way department will be able to aid in building some of the terminal areas.

Funding needs during the service period will be limited to the initial working capital and expected operating deficits. At this point, these can only be estimated. However, the level of demand necessary to realize the objectives of the demonstration should also prevent the operating deficit from exceeding $2 million annually. If demand is not great enough to keep the deficit below this, the project should not be launched. Lack of demand, however, should not be a problem.

The analysis suggests the conclusion that losses can be limited to well under $2 million. The trial period of the service should be of substantial length, in order that shippers may be induced to alter their present routing patterns. For planning purposes, this period has arbitrarily been set at 5 years. If the entire cost of the demonstration project reaches $10 million ($2 million a year for 5 years), it represents a very small investment compared with the project's massive potential value. The project might be the prototype of a national network.

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Intermodal Transport and Containerization

Howard W. Jones, General Foods Corporation

Shippers' associations began the development of intermodal operations about 10 years ago. Growth has been steady since that time because of improved transit times that make intermodal more competitive with truck and boxcar service. Containers also cost relatively little compared with boxcars. These capital considerations must be weighed by carrier management in future investing strategies. Many shippers are hopeful that intermodal will grow by using the flexibility of motor carrier deliveries with the economics of long-haul rail transportation. Private business must assist in the development of new concepts in intermodal transportation by cooperating with carriers, government, and shipper communities.

General Foods (GF) is a diversified processor and marketer of packaged grocery products, with worldwide operations and distribution capabilities. GF's net sales for fiscal year 1976 totaled almost $4 billion.

The transportation scheme within GF is designed basically to support our distribution and to provide our customers with the best service available at acceptable cost. Until recently, GF was primarily rail oriented; that is, most of our raw and packaging materials were received at our plants by rail, finished products shipped to our distribution centers by rail, and approximately 50 percent of the volume moved from our distribution centers to customers by rail. In the last few years, however, GF has tended to shift more toward truck, and for 1976 our volume split about evenly between rail and truck. Transportation dollars are also divided equally.

To implement our transportation strategies, we have made extensive use of the grocery car developed about 15 years ago in cooperation with railroads and car equipment manufacturers. These cars are made available to us by about 20 major rail carriers.

GF'S INTERMODAL HISTORY

To give a user's or customer's perspective on the transportation industry, one must go back about 10 years to the time when GF began developing intermodal transport. Intermodal in this context refers primarily to land transport within the United States, of the truck-on-flatcar, container-on-flatcar, or piggyback type.

In our international operations, we have used containerization for a number of years, because it was developed both by the container people and by the steamship lines. Many of the advantages of containerization have been exploited by water carriers, but there appears to be a great deal still to be done with containerization as applied to land transport.

In 1967, when we began our intermodal operation, we used shippers' associations primarily. We shipped several hundred trailers that year and realized favorable cost reductions and reduced transit times. In 1976, GF shipped products in more than 2000 trailers, or about 10 times as much as in 1967, and continued to use our membership in shippers' associations.

In the following I shall discuss the use of shippers' associations, the growth in containerization use, how GF views the future as customers or users of containerization, and what some of the difficulties in the development of containerization are.

SHIPPERS AND PIGGYBACK

Many shippers and customers began to use shippers' associations because of costs. The mixture rules and other pricing devices imposed by carriers in the last few decades to protect carload freight turned customers toward shippers' associations. The net result of this pricing strategy has been phenomenal growth of these associations in the last 10 to 15 years. In hindsight, at least, it appears that carriers' desire to protect the carload freight made them miss a good marketing opportunity.

The need for consolidators to perform so-called "marriage" arrangements because of mixture restrictions has eased in recent years, because the mixture rules themselves have been liberalized or eliminated. On the other hand, volume trains (10 trailers or more) increase the need for the consolidators to those shippers who cannot make the necessary minimums.

The growth in GF's piggyback traffic has developed because transit times are more competitive with existing truck service and much more dependable than carload service. For example, our experience with piggyback service has been excellent—in some cases, equal to or better than truck. Shipments from our Chicago plants to a distribution center in Dallas, for instance, have

shown that transit times and dependability are comparable to or better than those of motor carriers.

The importance of dependability and competitive transit times does not relate particularly to the transport business factors but is measured in reduced inventory in transit. We estimate that, at any one time, there may be 1 week's production in transit. This is inventory that has a measurable value, but it is also inventory that cannot be sold, or disposed of, or touched, or in any way managed until it is delivered.

