tions, whether done within an agency or by contract. Standards must be stated so that those responsible for the effort's integrity and its subsequent application may exercise control of the unit performing the task. To do otherwise is to give the task-performing unit inadequate guidance. Confidence intervals are expressions of levels of acceptable imprecision in the degree to which sample statistics reflect the actual condition of the population being studied. A 95 percent confidence interval, for example, states that we can be confident that the numerical representation of the population (mean, proportion, and so forth) that is being estimated by sampling will be included in a specified interval around the sample statistic.

There are two reasons why this item should be stated before the monitoring is undertaken. First, failing to do so will allow the analysts and users to "fudge" the results, i.e., to reject or accept the results as their mood or personal proclivities move them. Second, the cost of the survey will be directly related to the level of precision prescribed.

IMPORTANCE OF MONITORING

Appropriate analytical approaches, such as various experimental designs, should be considered to help assure randomized, objective results. Survey approaches should be carefully controlled in design, conduct, and interpretation.

It is too easy to look at conditions observed after the fact of the legislation's being applied and saying, "That's what Congress was looking for. The legislation is 'working'." Or, conversely, "That's what some carriers (shippers or communities) were afraid of. The legislation is a 'disaster'." Responsible monitoring does not just measure outcomes and link observations blindly to the initiating factors being evaluated.

This is another important reason why monitoring should be done with common sense, integrity, statistical objectivity, and professionalism. Causality is a major problem in any research effort. This is a sizable and a complex research effort and requires all of the attributes mentioned here.

In conclusion, there has been promise of billions of dollars in annual savings available to the economy as a result of the implementation of the new legislation. There is also concern that there are displacement costs that could overwhelm whatever savings are actually encountered. The quality of the monitoring effort will, I hope, raise the quality of the analytical effort that went into the development of the legislation and the policies flowing from it. If there are savings, in which the social benefits exceed the social costs, we should go further. If there are net social losses, perhaps there should be reversals or revisions. Neither the market nor policymakers are perfect. Regulation is not unique in that respect.

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Changing Market Structure for the For-Hire Motor Carrier

MICHAEL P. McGEE

This paper identifies the elements affecting the market structure of our trucking system and the long-term impact of altering these elements. To the extent that structural impacts may occur from less regulation, the impact of instituting these changes is also addressed. It is expected that these changes may be limited to selected carrier activities. To the extent that these elements can be measured, a quantitative analysis has been undertaken.

The regulatory system that was instituted more than 40 years ago in the Motor Carrier Act of 1935 (also known as Part II of the Interstate Commerce Act) had remained relatively stable until recently. The only major changes, impacts, or exceptions to the original act were (previous to the past two years): (a) the 1948 Reed-Bulwinkle Act that permitted joint ratemaking, (b) the Transportation Act of 1958 that overturned the concept of umbrella ratemaking; and (c) the creation of the U.S. Department of Transportation that moved safety regulation from the Interstate Commerce Commission (ICC) to the new agency. These alterations, for the most part, did not adversely impact motor carrier profits or the carriers' operating systems and strategies. In fact, these changes tended to provide stability for the industry.

In more recent times, changes to the nature and functions of the regulatory system have accelerated. The focus of these changes has been toward loosening regulatory constraints over the elements within the transportation system. These elements can be described in terms of both modal and industry components.

The transportation system is made up of elements that both interact and compete in the transportation production function. To a degree, many of the elements within both the modal and industry components are similar (pickup, delivery, and line haul). However, within each of the industry components, the activities are performed differently. To the degree that the activities are different is a function of one or more of the following: regulatory requirements, technological efficiencies, management philosophies, market demands (service standards), competitive forces, or joint production needs.

Current changes with the legislative enactment of the Motor Carrier Act of 1980 and alterations in the regulatory process at the ICC seem to be focusing on the regulatory requirements, with limited reference

or interest in the impact of these changes on other structural elements. As a result of not appreciating these impacts, the motor carrier industry must take upon itself a review of the remaining structural elements of the transportation system that are subject to alteration, as well as identify the functional and system activities that would be impacted.

