CHAPTER 4

SHIPPER CONCERNS AND MODAL COMPETITION

INTRODUCTION

In evaluating TS&W policy options, it is important to consider shipper concerns and competitive advantages of the truck, rail, water, and air modes. Shippers are a widely varying group who define freight transportation services by identifying customer needs, procuring necessary materials, and ultimately delivering goods to meet customer needs. Shippers are impacted directly by TS&W limits, as in the case of privately operated truck fleets, or indirectly affected because the carriers they select must comply with TS&W laws and regulations.

Shipper decisions regarding freight transportation are based on total logistics costs, customer requirements, and other corporate goals. Total logistics costs include inventory, capital cost of that inventory, warehousing, and transportation costs. These costs can vary between industries and among firms within the same industry. The TS&W policies contribute to total logistics costs, but each shipper must evaluate their transportation options against potential tradeoffs with other logistics costs.

Shippers are not a homogeneous group and the freight transportation market is dynamic with changing customer requirements, new transportation opportunities, technological advances and interrelated services. An example is satellite tracking of a shipment's location. These factors also influence how much freight moves by truck or by type of truck, even if no change is made in TS&W policies.

The 1997 CTS&W Study included a number of activities designed to understand the heterogeneous shipper interests and issues, and assess how shipper decisions relate to TS&W issues.[1] Primary findings are: (1) shippers will optimize their logistics operations in response to TS&W policies; (2) service requirements of freight transportation must be met before price

[1] These activities and findings are discussed in Report Number 10 of the 1997 U.S. DOT CTS&W Study, *A Post Deregulation Perspective on Shipper Decision Making.*

decisions can be made; (3) transportation efficiency has increased in recent years as a result of transportation industry consolidations, technological advances, and development of closer shipper/carrier/third-party relationships; and (4) shippers consider transportation system safety to be important.

The last two decades have seen remarkable changes in the freight transportation industry. Major deregulation has occurred in truck, rail, and air transportation businesses. As a result, there have been considerable consolidations in the trucking and rail industries, blurring the boundaries between traditional business entities. Consequently, intermodal transportation services have improved. These changes have supported the development of integrated supply chains and technological advances that have improved the efficiency with which freight is moved.

Nearly 56 percent of all freight shipped (measured in tons) travels less than 50 miles, and more than 75 percent travels less than 250 miles. In 1993, the trucking industry handled about 66 percent of all freight tons and about 75 percent of the market value of all freight shipments.[2] However, trucks constituted a far smaller portion of freight movements in terms of ton-miles traveled (about 36 percent) whereas rail accounted for 39 percent and water modes accounted for 11 percent of the total in 1993 with the balance made up by intermodal and other forms of transport. The value, travel distance, time-sensitivity, and density of freight combine ultimately to determine the means and mode of freight transportation.[3]

RECENT CHANGES AFFECTING SHIPPERS AND FREIGHT TRANSPORTATION

Since 1980, there have been significant changes in United States and global freight transportation. A number of common issues have prompted cross-industry (transportation) change that has had an impact on both the structure of the transportation systems and how shippers use these transportation systems. The most important factors influencing these changes are: (1) global markets; (2) deregulation; (3) technological advances; (4) merger, acquisitions, and alliances; and, (5) shipper process change. These factors, including TS&W limits, and other issues directly impact shipper logistics costs and how freight is moved.

GLOBAL MARKETS

Shippers and carriers have an increasing interest in globalization. For example, rather than being solely concerned with a Chicago-New York transportation move, a company may now have to consider inbound flow from Asia and outbound flow to Europe and South America. This

[2] 1993 CFS Data.

[3] A description of the models used to estimate the diversion of freight from one mode to another is provided in the Volume III Report of the 1997 CTS&W Study.

increases the complexity of the transportation network -- and of the entire supply chain -- and provides new challenges to effectively manage a combined global and domestic goods flow network.

