JOURNAL OF THE TRANSPORTATION RESEARCH FORUM

Volume XXIX Number 2 1989

TRANSPORTATION RESEARCH FORUM
In conjunction with

CANADIAN TRANSPORTATION RESEARCH FORUM

Motor Carrier Marketing/Pricing Strategy — A Logistical Approach

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Motor carrier pricing strategy since 1981 has been uncertain at best, and reactive at worst. New pricing freedoms, diversions of truckload freight to new carriers, excess capacity, and economic recession combined to diminish traditional carrier pricing practices. The industry continues its restructuring process lacking an ability to rely upon traditional pricing practices. What is occuring in the present market environment is essentially an industry striving for proactive strategic pricing, but unable to even establish any pricing benchmarks except through a proliferation of contracts and named shipper tariffs. The economic impact of recession, free entry, and traffic diversions from LTL trucking is reflected in the industry's financial performance. Bankruptcy among LTL carriers is high, and abnormally low earnings clearly demonstrate the industry's search for a pragmatic pricing strategy.

The purposes of this article are (1) to show the discrepancies between and carrier marketing/pricing practices and shipper needs regarding service, and (2) to review alternative carrier marketing strategies that should be of assistance in developing and implementing a competitive strategy based on service, not price. To reach this goal, we examine the current economic environment of trucking and review pricing and marketing strategies in that industry. We then discuss briefly the literature pertaining to carrier selection. Finally, because of the sharp contrast be tween shipper needs and carrier practices, we review several service-oriented carrier marketing strategies.

Primary emphasis upon service as opposed to price represents a conceivable resolution to the industry's pricing dilemma. One caveat is needed, however, service product offerings must be an integral part of a carrier's marketing strategy that can conceivably be more expensive than a price-oriented strategy.

THE ECONOMIC ENVIRONMENT OF TRUCKING

Since 1978 and administrative deregulation, approximately 85 organized LTL carriers have failed and exited the intercity for-hire trucking market. Concurrently, over 12,436 new carriers entered the TL segment of the industry (Weintraub 1986; Klein 1985). Traditional carrier classification categories such as common, contract, broker, and exempt carriers, moreover, have blurred with carriers now possessing a multiplicity of operating authorities. Pervasive use of value-of-service pricing has diminished, and a majority of rates are prescribed by individual carriers and published in their tariffs, thereby creating price uncertainty in parts of a market where price certainty once prevailed (ICC 1984). Price uncertainty should permit a facility of service or logistical marketing strategy.

Economic performance in the "restructuring" market can be examined on a dichotomous basis, i.e., LTL and TL carriers. In the capital intensive LTL segment of trucking, only one new carrier has entered the for-hire market while several hundred have departed.[1] ROI for an established sample of carriers is 6.5 percent (Silberman 1985), and restructuring and increased economic concentration has resulted in essentially a two-tier system of LTL carriers. That is, large national carriers and regional or "niche" carriers.[2] Available financial data indicates that downward price pressure, excess capacity, high fixed cost, declining traffic, and an accelerating "rate war" has created a situation where LTL firms are simply consuming their capital base (Harkins 1985). Some financial analysts contend that only five to ten major nationwide carriers will remain in business by 1990.

In the easily entered TL segment, carriers have successfully diverted substantial amounts of TL traffic from LTL firms, and overall carrying capacity has expanded exponentially with more than 32,000 firms in this segment of trucking (Klein 1985). TL carriers publish their own tariffs and contracts and face low market entry costs. Entry freedom in the TL segment of trucking is pervasive and for all practical purposes the industry is non-union. Earning experience in this part of trucking varies, but rapid growth, a reliable source of equipment, and future growth potential aptly characterizes TL general commodity carriers.[3] Although nominally licensed by the ICC for regulatory purposes, TL general commodity carriers approximate the micro-economic pure competition model with pricing determined almost entirely by the forces of supply and demand in the market for transport services.