ELEMENTS WITHIN THE TRANSPORT SYSTEM

Within the motor carrier industry there are a variety of ways for one to segment the transportation system elements. The most useful segmentation for this paper is operational, institutional, and regulatory. Each of these elements is discussed in detail.

Operational

The operational elements within the motor carrier transport system are pickup and delivery, line haul, terminal and platform, billing and collecting, and interline. These elements are not subject to many of the proposed changes. However, the nature and the technological process of these elements are subject to change. With a greater emphasis on opening up markets, or on innovation due to tax incentives (or government subsidy), a carrier might want to alter its current process. An example of this would be the use of more rail service, i.e., piggyback, for line haul. In addition, some carriers serving very special markets might want to move to high automation, as is the case in four United Parcel Service (UPS) terminals. These types of changes are due to technological efficiencies and cost reduction (management-type) decisions. While the current regulatory system does not encourage this type of activity, deregulation of entry could inspire some carriers to employ rail between break-bulks or a greater use in new systems.

In addition to the use of different system technology (i.e., rail or air), many of the larger carriers would expand their operations to take advantage of operational scale economies (1-3). To the extent that carriers can integrate these economies with their customer markets, then financial rewards will be recognized. The impact on the operational elements would be in the scheduling, type and mix of equipment, and type of market a carrier would serve. However, most of the proposed regulatory policies will probably not greatly affect these operational elements--except entry, and even this element will remain under management's control.

Safety regulations do and will continue to have a major effect on operational elements--particularly in the handling of hazardous materials. Safety regulations for fitness will also remain. Therefore, few if any operational changes would be a direct result from changes in areas of safety regulations. Competitor challenges, market demands, and service needs do and would continue to dictate alterations in the motor carrier operational elements.

Institutional Elements

The institutional elements within the transportation system can be grouped according to carrier (by type), union, rate bureaus, and government. These elements used to be distinct entities that influenced each other's performance in only a few areas. More recently, however, their interaction is more frequent and their distribution less clear.

Carrier (by type)

Carriers, at one time, could be neatly classified into one of the following groups: regular-route common carrier, irregular-route common carrier, contract carrier, private carrier, owner-operator, exempt carrier, local and/or short-haul carrier, and specialized carriers. This regulatory classification was in accordance with the type of service a carrier offered, the administrative operating constraints placed on the carrier, or the type of equipment employed in providing the service. Each of the categories served a prescribed market.

A serious problem, however, with this regulatory grouping was that it was administratively, not economically, based. This categorization provided stability in 1935; yet with the growth and changes in the U.S. economic infrastructure, these categories have been effectively eliminated--especially with the Motor Carrier Act of 1980 and the recent ICC Ex Parte MC-10 (Sub 2) decision that deleted 49CFR 1040; the adjectival differences between the carriers.

Unions

Another institutional element is the union--the International Brotherhood of Teamsters. The Teamsters are primarily affected by regulations dealing with health and safety. As noted earlier, health and safety regulations will not be lessened with changes to economic regulation; in fact, these safety regulations are likely to be more stringent.

The union has a major impact on productivity levels (or standards), work rules and wage (expense) levels. These impacts are only related to economic regulation as they affect the current ratemaking process. Wages and other expenses are included in a rate base that forms the basis for the regulatory rate level. The level is related to a "fair return." Currently, the return has been fixed at an industry level of 14.2 percent return on equity (the SMCRC decision). To the degree that management can hold down the impact of increased labor costs either through productivity increases or cost-reduction activities, carrier rate levels would (or could) remain constant.