In that Chicago to Dallas example, the best schedule by rail is 5 d. Experience, however, shows that the range of any individual shipment could be from 4 to 12 d, depending on the carriers used, their experience, the volume moving at any one time, and the weather. On one particular move, the 90th percentile—9 out of every 10 cars—would arrive on perhaps the eighth day; that is, there is a 3-d miss on the schedule. The 90th percentile tends to skew itself toward the high end of the range, and there is no assurance that any specific shipment will meet the 90th percentile or the schedule.

The difficulty for a customer is to maintain volume on the rail carriers and to develop competition with the existing motor carriers. One answer is piggyback or trailer-on-flatcar. This is one and perhaps the only way a customer can maintain some competition between existing modes of transport. Volume increases and a desire to maintain competition have led to the major intermodal growth in GF.

FUTURE OF INTERMODAL

In 1962 a grocery car cost about $19 000; today that same car costs well over $40 000. My company uses that car about 1.8 loaded trips per month, which is higher than the national average for free-running, railroad-owned boxcars. It is not surprising, then, that most carriers experience considerable difficulties in meeting established investment criteria, particularly at high interest rates on an investment in excess of $40 000, and that their profitability is under continuing pressure.

The cost of a trailer, on the other hand, is much closer to $8000 or $9000, and the utilization factor is considerably higher—five times that of a boxcar. These are compelling considerations for carriers trying to maintain a competitive position in the market, to attract high margin traffic, and to increase their market share.

One method that rail carriers can use to increase their share of the market is to develop their trailer-on-flatcar capabilities. The technology we have today no doubt needs improvement, but the equipment is there, as are the basic devices—the trailers, the cars, and the power. This is not the technology we would necessarily like to see in tomorrow's environment, but neither were the DC-3s we all rode. The 13.7-m (45-ft) trailers could be intermodal's answer to the 707.

What is needed is top management's attention and commitment to the development of intermodal capabilities, and their attention to organizing for maximum profits from these investments. Carriers can also benefit from some of the pricing errors of the past and can maximize their profitability with this new marketing tool.

Of course, there are definite capital implications that must be cost-benefit analyzed. Some of the hurdles can be foreseen if the carriers move forward in exploiting intermodal capability. Intermodal calls for increased marketing skill, and a proper blend of existing equipment and technology with flexible pricing philosophies and strategies is essential to making this a flexible, competitive mode of transport. One pricing approach to be closely scrutinized is the continued use of the mixture rules that have become so ingrained in some marketing philosophies and pricing strategies.

Another problem is the need for the high degree of dependability that would attract volume to intermodal. This could take the form of a guaranteed service at a premium price, which would permit the customer to choose between paying a higher price for a guaranteed service or running the risks of a less dependable service and trade-offs in his internal economics.

Equipment design also has to be reviewed and evaluated, particularly as it relates to efficient energy use. Consideration should be given to the use of containers over trailers on flatcars. Several studies have indicated that a container creates much less air resistance than a trailer on a flatcar and is therefore more energy efficient. In addition, the design of the flatcar is essential to improved equipment design. From the customer's viewpoint, the shipper should be able to switch the entire flatcar and container into the facility, just as a boxcar is handled today.

With proper flatcar design, containers could be moved onto the loading dock and loaded or unloaded as a truck trailer is today. This method would have two advantages. One is that many plants are designed for handling or shipping by rail. To increase shipments by motor or container would require a considerable capital investment on the part of the manufacturers. However, if the carriers themselves developed intermodal, the shipper would have the option of taking his shipment by trailer, that is on rubber, or having it switched into his plant as a boxcar. This flexibility would certainly open up avenues to shipper acceptability. GF has done considerable work in this area and has proved its feasibility.

CONCLUSION

Manufacturers are cautiously optimistic. We are extremely hopeful intermodal applied to land transportation will begin to accelerate soon. This would provide the best of both worlds: the economics of long-haul rail transportation plus the flexibility of motor carrier deliveries and operations on either end.

Creativity on the part of both motor carriers and railroads is necessary to giving them an opportunity to share the volume of traffic in intercity transportation. Both should become beneficiaries of this volume rather than out-and-out competitors.

The vigor, commitment, and management skills with which carrier management develops and exploits this mode will determine how well the public in general and the shipping public in particular will benefit from the advantages of intermodal land transport.

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