The economic environment for LTL carriers is limited growth and continued concentration, but potential gains exist for surviving carriers. Conversely, the economic environment for TL carriers is excellent although rising fuel prices, taxes, and driver shortages could impact in the short-run period. "Double-breasted" operations by some LTL carriers, however, could inject additional uncertainty into the TL market from a long-run perspective.[4]

PRICING PRACTICES—1988

Pricing in LTL trucking is presently reactive rather than proactive. Faced with restructuring, excess capacity, high cost, decreased and diverted

traffic, a fierce rate war has existed since 1983. Even though the general rate level has increased 87 percent since 1981 (Davis and Cunningham 1982), increased carrier earnings have been "turned back" in the form of massive freight discounts. A 5.7 percent increase in 1986, for example, has been discounted away to customers in one year and even though operating costs increased over 5 percent in 1985 alone,[5] three large price-leading carriers refused to adjust the overall rate level.[6]

Freight rates or price discounts take a variety of forms (ICC 1983). Some carriers meet every discount offered, while other carriers attempt to be more selective. Traditional relationships between prices and quantities shipped (volume) have been eliminated for all practical purposes. Some discounts are based on aggregate tender, some on size, but all are based on relative shipper purchasing power, i.e., relative total transport business with a given carrier. Any Quantity (AQ) rates are common and empirical evidence suggests that proffered discounts are larger to dominant shippers than to smaller shippers, even though individual shipment sizes tendered may be identical. Lastly, published rates presently are established as benchmarks, and the degree of price uncertainty has accelerated in recent years; thereby creating an environment favorable to price (rate) discrimination (Cunningham 1986).

TL firms also publish individual rates, tariffs, and contracts. Their rates, however, usually conform to a fully distributed cost-per-mile basis with uniformity requirements reflected in the rates. Lower rates are generally assumed in TL trucking with service representing the principal determinant of the carrier selection process. In short, traditional pricing models in both TL and LTL segments of the trucking industry are no longer widely employed.

CARRIER MARKETING PRACTICES

Serious carrier attempts to integrate price, promotion, and distribution into reliable and workable marketing programs have focused for the most part upon a singular goal, i.e., market coverage. Because the industry, at least in the LTL part, has restructured into national and regional or "niche" carriers, carrier marketing programs are designed to force costs and prices to levels lower than their competitors. While some large shippers presently are enjoying a state of relative pricing elysiasm, service appears consistent even though a nascence question of carrier safety has been raised with increased frequency during recent years (Northwestern University 1987).

National or market coverage strategies have evolved into a capital intensive process where expensive break-bulk terminals are strategically located, and a series of not altogether riskless hub-and-spoke operations are employed. These systems can be expanded through a satellite process using end-of-the-line terminals located on spokes. The entire process involves multiple handling, high levels of production, and considerable cross shipments, but in total a hub-and-spoke system can efficiently move vast quantities of freight and provide network economies analogous to economies of scale. From a market perspective, hub-and-spoke operations permit a carrier to advertise and sell nation-wide service; a service attractive to many large shippers. For these shippers lacking volume tenders of freight, while seeking national coverage, LTL carriers with extensive hubs provides attractive transport service. However, this strategy has several drawbacks. First, hub operations increase a carrier's operating risk. Not only are hubs expensive, but in the event that market tonnage fails to materialize, alternative uses of hub facilities are virtually nonexistent. Secondly, hubs require a large capital investment and capital cost, and sources of funds in an industry with marginal earnings are difficult to attract. Third, and lastly, hub-and-spoke and market share coverage from a macro-economic perspective may be inefficient in terms of adequate resources devoted to moving goods.[7]

Market share achieved through hub-and-spoke operations represents the dominant LTL market strategy currently in use. Price is essentially reactive because of discounting and excess capacity, and market share goals, normal goals or objectives in consumer product markets, are relatively new phenomena to LTL trucking. However, the risk is great and financial rewards appear minimal due to the current rate war. In short, the strategy is simply "put a terminal everywhere and capture traffic." End-use-segmentation as a viable marketing strategy has diminished in importance in the current market.

Double-breasting, operating a non-union truckload carrier, represents another cost strategy employed by LTL carriers. Virtually every major LTL carrier, with the exception of Yellow Freight System, operates TL carriers. Obviously, these carriers attempt to retain or recapture TL freight contested by the new entrants, and so far the profit results have been mixed. Organized labor obviously views these operations as a threat to the National Master Freight Agreement, and the International Brotherhood of Teamsters is in the Process of attempting to negotiate an end to this strategy (Murphy 1988).