Labor-related costs constitute more than 60 percent of carrier expenses. Wage level and benefit packages are negotiated each time the existing national labor contract terminates, generally every three years. With changes in economic regulation, nonunion carriers will have a short-run economic advantage over unionized carriers. In the long run, the bargaining posture of unionized carriers would undoubtedly change and bring union costs into a competitive range. These changes would take time, but they would be management decision making, not regulatory created.

Rate Bureaus

Rate bureaus have traditionally functioned as a synthesizer of cost and market information for the ratemaking process. This ratemaking process is a joint effort that involves interested shippers and the carriers who are members of that bureau. Inherent in this process is the sharing of cost data. This sharing of information and the joint setting of rates represent the heart of economic regulation (Section 5A of the Interstate Commerce Act).

As a result of the joint ratesetting processing, which is not permitted outside the transport industry, most of the efforts for removal of economic regulation tend to focus on the rate bureaus. Prime concern of these efforts is to force rates down to a lower level. This belief assumes that rates are above the long-run marginal costs of providing the transportation services. To the extent that costs

are above this level, rates would fall. Conversely, if rates were below this level, they would most likely rise (as was the case with air cargo rates after deregulation).

Government

The role of government in the motor carrier industry is separated into economic and noneconomic categories. Economic regulation is maintained at the ICC and noneconomic regulation at National Highway Traffic and Safety Administration, Office of Safety and Health Administration, Environmental Protection Agency, and other departments of federal and state departments of transportation. Changes in the roles of the ICC or noneconomic regulators would have an impact on the industry. The extent and nature of the changes would dictate the level of influence the regulatory agency would command.

Examples of noneconomic regulations that have had major impacts on the trucking industry are the 121 brake-locking decision, hours-of-service regulations, and state size and weight restrictions. Most of the noneconomic goals attempt to relate societal needs to the trucking industry under the "public good" argument. With a reduction in the role of economic regulation, it is safe to assume that these other regulators would play a greater role as it relates to the motor carrier industry.

Regulatory Elements

The regulatory elements in the transportation system deal with the powers of Congress vested with the ICC. These powers give the ICC authority to set rates, dictate routes, approve merges, and control market entry.

Each of these elements has a major impact on a carrier's ability to grow, penetrate profitable markets, and to maintain adequate return on investment. The degree to which carriers have "learned to play the game" for the past 40 years had permitted the more-aggressive and better-managed firms to achieve more profitable returns.

Within the past two years, however, the elements within the regulatory system have been drastically altered. In particular, the Motor Carrier Act of 1980 and recent actions by the ICC have moved to open entry and limit rates and profitability.

EVALUATION OF CHANGES TO TRANSPORTATION ELEMENTS

For large less-than-truckload (LTL)-based carriers, such as Ryder and Pacific Intermountain Express, deregulation changes have multiple impacts on market structure--both positive and negative; and these impacts are addressed in this section.

In the table that follows, a listing of the previously identified transportation elements and an estimated impact of what deregulation is having on these elements, as they relate to large LTL-based general commodity carriers, is noted:

	Degree of Impact with Complete Deregulation			
Transportation Elements	None	Minimal	Some	Major
Operational				
Pickup and delivery	X			
Line haul		X		
Terminal and platform	X			
Billing and collecting	X			
Interline			X	
Institutional				
Carrier (by type)				X
Union		X		
Rate bureaus				X
Government				X
Regulatory				
Rates				X
Routes				X
Mergers				X
Market				X

From this table, it is obvious that regulatory changes have only limited impacts on the operational elements. The bulk of the impacts is on the institutional and regulatory elements. As such, the thrust of this evaluation will be on the institutional and regulatory elements.

Transport Supply

Alterations to the institutional elements will have a pronounced effect on the supply of transportation services. The primary elements of supply are labor, plant, property, and equipment. With complete deregulation, trucking firms probably would alter their mix of these elements. Many carriers, as an example, might adjust their available capacity to service some of the profitable markets they are not currently serving. With increased levels of service on these lanes, empty miles, lower load factors (weight and cube), and increased competition are likely results. This is currently occurring in the highly competitive truckload (TL) and volume movement business. The consequence of these actions may accelerate service innovations, but the more likely consequence is greater concentration of carrier assets--to match traffic movements.