> The "globalization of U.S. business has been a double edged sword providing both a threat and an opportunity. There is no doubt, however, that it is no longer business as usual, and companies have responded, in part, by copying some foreign business practices, e.g., "just-in-time" (JIT) inventory control and flexible manufacturing systems, as well as instituting other changes in their organization structures to remain competitive.
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> [Global] . . . markets include "foreign purchasing (sourcing) of raw materials and supplies and selective sales in international markets with extensive use of intermediaries to multi-faceted international manufacturing and marketing strategies encompassing international production sites, multi-staging inventory, and counter trading product sales. The growing international dimension of both the inbound and outbound logistics channels has had and will continue to have a major impact upon the logistics and transportation requirements of companies."[4]

ECONOMIC DEREGULATION OF TRANSPORTATION

An overview of economic deregulation of transportation is relevant to TS&W for many reasons, including: changes to TS&W regulations have been stimulated by increasing markets for the trucking sector, growth in the number of carriers and trucks following deregulation is significant and has contributed to capacity problems faced by the States, and changes to TS&W limits can either stimulate or stifle efficient commodity flow, impacting both domestic and international commerce.

SURFACE TRANSPORTATION INDUSTRY DEREGULATION

The freight transportation industry in the United States has experienced enormous changes since 1980. In the late 1970s, advocates for deregulation of transportation began to argue for elimination of Federal economic regulation and Congress began to reevaluate the body of transportation regulation that had been developed since the ICC was created in 1887. Under the belief that inefficiencies existed, caused by rate and entry-exit regulation, Congress determined that the Nation's transportation system could perform better with less regulation and more competition. A number of Federal deregulatory laws -- including the Motor Carrier Act of 1980 (MCA), Staggers Rail Act of 1980, STAA of 1982, ISTEA, Trucking Industry Regulatory Reform Act of 1994 (TIRRA), Title VI of the Federal Aviation Administration Authorization Act of 1994, and, ICC Termination Act of 1995 -- followed as Table IV-1 shows.

[4] "Future Manufacturing, Markets, and Logistics Needs," John J. Coyle, Conference Proceedings 3: International Symposium on Motor Carrier Transportation, National Academy Press, 1994, pg. 21.

Table IV-1
Deregulation of Surface Transportation

Mode	1980	1982	1984	1991	1994	1995
Trucking	Motor Carrier Act	STAA		ISTEA	TIRRA	ICCTA
Rail	Staggers Rail Act			ISTEA		ICCTA
Rivers/Canals				ISTEA		ICCTA
Shipping			Shipping Act			

Under the deregulated market, each freight transportation mode experienced significant business volume growth in the 15 years that followed the 1980 and 1982 legislation. Although each mode had a rise in ton-miles (Table IV-2), the greatest gains were made by air freight and non-ICC regulated trucking. The Eno Foundation's estimate of domestic intercity ton-miles show the variance in relative shares as the industry has evolved during deregulation. In the early 1980s rail lost share to trucking, but it recovered somewhat in the 1990s with new operations and services.

Table IV-2
Historical Domestic Intercity Ton-miles of Freight
Selected Years By Mode (Billions)[5]

	Rail		ICC Truck		Non-ICC Truck		Rivers/Canals		Air	
	Ton-Miles	%	Ton-Miles	%	Ton-Miles	%	Ton-Miles	%	Ton-Miles	%
1980	932	**37.5**	242	**9.7**	313	**12.6**	227	**12.5**	4.84	**0.19**
1982	810	**36.0**	218	**9.7**	302	**13.4**	217	**12.8**	5.14	**0.23**
1987	972	**36.8**	276	**10.4**	387	**14.6**	257	**12.8**	8.67	**0.33**
1991	1100	**37.7**	320	**11.0**	438	**15.0**	290	**13.3**	9.96	**0.34**
1992	1138	**37.6**	342	**11.3**	473	**15.6**	298	**13.1**	10.99	**0.36**
1993	1183	**38.1**	365	**11.7**	496	**15.9**	284	**12.2**	11.54	**0.37**
1994	1275	**39.1**	391	**11.9**	517	**15.8**	290	**11.8**	12.70	**0.39**

Source: Eno Transportation Foundation, Inc.