In the TL segment of trucking, the principal marketing strategy is service and cost containment. By dedicating equipment, operating flexible schedules, and using owner-operators, the successful new carriers attempt to provide high quality service that emphasizes the ability of the firm (shipper) to constantly have inventory in transit. Given the paroxysm of growth in this industry, transit/inventory minimization as a marketing strategy appears viable. However, this segment of trucking is a classic "cost push down" type of operation where cost containment at predetermined levels is essential. Certain risks are present to varying degrees among TL carriers; they are normally poorly capitalized; some are unsafe; insurance costs are increasing; and fuel cost fluctuations can impact dramatically upon cost and hence profits. Volatility best describes this rapidly growing segment of trucking.

Specific marketing strategies for TL and LTL carriers vary extensively, but two commonalities are pervasive, i.e., rate control is difficult if not impossible, and service is predicated on cost containment. In this type of environment, price, which

is paramount among LTL carriers, is important from a marketing view. Price to TL carriers is a crucial variable since their price is depicted and sold as being lower than a private firm can move its own goods. However, in both of these segments of trucking, at the moment price truly appears beyond management control, so instead an alternative marketing strategy to ensure survival is needed.

CARRIER SELECTION

The previous discussion would lead one to suspect that surveys of shippers would reveal that the predominant criterion used in selecting carriers was freight rates or transportation costs. However, quite the contrary is true. Literature in the field of transportation and logistics suggests that shippers consider several factors in selecting carriers. Frequently cited criteria include the following: consistent, on-time pickup and delivery; absolute transit time; locations served; loss and damage history; freight charges; shipment tracing; claims service; frequency of service; completeness of service; and loading and unloading facilities (Baker 1984). Though this list is not exhaustive, it should be clear that several criteria can be used in selecting carriers. Moreover, freight rates (or cost of service) is rarely stated as the most important criterion (Baker 1984; Bardi 1973; Brand and Grabner 1985; Stock and Lambert 1987), but most carriers seem to be ignoring other competitive dimensions and continue to compete on price.

The environment in the transportation industry has been greatly modified by regulatory changes. This, in turn, has altered the environment in which shippers make transportation decisions. Several studies have delineated the major changes brought about by this new climate, and two trends tend to stand out. The first, precipitated both by deregulation and the move underway towards just-in-time (JIT) manufacturing techniques, is the reduction in the number of carriers that shippers utilize (Lieb and Miller 1988). The second trend, and related to the first, is the effect on modal and carrier selection criteria, specifically the increasing importance of service factors (variability and absolute speed of deliveries) and the decreasing importance in price (Baker 1984; Hoover 1985; Marcus 1987).

These environmental changes in the motor carrier industry and factors influencing carrier/modal selection have caused an increased interest in strategic marketing and planning by shippers, and several writers suggest that the interest should be as strong in the motor carrier industry. Baker (1984) examined the carrier elimination decision from the shipper's view point and offered several suggestions regarding the implications of this decision (as well as carrier selection decisions) to motor carrier marketing. Specifically, she states, "The most important implication ...is that carriers should place less emphasis on pricing as a competitive weapon and focus instead on service differentiation" (Baker 1984, p. 28). Marcus (1987) investigated the change in shippers' strategies in a deregulated motor carrier atmosphere and pointed out the problems associated with decisions based merely on price, both from the shipper and carrier point of view, noting how decisions should and will be based on consistent service. Cooper and Rose (1985) brought out the use of a segment competition matrix as a strategic management tool for transportation. Explicit in their analysis was the importance of service, both to shippers as an evaluation tool and to carriers as a basis for segmentation.

Contained in the above studies is the idea that service should be of paramount importance to both shippers and carriers. Implicit in this is that it is not *service*, per se, but the effect of service on costs. A particular shipper will favor some service/price combination because it results in the lowest total cost. However, carriers, given their persistent use of price competition, apparently have not developed the same level of interest in service as have shippers.

From a carrier management perspective, a major problem with these and other studies of carrier selection is that most of the literature is targeted toward shippers, and the few studies that are aimed at carrier managers offer only general implications rather than specific suggestions for developing successful service-oriented strategies. While they point out key variables that shippers use for evaluating carriers and suggest the need for carriers to develop strategies to take advantage of emerging opportunities, there is actually very little integration of logistics/customer service literature into the field of carrier management. Consequently, the next section provides a review of several logistics concepts which can be used to form the basis of non-price competitive strategies.