The reason carriers want to match assets more closely to revenue potential is to effectively lower per-unit handling costs. Carriers currently have different freight handling systems, different labor costs (union/nonunion), and different market orientations (LTL/TL); the resulting reconsolidations of their systems would leave many carriers at a competitive disadvantage. If one merely looks at the Senate Judiciary Committee study on motor carrier concentrations, it is obvious that shippers want to work with only a limited number of carriers (4). Combining this phenomenon with the likely reordering of carrier assets to match revenue, one quickly realizes that the number of surviving carriers will be limited. To note an example, the data in Table 1 are taken from the Judiciary Committee report (4). In these cities, the LTL tonnage figures note high levels of concentration (even with the large number of potential carriers).

LTL long-haul traffic would not be subject to many short-run changes on the supply side. As the capital requirements for breakbulk and other LTL support facilities are substantially higher than for TL, the demand-related lane-density requirements are inadequate to support building many new facilities. New competitors would be discouraged regarding immediate entry. Existing LTL carriers would, however, enter the high-density markets as capital for this expansion is made available. The impact of this expansion would be noted over the longer term. In fact, this expansion will likely be at an increased pace rather than the expansion process that was initiated under the earlier regulatory structure. Table 2 notes the changes in the long-haul LTL market (growing at about 3 percent per year since 1974) and Table 3 notes the changing mix of these operations. With the current economic recession and the associated high cost of capital, this expansion will undoubtedly be stretched.

Transport Pricing

The ability of many of the major LTL carriers to

Table 1. Freight concentration comparison.

Outbound City	Inbound City	Four-Firm Concentration (%)	Eight-Firm Concentration (%)	No. of Potential Carriers[a]
Milwaukee, WI	Minneapolis, MN	88	99	15
Greenville, SC	Charlotte, NC	93	99	27
Chicago, IL	Washington, DC	63	83	19
Houston, TX	New Orleans, LA	87	100	12

[a]Information based on points served (see National Highway and Airway Carriers, Fall 1980).

Table 2. Percentage change in the market structure (tonnage based).

Reporting Quarter/ Year	Average Length of Haul: 600-900 Miles LTL	600-900 Miles TL	>900 Miles LTL	>900 Miles TL
1/77	2.5	7.1	3.1	5.3
2/77	5.7	9.8	9.3	10.5
3/77	5.7	7.6	6.9	5.7
4/77	10.7	10.0	11.7	11.2
1/78	6.5	5.4	9.4	6.3
2/78	8.8	7.1	11.6	8.0
3/78	4.4	4.3	6.0	6.2
4/78	3.7	8.1	8.7	8.8
1/79	5.8	9.3	4.8	6.2
2/79	20.5	13.6	11.0	20.4
3/79	11.9	7.8	0.1	14.2
4/79	12.7	14.9	2.9	20.3
1/80	6.9	24.6	2.6	27.6
2/80	2.4	24.4	1.3	25.0

Table 3. Percentage of market LTL tonnage.

Quarter	Length of Haul (miles)	Market (%): 1976	1977	1978	1979	1980
1	600-900	44.3	44.2	43.5	40.9	39.8
	>900	55.7	55.8	56.5	59.1	60.2
2	600-900	44.5	43.7	43.1	40.3	40.0
	>900	55.5	56.3	56.9	59.7	60.0
3	600-900	43.7	43.4	43.1	40.0	
	>900	56.3	56.6	56.9	60.0	
4	600-900	44.9	44.7	43.6	41.0	
	>900	55.1	55.3	56.4	59.0	

remain profitable will be difficult. Changes in the new Motor Carrier Act of 1980, the current rate and entry policies of the ICC, and the drop in freight business are the prime reasons for this problem. As carriers are permitted to compete in multiple markets, as most ICC policies suggest, and rate freedom is permitted, then the questions of shipment profitability and rate cross-subsidization with respect to firms and communities will change. Some rates will go up, others down.