[5] Percents are based on totals which include oil pipelines and all Rivers/Canals not just domestic.

THE STAGGERS RAIL ACT OF 1980

The Staggers Rail Act of 1980 limited ICC authority over maximum rail rates to movements where railroads had market dominance over the specific traffic at issue.[6] The Act also allowed carriers and shippers to enter into confidential, unreviewable rate and service contracts, and broadened the ICC's authority to exempt specific traffic segments or services from all regulation, if competition is sufficient to protect shippers. As a result of all these changes, today, only approximately 10-15 percent of rail traffic is subject to maximum rate regulation. The ICC's maximum rate guidelines are designed to stimulate a competitive rate level in cases where market forces are weak or absent.

The Staggers Act set minimum rates at "a reasonable minimum," which the ICC interpreted as not below directly variable costs. By prohibiting most collective ratemaking as collusive, the Act significantly stimulated intramodal competition and encouraged rail-barge and rail-truck intermodal movements (the Act did retain permission for railroads that participated in joint line movements to work together to set rates).

The Act extended 1976 legislation and ICC administrative actions to allow railroads to abandon lines where traffic did not support the cost of providing service. By allowing any financially responsible party to acquire an abandoned line at low cost, the Act preserved local rail service in many areas and stimulated the growth of the shortline railroad industry. The Staggers Act also placed time deadlines on ICC determinations in abandonment and merger proceedings, and set slightly easier approval criteria for mergers and acquisitions that did not involve at least two Class I (major) railroads.

THE MOTOR CARRIER ACT OF 1980

The goal of Congress and the ICC in deregulating the trucking industry was to lower rates, particularly in the less-than-truckload sector. Various studies concluded that the trucking industry's collective rate-making system, composed of regional rate bureaus, resulted in rates in the LTL sector that were substantially higher than they would be in a fully competitive environment.[7] To remedy this situation, Congress passed the MCA, which significantly affected the structure and functioning of the trucking industry by limiting collective rate making, easing entry restrictions, and encouraging pricing freedom.

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[6] For a railroad to have market dominance over a specific movement, the rate to variable cost ratio for the traffic has to exceed a statutory threshold (originally set at 160 percent and rising by increments to 180 percent, the level today). Additionally, there must be no effective intermodal, intramodal, product or geographic competition for the movement.

[7] For one example, see John W. Snow, "The Problem of Motor Carrier Regulation and the Ford Administration's Proposal Reform," in Paul W. MacAvoy and John W. Snow, eds., *Regulation of Entry and Pricing in Truck Transportation.* American Enterprise Institute, 1977.

The MCA directed the ICC to eliminate gateway and circuitous route restrictions, as well as some other operating restrictions, for the common carrier segment of the industry and for contract carriers of property, the Act eliminated restrictions on the number of shippers they could serve. Of particular importance, the Act phased-out antitrust immunity for collusive rate-setting activities, which resulted in increased price competition.

A significant provision of the MCA was the relaxation of entry restrictions for new carriers, making it easier to obtain certificates of operating authority. Unless the ICC found the proposed new service to be inconsistent with public convenience and necessity, the ICC was required to grant certificates. Prior to the act, applicants had to prove that their proposed new service was in the public interest. Existing carriers serving the market now had to prove that the new service was not in the public interest.

