Efficiency in Transportation Packaging

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There is today a renewed interest in the area of transportation and transportation packaging. A great deal of time and effort is being expended in the search for answers to problems of commodity movement. Much of this is being spent in efforts to secure lower freight rates in a rather conventional manner. At the same time there is a move toward greater efficiency and economy in transportation through new procedures and techniques. The latter is the area of greatest promise and is the subject of this discussion.

The Transportation Function

Any consideration of transportation packaging must, of necessity, start with a discussion of the basic concepts of commodity flow. Historically, there are two separate and well-defined activities within the area of commodity movement: (1) The in-plant or intraprocess flow of an item which is covered under the heading of “Materials Handling.” Improvement in this area is the responsibility of the industrial engineer working within the management framework of any given industry. (2) The inter-plant movement, that which commences on the shipping dock and ends on the receiving dock, which is covered under the heading of “Transportation.” This pertains to the function of transportation within commercial channels. The movement of goods within and beyond the retail outlet is not a part of this discussion.

A realistic examination of the production and marketing of any commodity will show that activity, at any point, is part of the flow of that commodity from field to consumer. The production-marketing activity is a single equation of varying complexity dependent upon the production-marketing process involved. Between any two points, A and B, in the total progression there can be only a single transportation function. The pur-
pose of this function, regardless of how complex we make it, is to move the commodity from point A to point B in a manner physically and economically compatible with the activity at both points. Transportation must be defined as the movement between any two points in the production-marketing activity regardless of where this movement occurs.

The Transportation Package

The transportation package is a device to assist in the movement from A to B. It has no other purpose. Although at times it may be used to strengthen a product identification, its only real purpose is to facilitate the flow of goods. An acceptable package must be compatible with the physical facilities of both points. It must be capable of ready movement by a carrier without damage to its contents. There are no other requirements for an acceptable container beyond those that are imposed by economics. However, for greatest economy, this package must be more than just acceptable. It must be efficient—efficient in terms of the most desirable physical and economic environment. The transportation container is an integrated part of the total movement and cannot be considered apart from the specific purpose at hand.

The economist who chooses to work in the area of transportation cannot accept any relationship as being given. There is no part of the existing flow from A to B that is not subject to change. A transportation economist must challenge the commodity identification, the in-plant handling, the package, the rate structure, and the concept of freight handling. Seldom will change occur at all points in a given movement, but it is not infrequent for change to occur at two or three points.

Case Study I

Consider, for example, a West Coast movement of printing ink. The movement consists of black printing ink in volume for newspaper copy and colored ink in substantially less volume for special advertisements and Sunday funnies. One Northwest newspaper consumes 80,000 pounds of black ink and 6,000 pounds of colored ink per month. Originally the movement was by two forms of transport. The black ink moved in bulk via tank truck while the colored ink moved in drums via a different motor common carrier. The rate on the bulk black ink was $1.80 per hundredweight with a minimum of 45 thousand pounds. The rate on the colored ink was $2.93 per hundredweight with a minimum of 5 thousand pounds. There was no way to pool the billing.

An examination of the total movement disclosed that the condition

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2 The retail container with its point of sale identification is not a part of this discussion. It should not be considered as a transportation container, but rather as a part of the commodity. Generally it is not used as a shipping container.
of the ink was proper for both movements. Bulk packaging was the most efficient way to handle the black ink, and the drum container was the most efficient way to handle the colored ink. Further study disclosed that there was a change potential with the vehicle being used. By changing from bulk tank truck to the use of a collapsible rubber transport container it was possible to pool both shipments on a single bill of lading by one carrier and ship the total at a rate of $1.56 per hundredweight with a minimum of 40 thousand pounds. This effected a saving of $82.80 per month on the colored ink plus $192.00 per month on the black ink for a combined annual savings of $3,290.00. In addition, the carrier could roll up the transport package (rubber container), store it out of the way, and use the equipment to carry a pay load of dry freight on the return trip.

Case Study II

Of more interest, perhaps, is the changing transportation potential for potatoes in the Northwest. The movement is from the Columbia Basin to the coastal cites of Portland, Tacoma and Seattle. Potatoes move from the Basin area to these cities for chipping and for consumer repacking. The potato is customarily handled out of the field in bulk trucks to the field warehouse where the potato goes over the grading table and is sacked. The sacks are hand trucked to a storage area and then to truck or rail car. At the receiving end the sack is either palletized and stored for repacking or dumped into bins and stored for chipping. The repack potato requires an additional handling for palletization.

Returning to the original concept of efficiency, the goal is to move the product from point A, the grading table, to point B, the prepack hopper or to point B, the chip plant hopper. All activity occurs to bring about this one result. One thing is strikingly obvious in this instance. The potato is bulk at point A and needs to be bulk at point B. If the potato can be moved in bulk all the way, a great many steps can be saved.

To accomplish a bulk move it was first necessary to design a conversion unit for the common carrier trucks that would allow potatoes to move in bulk at the sacked potato rate. (Had this not been done it would have required a one-way empty run.) Once a vehicle design was determined a bulk loader was adapted to existing plant facilities and a bulk unloading system developed to fit the receiving end. The potato now moves from the grading table to the truck and from the truck to a storage bin which can be mechanically dumped.

At the present time bulk potatoes for chipping are moving in volume a distance of 300 miles and repack potatoes are moved in bulk a distance of 225 miles. Preliminary figures on the chip potato haul indicate a labor
Table 1. Sacked potato flow process chart: An illustration of the steps involved in the in-plant handling of sacked potatoes from the grading table to the repack hopper.