With motor carriers exercising some rate freedom, the economic infrastructure of many shippers' distribution systems will be impacted. The result will be that many shippers will stop using the service of the high-cost or the nondirect and marginal motor carriers. With these carriers' services not used by shippers, the revenue necessary to maintain viability for nondirect service and marginal carriers will probably be inadequate. This results in the shrinking of the total number of carriers as the less-efficient carriers are eliminated. To some extent this has already begun with the closing of Wilson and Johnson Motor Freight.

For the remaining carriers, the return on equity or other standards of normal (or required) profits would be altered. New standards would be determined from the survivors. These survivors are currently healthy carriers, and the returns of these carriers would remain viable if they were free to set rates (for normal profits). Therefore, the elimination of rate regulation would impact the profits of large, efficient carriers and cripple or eliminate many of the nondirect service and marginally profitable carriers.

Rates, as noted earlier, are jointly developed at one of the rate bureaus. The prime aim of deregulationists is to remove this joint ratemaking authority from the bureaus and to have each carrier compute its own rate. Rate bureaus would become only tariff-publishing agents in most scenarios.

With carriers developing their own rates, aggressive, growth-oriented carriers would, theoretically, set their rates at the long-run marginal cost level. If there existed excess capacity, then carriers would price at a shipment's short-run marginal cost; if insufficient capacity exists, then carriers would set rates much higher. In all instances, industry average profit margins, termed normal profits, would have to be equal to the cost of either (a) the return investors would receive from alternative investments or (b) the cost of obtaining investment capital for economic survival.

MOTOR CARRIER MARKET STRUCTURE

In classical economic theory, as long as better-than-normal profits are being earned, additional firms (in this case carriers) will presumably be attracted to the industry. But when, for example, minimum average cost is equal to the optimal number of firms' competitive price, entry of one more firm will cause every firm to earn less-than-normal profits even though price settles in the neighborhood of the optimum price (5).

This assumption of normal profits and a competitive environment does not fit all the multiple market structures of the trucking industry. In order to understand the likely structure of a deregulated motor carrier industry and the management policies that would most likely be encountered, a listing of economic market structures and their characteristics is noted in Table 4. With this table, one is able to depict the most likely structure of a deregulated motor carrier industry. The best example of pure competition is in parts of the TL traffic (i.e., the owner-operator). Barriers to entry are not great for TL operations. There are many buyers and sellers and information flows are relatively good; competitive marketplace pricing already exists in the volatile fresh food and vegetable markets.

General commodity carriers, other than the long-haul LTL carriers, tend to exhibit monopolistic competition characteristics. These carriers generally provide the same product or service, but they try to differentiate their product. A good non-transportation example would be Sunkist oranges versus California oranges. The seller attempts to influence the product purchaser with product identification or other product differentiation techniques. These carriers tend to be regional in nature.

Table 4. Economic market structures and their characteristics.

Characteristics	Market Structure			
	Pure Competition	Monopolistic Competition	Oligopoly	Monopoly
Number of buyers	Many	Many	Many	Many
Number of sellers	Many	Several	Few	One
Ease of entry	Easy	Easy	Difficult	Hard
Factor mobility	Free	Free	Free	Free
Product	Homogeneous	Differentiated	Somewhat differentiated	Homogeneous
Control over price	None	Some	Some	Considerable

Long-haul LTL carriers, on the other hand, exhibit oligopoly characteristics. This is particularly true when one notes the capital barriers that limit entry, the returns to scale (although not great), limited product differentiation, and, from the supply side, the limited amount of traffic that can support only a few carriers. No environment would exhibit monopoly market structures--unless administratively set--such as UPS.