INDUSTRY CHANGES

Deregulation of the surface freight transportation industry allowed the transportation system to grow in size and to become more efficient. Industry figures suggest that a huge influx of new entrants into the trucking business followed the MCA. In the period from 1978 to 1987 the number of for-hire carriers increased from 67,038 to 89,677; the number of local carriers increased from 41,069 to 50,091; intercity carriers increased from 21,426 to 33,547; and household goods carriers increased from 4,543 to 6,039. The largest increase in number was the ICC-regulated carriers, doubling from 16,874 in 1978 to 36,948 by 1986.[8] The largest increase in operating authority came primarily from small Class III[9] carriers, which almost exclusively provide truckload service. These carriers increased from 14,610 in 1980 to 33,903 in 1986. The main source of this increase was from private carriers that took advantage of their ability to obtain backhaul authority.[10] Other sources of growth were in owner-operators, who previously leased their services to common carriers, and carriers that operated in intrastate or exempt markets.

Rail and motor-carrier operations changed dramatically in response to the movement toward deregulation. Railroads and shippers negotiated thousands of contract rates for regulated and unregulated commodities. Consolidation and abandonment reduced excess capacity and improved yard and linehaul operations, enabling railroads to lower their costs and to offer substantially faster service.[11] In 1975, there were 73 Class I[12] railroads; by 1988, the number

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8 "Trends and Statistics," *Commercial Carrier Journal, July 1987*.

9 Class III carriers are those carriers receiving annual gross operating revenues less than $3 million from property motor carrier operations.

10 Toto Purchasing and Supply Company, Inc. 128 ICC 873, March 24, 1978.

11 "Potential Benefits of Rail Mergers: An Econometric Analysis of Network Effects on Service Quality," G. Harris and Clifford Winston, *Review of Economics and Statistics*, Volume 65, February 1983, pp. 32-40.

12 For 1994, Class I railroads are those railroads with operating revenue of $255.9 million or more. According to Railroad Facts published by the AAR. Note: The operating level is adjusted annually for inflation.

had dropped to 17, operating 82 percent of the system mileage and employing 90 percent of the industry's labor force. By 1995, the number had decreased to 10 Class I railroads.[13]

An important outcome of deregulation of motor carrier and rail that is relevant to TS&W regulations is the shipper advantage gained. For example, the average rail rate per ton declined 38 percent between 1980 and 1995 (after adjusted for inflation).[14] From a shipper's point of view, the improvements in rail and motor carrier service have been beneficial because they have coincided with efforts to reduce inventory costs. There has been a shift to JIT production and inventory management, which attempts to minimize inventories by bringing in raw materials and components JIT for production. Companies are achieving substantial savings in the lower cost of warehousing, insurance, interest expense, taxes, loss, and damage. Deregulation aided the development of this policy because shippers were freer to enter into contracts and to specify service standards that carriers had greater incentive and ability to meet.

Deregulation of transportation services has allowed carriers to focus on providing flexible service that responds to changing market conditions and is not dependent on a lengthy approval process by a regulatory agency. Carriers operate more efficiently, with more direct routes and fewer empty backhauls, and offer more service options with greater pricing flexibility.

TRUCKING INDUSTRY REGULATORY REFORM ACT OF 1994

With the passage of the TIRRA in August 1994, the domestic trucking industry became almost entirely deregulated, finishing the work that Congress started with the MCA. The catalyst for change contained in the TIRRA was a provision that eliminated the long-standing requirement that interstate motor common carriers file their rates with the ICC.

Before TIRRA, 41 States exercised some degree of control over truck movements within their borders through regulation of operation authority. The TIRRA prompted many LTL carriers to expand their territorial coverage to include intrastate service. Further, large, well-financed regional carriers expanded into once-protected markets like California and Texas. Relevant to TS&W regulation was the provision in TIRRA that established the minimum entry requirements for motor carrier applications to safety, fitness, and financial responsibility with revocation of a carriers' authority limited to a carriers' failure to maintain safety standards and insurance.

FEDERAL AVIATION ACT OF 1994: TITLE VI

The MCA and TIRRA deregulated interstate commerce among States, permitting shippers to negotiate with truckers on rates, however some States exercised tight controls over intrastate operating authority -- preventing carriers from reaching the full potential of the MCA. Shippers found themselves paying more to move freight within large States than for cross-country hauls.