NON-PRICE COMPETITIVE STRATEGIES

Consistent Transit Times

Surveys of shippers reveal that consistency of delivery time is probably the single most important criterion they look at when selecting carriers (Baker 1984; Bardi 1973; Brand and Grabner 1985; Stock and Lambert 1987). The reason for shippers' concern with transit time dependability is the impact it has on the level of inventory needed to protect against stockouts. This, in turn, is related to the fill-rate[8] that shippers are able to offer their customers. Customers respond negatively to incomplete orders (consistently low fill-rates) (Coyle and Bardi 1984; Stock and Lambert 1987; Tucker 1983). That is, if an order is shipped with only 85 percent of the items ordered, the receiver is less likely to place orders with that shipper in the future if higher fill-rates are available from other suppliers.

To offer consistently high fill-rates, shippers must carry enough stock to ensure that they can fill a large percentage of the orders they receive. If demand varies or if transit time varies, additional inventory must be held to guard against stockouts. As variability increases, more and more safety stock must be held to protect against stockouts. Thus, carriers that offer consistent, dependable delivery times can permit a shipper to reduce its cost of carrying inventory, and even if the freight rate is somewhat higher than that of competing carriers, the net savings may be enough for the ship-

FIGURE 1:

Calculation of Combined Standard Deviation of Demand Over Time.

$$S_{Dt} = \sqrt{\bar{t}\,(S_D)^2 + (\bar{D})^2(S_t)^2}$$

Where:

S_{Dt} = Units of safety stock required to satisfy 68 percent of all probable sales levels.
t = Average delivery time.
S_t = Standard Deviation of delivery time.
D = Average demand.
SD = Standard Deviation of demand.

Source: James R. Stock and Douglas M. Lambert, *Strategic Logistics Management*, 2nd edition, (Homewood, IL: Richard D. Irwin, 1987) p. 412.

per to justify using the more expensive carrier. Additionally, more dependable delivery times may permit the shipper to offer even higher fill-rates to its customers without an increase in total logistical cost, thereby increasing sales and, hence, profits. Ultimately, this may mean that the carrier shares in an increased volume of traffic.

The following example can be used to show the impact of consistent transit times on a shipper's logistical cost. The XYZ Company has average daily sales of 100 units of Product A. It takes one day from the time orders are placed to get resupplied. The manager of logistics has deter mined that in order to remain competitive in the industry, the company must maintain a 97.5 percent fill-rate.[9] If there was no variation in sales, the manager would set the order point at 100 units (daily sales X delivery time). Inventory levels fall over time as goods are sold, and when the stock level hits the reorder point, an order for additional stock is placed with the supplier. If sales and delivery times could be predicted perfectly, the order would arrive at the end of the day, just as the last unit was sold, and stock would be available for the start of the next business day. Hence, the fill-rate would be 100 percent.

Naturally, neither demand nor lead times are constant, and the variation in lead time, when combined with the variation in demand, can make a significant impact on the level of safety stock necessary to provide a given fill-rate. To determine the safety stock level when lead time varies together with demand, it is necessary to use a method that combines the standard deviation of demand with the standard deviation of delivery times. Figure 1 shows how the combined variation in sales and time is calculated.

Continuing with the previous example, it will be further assumed that two carriers are competing for the shipper's business. Both carriers have been used in the past and the delivery records of each are known. The average delivery time is the same for each carrier, 5 days; however, the standard deviation of delivery time for Carrier A is 1 day while for Carrier B it is 2 days. Figure 2 shows the summary data required to determine safety stock and the calculations of the combined standard deviation of demand overtime for each carrier. The

FIGURE 2:

Estimated Combined Standard Deviations of Demand and Transit Times for Carrier A and Carrier B.