With these general comments, one can return to the economic model (5):

> If knowledge is complete, will additional firms enter the industry?
>
> This depends on the probability that the firm, contemplating entry, has only one chance in three of surviving. If there are a hundred firms, it has 100 chances in 101. Hence entry would be more likely in the latter than in the former case.
>
> But if this is so, firms (carriers) will continuously be entering and leaving the industry that can support a large number of firms when that industry is in long-run "equilibrium," and nobody is likely to earn better-than-normal profits over the long run. Firms in the industry would be better off if entry were discouraged by moving price even closer to the optimum firm competitive price than it would be at the optimum price with too many firms. Therefore, this second factor, price equilibrium, operates in the long run to bring the equilibrium price closer and closer to the competition level such that the number of firms earning normal profits becomes larger and larger.

For carriers in the monopolistic competition market structure, price competition will be such that only normal profits can be earned. However, entry would remain difficult in the deregulated environment as there are capital barriers to entry. Major attempts at product differentiation, whether real or contrived, will be attempted. One of our carriers, Helms Express, is complementing its regular LTL service with an extensive consolidation and distribution service. In addition to this new service, they also provide a TL operation. These services are an attempt to differentiate themselves from their primary competitors that only offer one type of the above-mentioned products.

The economic market structure most likely for major LTL carriers is the oligopoly. Carriers operating within the long-haul LTL markets have major capital barriers, few sellers, and some cost economies. With the long-haul LTL carriers, profits would probably accrue at a normal rate. This positive profit growth would continue as long as these carriers increased their freight tonnage and revenues. This positive profit growth is a function of the scale economies and of freight growth. Any downward pressure on prices and the resulting decline in profits expected by some could be caused by new competitors cutting rates as they enter selected markets. The degree of rate reduction, however, would probably be limited as there is no incentive to greatly reduced rates. If the largest carriers collectively reduced their rates, then they could dictate price and profit levels. This price reduction would, however, hurt them as much as it would the majority of other well-managed LTL carriers.

A diagram of pricing actions and their impacts on profit levels is noted in Figure 1. Diagram A notes the matching of marginal costs, average costs, and marginal revenue. Only limited amounts of profit are earned; no real incentives exist for major investment or growth. This type of pricing action has long been practiced in the owner-operator business; and as recent studies have noted, there has not been any growth in the number of carriers (in this case drivers) over the last three years (6).

Diagram B denotes monopolistic competition with some product differentiation. Examples of this are regional carriers that try to offer different services (assembly/distribution operations, warehousing, container drayage, etc.). These carriers are trying to provide the same basic service, but they are selling a different set of transport attributes to meet their customer needs.

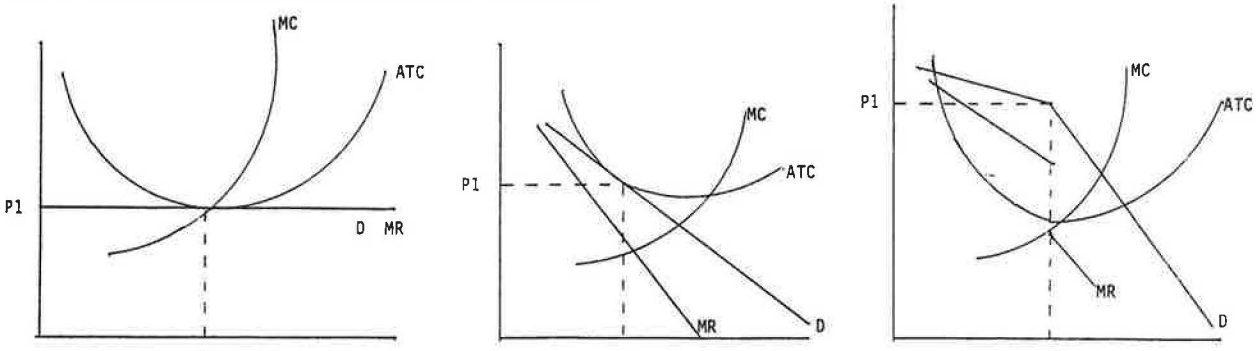
Diagram C depicts oligopoly pricing. Market share and price leadership are critical to growth and strategy development in this market. Prices are generally set at the long-run marginal cost; however, if one carrier attempts to lower price to gain market share, all carriers will generally match that lower price and, as a result, no single carrier is better off--all carriers simply have a smaller revenue base market to divide. To the extent that carriers can compete in nonprice areas, they will. Carriers will also compete in price only if they can earn long-run profits and gain market share. The key, therefore, is to develop market share with price leadership. Price leadership, however, has not evolved at this time in the motor carrier industry.

