economic advantage by doing business with it.

3. Solidify supplier-customer relationships. A soundly conceived distribution system can help to solidify and perpetuate a supplier's relationships with its customers. This can be accomplished through integration of the supplier's delivery facilities with customers' receiving facilities, consignment of stocks to customers, and other devices of a similar nature.

4. Increase delivery discounts. The development of more efficient physical distribution procedures frequently produces sufficient cost savings to enable the sharing of part of these savings with customers in the form of increased delivery discounts.

5. Enable expanded market coverage. More efficient distribution operations frequently permit a company to compete more profitably and more effectively in distant markets, or in markets that previously were marginal. In this way the company is enabled to expand its distribution, which leads in turn to increased sales volume.

6. Allow greater concentration on demand creation. The development of a well-organized physical distribution activity in which a separate administrative group is established to plan and operate the distribution system can free up marketing and sales personnel—to allow them to concentrate more attention on their basic responsibility, demand creation. In many companies this has led to an expansion in the number of sales offices and a decrease in the number of warehouses, with a consequent reduction in total distribution costs.

How Can Distribution Costs Be Reduced?

The development of a productive approach toward distribution cost reduction requires an understanding of:

- The nature of the individual cost elements normally associated with distribution.
- The manner in which these costs vary when changes occur—for example, in the number of warehouses or in the level of customer service to be produced by the system.

A knowledge of cost-variation characteristics provide a frame of reference within which a representative range of alternate distribution plans may be selected for evaluation for cost-reduction opportunities.

Figure 3 presents a simplified example of the manner in which transportation, warehousing, and inventory carrying costs vary as the number of warehouses is increased.

Note that the bottom line, representing warehouse-to-customer transportation costs, declines as the number of warehouses increases and the average distance from warehouse to customer is reduced. At the same time, however, plant-to-warehouse transportation costs, warehousing costs, and inventory costs, as shown by the middle line, go up as the number of warehouses increases.

The increase in plant-to-warehouse costs is due to the fact that smaller shipments to a greater number of points cost more than transporting the same volume in large shipments to a relatively few points.

Warehousing and inventory-carrying costs go up primarily because of duplications in overhead, and the reduced inventory utilization which results from the increased number of warehouse locations.

The important thing to note is that, up to a point, the cumulative effect of both cost lines is a reduction in the top or total cost line. However, as the larger cost elements continue to increase, a point is reached where they more than offset the diminishing warehouse-to-customer transportation costs, with the net result that total costs go up.

Directly below the low point on the total cost curve is the optimum number of warehouses at which total physical distribution costs are minimized.

Distribution costs must be identified in considerable detail in order to be of use in efforts to reduce costs. For example, transportation costs might be classified in terms of the activity for which they were incurred, such as:

![Distribution Costs vs. Number of Warehouses](image-url)
In recent years an increasing number of technological improvements affecting the distribution area have been forthcoming. These include such developments as containerization, high-speed computers and communications equipment, air freight, new and more automatic materials-handling equipment, new types of trailer equipment suitable for both over-the-road and local delivery service, integral trains, motor carrier distribution tariffs, and so-called cube rates. Frequently it is possible to reduce distribution costs through the use of one or more of these innovations.

6. Revised channels of distribution. Of course, it is possible that the basic reason for high distribution costs may be found in the channels of distribution being used. Certain channels are inherently higher cost than others. Depending on the company’s volume, its sales objectives and policies, and the nature of its markets, it may be possible to lower distribution costs appreciably by revising the channels of distribution being used—assuming that this can be accomplished without impairing marketing effectiveness. The marketing aspects of the problem are so closely related to the purely physical aspects as to be inseparable.

The mere fact that something has been done in a certain way for 10 or 15 years is all the more reason to give it a thoroughly objective look in an effort to find a better, less expensive way of doing it. Typical results of major cost reduction studies range from 3, 4, or 5% up to as much as 25%.

Procedure for Studying Physical Distribution Operations

Once management becomes aware of the need to improve distribution, a decision must be made as to how this can best be accomplished.

Experience would indicate that there is no substitute for a complete, balanced review of the entire distribution activity. Anything less than this will produce only limited cost reduction.