ASSUMPTIONS:

Average Sales (D) = 100 units
Standard Deviation of Sales (S_D) = 10 units

	CARRIER A	CARRIER B
Average Transit Time (t)	5 Days	5 Days
Standard Deviation of Time (S_t)	1 Day	2 Days

COMBINED STANDARD DEVIATIONS:

CARRIER A

$$S_{Dt} = \sqrt{(5)\,(10)^2 + (100)^2\,(1)^2} = 102 \text{ units}$$

CARRIER B

$$S_{Dt} = \sqrt{(5)\,(10)^2 + (100)^2\,(1)^2} = 201 \text{ units}$$

less reliable carrier will require the shipper to hold twice as much safety stock in order to provide the same level of service (fill-rate) to its customers. The additional cost to the shipper could be substantial, depending on factors such as the value of the goods held, the cost of carrying inventory, and the actual service level required. Figure 3 shows the added cost associated with using the less reliable carrier. Assuming that the value per unit is 100 dollars, the carrying cost is 20 percent of the average value of goods held, and the required fill-rate is 97.5 percent, the cost of using Carrier B would be approximately 4,000 dollars more than that of using Carrier A.

Though transportation rates have not been brought into the example, it is clear that the more reliable carrier could charge a considerably higher rate and still save the shipper money. Moreover, the example considers a single product, but for actual firms in which thousands of line items must be controlled, or for firms adopting Just-In-Time systems in which the costs of shutting down production lines must be considered, the savings associated with reliable transit times may reach extreme levels.

Quantity-Based Competition

Vendors frequently offer quantity discounts, but to take advantage of them means that the buyer has to carry larger inventories which offsets some of the savings in price. Similarly, carriers offer lower rates to shippers as the quantity shipped increases. Shipping in larger volumes means carrying larger inventories which, again, offsets some of the savings in transportation costs. It is generally coincidental if the volumes at which vendor price breaks occur are identical to those of a carrier.

Figure 4 shows the total logistical costs associated with ordering, purchasing, transporting, and carrying inventory with several vendor and transportation price breaks available. The order quantity at Q_1 represents the classic economic order quantity (EOQ) which minimizes the sum of the costs of ordering and carrying inventory. At each vendor or carrier price break (Q_2—Q_5) beyond the EOQ, the total cost curve is pulled down by the savings generated by the discount. At quantities beyond the point at which the discount is offered, total costs increase due to additional inventory costs associated with carrying larger inventories. Thus, it is conceivable that a shipper could be indifferent to several alternative shipment sizes since each additional quantity offers insignificant savings due to con stantly increasing costs of carrying inventory.

For the most part, the volumes at which transportation rates change are standardized from traditional tariffs. LTL rates typically begin at an Any Quantity rate and fall as the volume increases with breaks occurring at 1,000, 2,000, 5,000, 10,000, 20,000, and 40,000 pounds, for example. These traditional volumes, however, have no real bearing on carrier costs other than the general monotonically decreasing unit cost function characteristic of the transportation industry. Shipper-carrier negotiations usually focus on price adjustments within the various quantity categories. However, price breaks offered at other volumes may be justified also, and negotiations could easily focus on the quantities at which various transportation prices are offered.

If the quantities at which a carrier offers rate reductions to a shipper could be coordinated with the quantities at which vendor discounts are made available, the shipper could enjoy the combined savings of the vendor discount and the carrier's price break without incurring the additional inventory carrying costs that typically occur between the two. Figure 5 illustrates the effect that coordinating these quantities has on the shipper's total logistical cost. Again, Q_1 represents the classic EOQ. The volumes at which vendor and carrier price breaks are made available (Q_2 and Q_3) provide savings of a greater magnitude than those shown in Figure 4 because they permit savings on two dimensions without the off-setting effect of added inventory carrying costs.

Other Competitive Dimensions

Shippers that are concerned with the level of service they offer their customers provide unique

FIGURE 3:

Estimated Cost of Additional Safety Stock Due to Using Carrier B versus Carrier A.