CONCLUSIONS

The economic and market structure of the for-hire motor carrier industry is undergoing massive changes. These changes, however, are not fundamental but are merely a rationalization of the existing structure. This rationalization involves a shrinking of the number of carriers, greater degrees of product specialization, and more emphasis on market economics.

As for shippers, these changes to the motor carrier market structure have a number of implications. Shippers will be able to negotiate lower rates if these rates can be economically justified, but the number of carriers they will be able to negotiate with will most likely be fewer. The converse is also true: Shippers without economic clout will face higher rates. As a result of these economic imbalances in the rate-negotiation process, many shippers and carriers will be seeking contract rates. This type of an arrangement assures carriers a rate level that earns a profit and, at the same

Figure 1. Market conduct: pricing in different deregulated environments.



time, assures shippers a standard or constant cost for the transport element of their production function.

Shippers will also be offered a number of new or differentiated (real or perceived) products. To evaluate these products, shippers will have to develop their own in-house staff of technical expertise (that calculates the value of these products). It should be noted that some major shippers have already assembled individuals with these kinds of skills. The result is that both carriers and shippers will be developing new expertise to meet the changing transport market structure.

The ability of the for-hire motor carrier industry to grow depends on its ability to integrate itself into shippers' distribution systems. In many instances, this integration will be limited by the shippers' willingness (or unwillingness) to allow carriers to perform more of the distribution functions (e.g., assembly, distribution, and warehousing). In essence, the for-hire industry will evolve into a much smaller industry (number of firms) with a greater degree of specialization. The survival of any one firm will be a function of its ability to adapt--to be a distribution generalist or transport specialist.

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Implications of Motor Carrier Regulatory Reform for Carrier Planning and Marketing

WILLIAM B. TYE

Some important developments in the structure of the motor carrier industry that are likely to arise from regulatory reform are reviewed and likely changes in the marketing and corporate planning functions for motor carriers are examined. Motor carriers have traditionally been operation-oriented rather than marketing-oriented. However, many past formulas for success are not likely to prove successful in the future. In particular, corporate planning and marketing are likely to be far more prominent tools in future carrier management. A number of issues in competitive philosophy for motor carriers are examined and likely future trends are suggested. The role of maximization of market share as a competitive weapon, changes in corporate communication and responsibility, service and rate trade-offs, and the benefits of a distinctive service concept versus the benefits of a full line of service alternatives to the shipper are considered. Some specific suggestions for motor carrier management to help ease the transition to the new environment, such as a marketing audit, are also examined.

The motor carrier industry, particularly the regular-route sector, suffered a double blow during 1980. Motor carrier traffic was dropping drastically during the recession and, at the same time, the Interstate Commerce Commission (ICC) was holding down rate bureau rate requests and individual carriers were breaking ranks to get a jump on regulatory reform by announcing independent actions that were undermining the less-than-truckload (LTL) rate structure. Meanwhile, President Jimmy Carter signed the Motor Carrier Act of 1980 that promised to pave the way toward elimination of many of the economic regulatory restraints imposed on motor carriers by the ICC. The ICC is currently implementing that