<table>
<thead>
<tr>
<th>Shipper</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fill sack</td>
<td>1. Pallet to vehicle</td>
</tr>
<tr>
<td>2. Sew sack</td>
<td>1. Load pallet</td>
</tr>
<tr>
<td>3. Stack sack</td>
<td>2. Pallet to warehouse</td>
</tr>
<tr>
<td>1. Truck to warehouse</td>
<td>2. Stack pallets</td>
</tr>
<tr>
<td>1. Store</td>
<td>3. Pallet to hopper</td>
</tr>
<tr>
<td>2. Truck to loading area</td>
<td>3. Stand sacks</td>
</tr>
<tr>
<td>4. Load vehicle</td>
<td>4. Cut ties</td>
</tr>
<tr>
<td></td>
<td>5. Dump sack</td>
</tr>
<tr>
<td></td>
<td>6. Turn sack</td>
</tr>
<tr>
<td></td>
<td>7. Pile sack</td>
</tr>
</tbody>
</table>

*Flow commences at point A, the end of the grading process, and ceases at point B, the repack line hopper.*

economy of $1.60 per ton plus $.08 for each sack not used. In addition a better quality potato is being delivered. Figures are not yet available for the repack potato shipments. The above movement required a change in shipping facility, in transport unit, and in receiving facility. It also required a change in market practice. Sacked potatoes average 103
Table 2. Bulk potato flow chart: An illustration of the steps involved in the in-plant handling of bulk potatoes from the grading table to the repack hopper.*

<table>
<thead>
<tr>
<th>Shipper</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Load vehicle</td>
<td>1 Bin to trailer</td>
</tr>
<tr>
<td></td>
<td>1 Fill bin</td>
</tr>
<tr>
<td></td>
<td>2 Bin to warehouse</td>
</tr>
<tr>
<td></td>
<td>2 Stack bins</td>
</tr>
<tr>
<td></td>
<td>3 To bin dumper</td>
</tr>
<tr>
<td></td>
<td>3 Dump bin</td>
</tr>
</tbody>
</table>

Standard symbols
- Operation
- Transport
- Inspection
- Storage
- Delay

* Flow commences at point A, the end of the grading process, and ceases at point B, the repack line hopper.

Pounds per sack to cover shrinkage. Bulk potatoes are sold on a net weight basis requiring a price adjustment to reflect the difference in weight.

There could be many more examples, but the point is fairly illustrated. Change can and must occur at many points if the most efficient flow of goods is to be attained.

The Role of the Transportation Economist

The above case studies demonstrate that efficiency can be achieved by the coordinated movement of commodities. However, coordination of the transportation movement is a complex job. The transportation activity is subservient to the primary goal of both the shipper and the receiver. Carriers tend to expend their effort on the handling of com-
Table 3. Comparative potato flow process diagrams

I. Sacked

(\text{Row}) 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 10

II. Bulk

(\text{Row}) 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9

\* Point A is end of grading process. Point B repack line hopper. (See Tables 1 and 2 for activity listings.)

modities in their possession; what occurs before or after an item is actually moved is of little interest to them. This division of interest and responsibility not only creates transportation inefficiencies, but also complicates their elimination.

The achievement of a coordinated movement requires the services of a fourth party who is knowledgeable of the problems of all parties, who is familiar with packaging and materials handling concepts, and who is conversant with transportation equipment and tariffs. The responsibility for stimulating and coordinating the activity falls upon the transportation economist. It is necessary to identify the interests of each firm and the flow problem as a problem common to all. A solution must be developed that is capable of execution, economically and physically, by all of the firms involved. Arrangements must be made for the modification of in-plant facilities and carrier equipment. Since the projected gain will not often accrue evenly to all parties, adjustments will need to be made in the terms of trade and freight rates.

People qualified for this activity are few in number. Usually they are specialists in a single industry who have continually widened their total knowledge in an attempt to expand the market area of their commodity or service until they are capable of viewing the total movement in its proper perspective.

The need today is for transportation economists who are well-grounded in production and marketing concepts; individuals who are competent in many commodity areas and who are not restricted in their outlook to a single industry or form of transportation. The need is just as great for marketing specialists and economists capable of reducing the transportation function to the basic movement and identifying the most desirable state of packaging; individuals capable of working with the suppliers of packaging and materials handling equipment to develop the most physically efficient method of handling the item.

The training of such people is a challenge to the academic system.
It requires a junking of the traditional concept of transportation as a study of rate theory, regulatory policy, and equipment utilization. The academic image of transportation must be changed. Transportation should not be taught on a trade school basis as a part of a business and technology program; transportation must be taught as an essential part of the production-marketing equation. Transportation is the very keystone of the production-marketing activity and should be taught for what it is. Nowhere within the field of economics is there an area of specialization that offers a greater challenge than transportation. A transportation marketing program should attract the most promising marketing students.

Summary

To gain efficiency in transportation and transportation packaging we must lay aside the traditional concepts of transportation and materials handling. We must define transportation as the movement of goods between any two points regardless of where these points occur in the production-marketing process. The transportation package must be made a part of this flow. The package should be economically and physically compatible with the shipping and receiving areas.

The accomplishment of such a movement requires the service of a fourth party who is capable of viewing the entire movement and is not subject to the restriction imposed by self-interest. Such a person must be knowledgeable of the problems of all parties involved in the flow of goods.

The training of such people is a challenge to our academic system. It is necessary to replace the trade school concept of transportation training with a program that will develop transportation economists capable of functioning in the various commodities.

Don't sell short the function of transportation in our society today. Remember all civilizations rose and fell within 10 feet of sea level prior to the development of the steam locomotive.