ASSUMPTIONS:

Cost of Carrying Safety Stock = (Safety Stock) X (Value) X (Carrying Cost)
Value per Unit = $100.00
Carrying Cost = 20 percent
Service Level = 97.5 percent[a]

CARRIER A: S_{Dt} = 102 units
Cost = 2 × 102 × 100 × .2 = $4,080

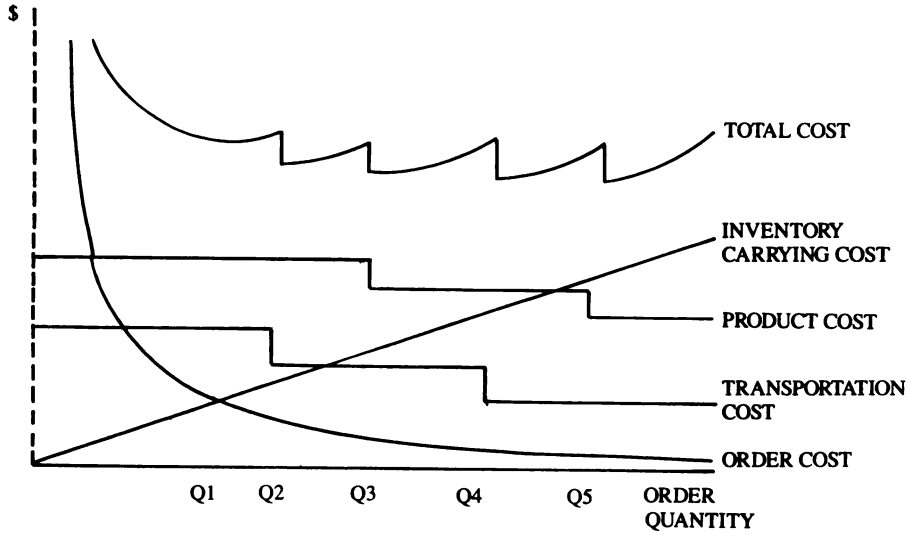
CARRIER B: S_{Dt} = 201 units
Cost = 2 × 201 × 100 × .2 = $8,040

ADDITIONAL COST OF USING LESS RELIABLE CARRIER: ($8,040 − $4,080) = $3,960

[a]To attain the 97.5% service level, the shipper will have to add two standard deviations of safety stock to the order point.

FIGURE 4:

Total Logistics Costs without Coordinated Volumes for Vendor and Carrier Price Breaks.

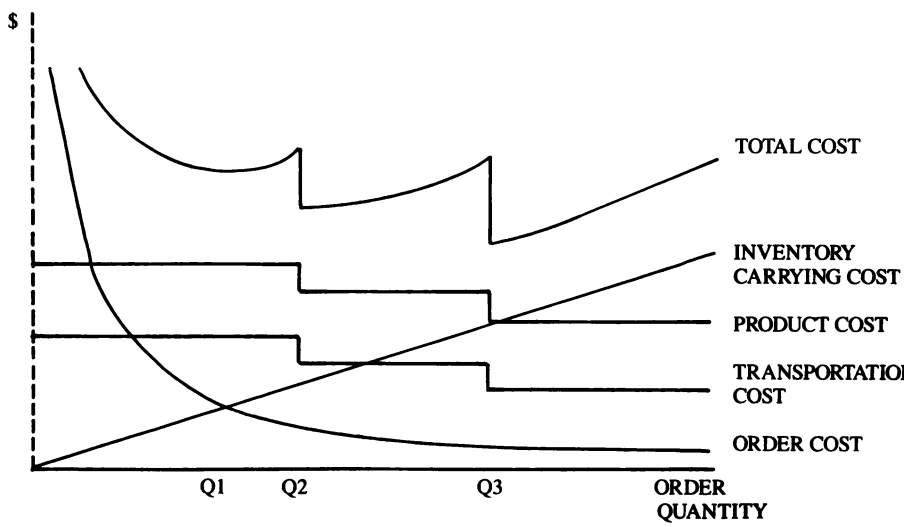


opportunities for carriers that choose not to compete on price. Besides consistency of delivery times and quantity-based competition, carriers will find rich rewards from efforts aimed at providing services that permit the shippers they serve to be more responsive to the needs of the receivers of the goods they ship. From the shipper's perspective, for example, a carrier that works toward eliminating loss and damage in transit will be preferred to a carrier that focuses on efficient claims handling and ignores the problems that cause it. A carrier's promptness in paying a claim cannot compensate the shipper for production down-time experienced or for sales lost because goods arrived in a damaged or unusable condition.