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[13] AAR, *Railroad 10 Year Trend*, 1985-1994. Washington, D.C., November 1995.

[14] ICC Office of Economic and Environmental Analysis, Rail Rates Continue Multi-Year Decline (1995).

Restricted competition allowed intrastate rates to rise to levels about 40 percent higher than interstate rates for the same distances.[15]

On January 1, 1995, Title VI of the Federal Aviation Act of 1994, the section that preempts State economic regulation of motor carriers transporting property intrastate, became effective. The Act bars all States from enacting or enforcing a law, regulation, or other provision having the force and effect of a law related to price, route or service of any motor carrier (other than a carrier affiliated with a direct air carrier) or any motor private carrier with respect to the transportation of property.

THE ICC TERMINATION ACT OF 1995

The deregulation of the rail and trucking industries diminished much of the ICC regulation in these industries; constraints on rates and entry into these industries were largely eliminated. After the MCA, in addition to some residual rate and entry regulations, the ICC continued to enforce several kinds of ancillary trucking regulations on matters other than rates and entry. One of the "fitness" regulations the ICC continued to enforce was safety, requiring ICC-regulated motor carriers to have insurance coverage, in the amount of $750,000 in 1980.

In December 1995, the ICC Termination Act was signed into law. The act eliminated dozens of ICC functions, with the remaining responsibilities transferred to a new Surface Transportation Board. The Board will continue to render decisions on undercharge claims, rate reasonableness, and adequacy of service. Specifically, it retained almost all its authority over rail regulation under the Staggers Act (including maximum rates, abandonments, mergers, etc.).

IMPACT OF DEREGULATION AND TS&W REGULATION

Federal trucking deregulation has had a profound effect on all aspects of the industry since the passage of the most significant legislation, the MCA.[16] Simplified entry into the industry, greater pricing freedom, expanded classification of exempt commodities, provisions of for-hire services by private fleets, and easing of territorial restrictions have all contributed to stimulating industry and market competition.

During the mid- to late-1980s the trucking industry underwent a significant reorganization that resulted in many changes, such as established carriers expanding into new services, and private carriers and owner-operators operating independently as for-hire interstate carriers. Economic deregulation eroded the relevance of many traditional distinctions between trucking companies and carriers are now described more by the market segment they serve, TL or LTL. The TL carriers account for 80 to 90 percent of all combination truck traffic.

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[15] "The Brave New World of Tariff-Free Pricing," Ray Bohman, *Traffic Management*, June 1995.

[16] Harris, op cit.

Increased use of larger trucks following enactment of the STAA of 1982 and changes in the trucking industry that evolved from economic deregulation coincided. A strong economic incentive influenced the trucking industry conversion to the STAA trucks. Carriers select trailers largely on the basis of the characteristics of the commodities they haul, therefore increases in truck size limits is of lesser importance to TL carriers than the LTL carriers.[17]

Consequently, any policy scenario that increases size limits, but not weight limits, would benefit one segment of the industry, the LTL carriers, but not TL carriers. The expanded use of twin trailers provided for in STAA is primarily concentrated within the LTL segment of the industry, whereas the longer semitrailers are favored by the TL carriers.

The 1980 deregulation of the rail and trucking industries strongly affected shipper decisions. Deregulation has given greater freedom to both shippers and carriers in meeting the requirements of the market place for both a cost-effective and service-effective system. However, deregulation has not been without its casualties. The industry changes in the mid 1980s found over a thousand truck lines a year ceasing operations. Many short-line railroads also ceased operations. Carriers which were not able to adapt to new shipper requirements were the first casualties of deregulation. However, many more thousands of motor carriers entered the market, as did about 300 short line railroads.