For example, it makes little sense to concentrate on improving the efficiency of a warehouse when economic or service justification for the warehouse itself is lacking. The complete review will take time; but it provides a background of basic understanding that cannot be obtained any other way. Such a review involves four steps:

Step 1—Developing proper perspective. In order to develop perspective, it is helpful to:

- Analyze present distribution patterns and demand requirements, by quantifying customer ordering habits such as the frequency and size of order, number of line items per order, the relative volume of demand by item and so on.
- Review the nature of demand, that is, the degree and duration of sales fluctuations, volume growth trends and product mix trends.
- Analyze the geographic concentration of sales and study the present concentration versus anticipated future concentrations.
- Review competitive distribution programs.
- Evaluate the company’s distribution image with key customers.
- Determine the company’s present customer service levels by:
  - product group
  - geographic area
  - class of trade or channel of distribution
• Review marketing plans, policies, and objectives as these have a bearing on distribution operations.
• Develop a clear understanding of key distribution problems and their causes.

Step 2—Delineate present distribution methods, costs, and volumes. This is done for the purpose of establishing a basis of comparison for alternate plans. Information should be developed on the following where applicable:

a. With respect to transportation it is helpful to know:
   • operating costs by mode, product group, and geographic location. These need to be stated in unit costs if linear progrming is to be used to develop the optimum distribution plan.
   • tonnage volumes by mode, product group, and geographic location
   • relative usage of various modes—rail versus truck versus forwarder, and the economic or service justification for each
   • relative expense of owning or leasing a private fleet
   • the cost of the company’s f.o.b. policy

b. Concerning warehousing, receiving, and shipping, it is necessary to determine:
   • operating costs, both in-plant and in the field, for all private and public warehousing done by the company
   • facility and equipment costs—owned versus leased
   • through-put volumes at each location, to determine relative efficiency
   • manning requirements at each location
   • methods and procedures, including possibilities for increased automation or more mechanical handling (short of full automation)
   • utilization of present company-operated facilities
   • clerical work volume, cost, and productivity
   • economic service areas of existing locations

c. In connection with inventory, determine:
   • average month-end unit levels
   • turnover rates by location
   • average value (investment)
   • carrying costs

d. With respect to order processing, communications and related data-processing activities, determine:
   • systems requirements and work load
   • present costs
   • capacity of present system (machine utilization)
   • feasibility of practical alternatives
   • need for compatibility with other company data processing procedures

e. With respect to packaging, look at:
   • filling and container costs
   • repackaging costs
   • ICC packing requirements
   • possibilities for standardization
   • changing customer needs

In the process of reviewing present methods, costs, and productivity, it is quite possible that a number of short-range improvements can be found that can be put into effect almost immediately.

Step 3—Develop a representative range of alternative methods and plans.

Knowing present costs and customer distribution requirements, it is possible to begin developing a representative range of alternative distribution methods and plans.

Start by attempting to simplify the system. Since it costs money to handle the product, which handlings—if any—can be eliminated? Is more direct shipment to customers possible? Can the present channels of distribution be simplified? What would happen if the present order cycle were shortened? Is it necessary to make all warehouses "full line"? Is it economically feasible to consign stocks to customers and let them handle warehousing? Can the use of premium transportation enable more than offsetting cost reductions in field warehousing and inventories? Are fluctuations in demand gradual enough and sufficiently predictable to enable further centralization of inventory? Is the present distribution system keyed to handling the troublesome exceptions or the easy-to-handle, run-of-the-mill type orders?

Next, look at possibilities for utilizing the more recent technological innovations.

Can standard containers or specially designed bulk packs be used to unitize loads and thereby reduce piece handling? Can the product be stored and transported in such a way that it can be unloaded directly into the customer’s processing operations—thus reducing packaging, handling, and delivery costs?

Opportunities should also be sought for improvements in packaging and product design, to permit better utilization of the available cubic capacity of warehouses and transportation equipment. Perhaps bulk packaging of certain items can save money.

Step 4—Evaluate alternatives and select the optimum plan.

Once alternative plans have been selected for evaluation, their operating and facility costs and the levels of customer service they are capable of producing need to be projected.

To accomplish this requires the development for each alternative of specific information about operating costs, transportation rates and schedules, and the subsequent simulation of the operation of each alternative under a representative range of operating conditions. From this it will be possible to select the best alternative and to prepare a practical plan of implementation.

Various mathematical techniques, such as linear and non-linear programing, are also available to facilitate the process of evaluation. The continuing use of mathematical models in distribution planning is a rapidly developing science.

A word of caution! Changes in distribution must be palatable to the company’s customers. Changes which provide cost benefits only to the company without corresponding benefits to customers may be more difficult to implement than those that offer incentives to customers to accept the change.
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