Another important dimension on which carriers can compete is on the basis of providing information to shippers regarding the status of shipments. If damage or delay occurs, it can be extremely important for the shipper to know about it as early

FIGURE 5:

Total Logistics Costs with Coordinated Volumes for Vendor and Carrier Price Breaks.



as possible. Frequently, problems that may limit a shipper's ability to offer an adequate level of service to its customers can be avoided if the carrier notifies the shipper soon enough. Working together to share information can increase the effectiveness of the entire channel of distribution.

Finally, flexibility on the part of the carrier to meet specialized needs of shippers is another important dimension on which to compete. Flexibility may take on many different meanings depending upon specific needs of individual shippers. Naturally, a carrier cannot be all things to all shippers; however, some shippers have more at risk at times than others. The cost of lost sales or production down-time varies among ship pers and their customers, and there are times when the flexibility to meet a unique need of a shipper will pay off in terms of establishing a long lasting commitment to use that carrier's services. Identifying critical customers with occasional needs which vary from the norm will permit the carrier to keep track of available capacity to meet these specialized needs.

CONCLUSIONS AND IMPLICATIONS

Carriers choosing to break from tradition and avoid the disasterous effects of continued price wars must focus their efforts on providing services which will permit their customers to minimize total logistics costs. Frequently, it is possible to accomplish this at even higher transportation rates. The trade-offs of logistical costs can permit a carrier to charge premium rates, provided the service offered will allow the shipper to reduce its costs in nontransportation areas and/or improve its service level to a point which will lead to increased revenues.

Unfortunately, several constraints must be overcome before such a goal can become reality. First, carrier managers must know how and why shippers make decisions regarding logistics functions in addition to transportation. Based on the needs of key customers, the carrier's operations must be managed in a manner to achieve the required level of dependability. Carriers must be able to offer higher levels of service than competitors who offer substantial rate discounts or the shipper will have no motivation to use the more expensive service.

Second, carrier managers and carrier sales representatives must know how shippers *should* make decisions. Many shipper organizations are staffed with personnel who are unaware of the total cost approach to making logistics decisions. In these situations, representatives of the carrier will need to educate shippers regarding the opportunities for cost savings attainable through careful selection of dependable carriers. Burlington Northern Railroad, for example, in association with Massachusetts Institute of Technology has developed a microcomputer model to be used by its marketing representatives at the customer's site for a comprehensive mode choice analysis (Sheffi, Eskandari and Koutspoulos 1987). Even though the cost of BN's model was close to a quarter of a million dollars,[10] carriers can develop similar types of models by using spread sheets such as *LOTUS 123*.0 Such models can become an effective tool for demonstrating the savings that potential customers may enjoy from the services the carrier has to offer.

Third, traffic managers who are evaluated on the basis of a budget are motivated to minimize transportation costs without regard for additional costs incurred in other areas, i.e., inventory costs. Thus, carrier representatives may need to call on persons other than traffic managers to explain what benefits can be derived from a carrier that offers efficient and dependable service.

In an age in which many products have reached maturity and producers and suppliers have turned to service as a means of competition, it is essential that carriers competing in those channels also focus their attention on service. To continue to base selling efforts solely on the cost of service is detrimental to individual carriers, to the motor carrier industry, and to managing product flow in channels of distribution.

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ENDNOTES

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1. Leaseway Transportation entered the LTL market since 1980 but has since departed following substantial losses.
2. The "Concentration Issue" has been raised in each of the oversight hearings conducted by Congress on the Motor Carrier Act of 1980.
3. The potential market for TL carriers is freight presently transported by private carriers.
4. Some major LTL carriers operate non-union TL subsidary carriers. For Labor's concern regarding this practice see Murphy (1988)
5. Suspension Board Case No. 71302, April 1, 1986.
6. Three major carriers "flagged-out" of the gen eral increase, thereby percipating a "wave" of other independent announcements.
7. Freight obviously does not move in a straight line between two points when a breakbulk operation is used for consolidating shipments.
8. "Fill-rate" is a term commonly used to reflect the percentage of items ordered which are actually shipped.
9. To attain the 97.5 percent fill-rate, the shipper must set an order point such that two standard deviations of safety stock are added to the average demand. For a discussion on setting service levels and the required number of standard deviations of safety stock, see Stock and Lambert, *Strategic Logistics Management*, Chapter 10.
10. Personal correspondence with Burlington Northern representatives, March 11, 1988.