TECHNOLOGICAL ADVANCES

New technology has provided the platform for many pervasive and continuing changes in transportation supply which have improved communication between shippers and carriers. Examples of technologies include bar coding, advanced material-handling systems, and sophisticated carrier routing and scheduling programs. Movement-related equipment, such as double-stack trains, RoadRailer,[18] and other advanced rail car designs, has also provided technology applications that have a direct impact on the economics of both shippers and carriers. Electronic Data Interchange (EDI) and more broadly electronic commerce is linking together the shipper, carrier, and customer in real time. Additionally, reduced costs and increased capabilities of personal computers contributed to improvements in shipper and carrier communications.

> "The impact of . . . computer technology on logistical practices has been far reaching. Complex tasks such as truck routing and scheduling are now much more routine using desktop computers. Simulations of entire logistical systems can be developed to determine the optimal approach to achieving desired customer service performance. It is possible to simulate the knowledge of logistics experts and combine it with current data to develop new strategic

[17] Harris, op cit.

[18] A type of rail-highway vehicle developed in the late 1950s by the Chesapeake and Ohio Railroad consisting of a conventional highway semi-trailer with a pair of steel railroad wheels that could be lowered so the trailer could also ride on railroad tracks. The evolution of the RoadRailer is summarized in *Intermodal Freight Transportation*, 3rd Edition, Gerhardt Muller, 1995, pg. 62.

alternatives. Such systems offer the promise of linking status and control information from material procurement to finished product customer delivery. The development and management of such a huge data base would not have been possible a few short years ago.

Current available systems such as bar coding are being improved and combined with data communication transmission to improve logistical control and manage inventory more effectively. With the advent of satellite transmission, a shipper/carrier can pinpoint the exact location and schedule of an individual package at any time throughout the entire logistical supply chain. Throughout the logistics infrastructure, carriers, warehouses, and special service providers are introducing much better information and control systems.

The information transmission part of the technological revolution is worthy of special note. EDI and bar coding have played a major role in the more efficient and effective management of the distribution process, but there is much more that can be done to integrate the systems of vendors, customers and transportation companies."[19]

MERGERS, ACQUISITIONS, ALLIANCES

The high level of merger activity within and between the traditional modes of transportation during the past decade created new transportation capability for shippers. Several recent mergers of large Class I rail lines have been initiated for improving rail service and making it more competitive with trucks. Similarly, other mergers, acquisitions, and alliances within and between the modes have created a new menu of enhanced carrier and third-party service capabilities for the shipper. Even with this enhanced menu, according to the NPTC and American Trucking Associations, Inc. (ATA), private carriers continue to represent a 52 percent share of interstate freight movement. At the same time that these mergers, acquisitions, and new alliances are taking place, some carriers have emerged to aggressively take a new role in the transportation network.

"A key trend in organizational restructuring has been the flattening or leaning of organizations with layers of middle management being eliminated and the span of control being increased. The logistics and transportation function has frequently been a primary area for economies to be implemented with less staff. With mergers, one company's department of logistics and transportation is often eliminated, or in some instances both, and the function is outsourced to a third party company in whole or in part.

[19] "Future Manufacturing, Markets, and Logistics Needs," John J. Coyle, Conference Proceedings 3: International Symposium on Motor Carrier Transportation, National Academy Press, 1994, pg. 24.

> . . . The outsourcing of logistics and transportation has created a niche for transportation companies to add services that will add value for their customers. Some transportation companies have established subsidiaries to offer broad based logistical services for their customers including warehousing, inventory control, order processing, delivery,". . . and so forth.[20]

SHIPPER PROCESS CHANGES

There is strong evidence in almost every industry sector that forward-thinking shippers have changed the way they go to market. It is difficult to find an industry meeting where one is not bombarded by the relative merits of a new alphabet of acronyms: JIT, Quick Response (QR), Efficient Consumer Response (ECR), Distribution Requirements Planning (DRP), and a host of others. Most of these in one way or another deal with connecting the supply chain with a unified operation, eliminating safety stock, duplicating inventory in the system, shortening freight ordering and transit times, and bringing more value to the consumer or user.

Along with these changes have come changes in buyer-seller relationships in the transportation network. Most of the freight moving today in the United States moves under contract rates -- where the price of an individual shipment is set by an overall contractual relationship between a shipper and carrier. Shippers project that contract rate shipments could climb to over 75 percent of total shipments by the turn of the century.[21] This trend suggests a changing set of relationships in the supply chain, and a set of relationships which may provide a more stable, predictable, and productive base for forecasting future transportation requirements.

These five factors, along with other industry-specific factors, have a significant impact on costs, productivity, and strategy of the entire logistics supply chain. For a number of firms, the total logistics costs in 1996 on a cost-per-unit basis are lower than they were in 1980 (inflation adjusted). The savings come from elimination of duplicate inventory in the system, lower overall transportation costs, and reduced transaction costs in the supply chain.

ANALYSIS OF MARKETPLACE CHANGES IN DISTRIBUTION[22]

Logistics costs have been increasing since 1983 in the United States and are projected to exceed $600 billion annually during the 1990s. As indicated in Figure IV-1, logistics costs as a percentage of gross national product (GNP) declined from about 15 percent in 1981 to 11 percent in 1990. This decline is expected to continue through the 1990s.

Table IV-3 presents the components of total National logistics costs in 1990. Of the major categories listed, motor carrier transportation costs accounted for $277 billion out of the total

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[20] Coyle, op cit., pg. 25.

[21] Based on findings of Report Number 10 of TS&W Study previously cited.

[22] The material in this section is based on Coyle, op cit.

$600 billion. Expenditures for inventory costs ($221 billion) almost equaled transportation costs. Outlays for other transportation modes and administrative activities were small in comparison.

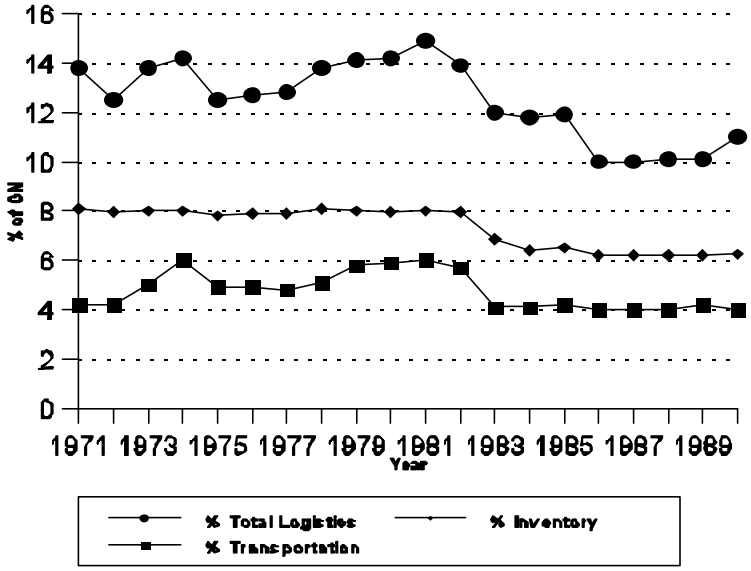
Figure IV-1 indicates an overall decline in total expenditures for logistics, transportation and inventory carrying costs as a percentage of GNP from 1970 through 1990. During the 1980s, total business logistics costs declined by about $65 billion. About $35 billion of this savings is attributed to reductions in transportation costs; savings in inventory carrying costs accounts for the remaining $30 billion. Figure IV-2 demonstrates the dramatic decrease in inventory levels during the period 1980 through 1990.

Table IV-3
Components of 1990 Logistics Cost

COMPONENT	COST ($ Billions)
Inventory Carrying Costs	76
Interest	84
Taxes, Obsolescence, Depreciation	61
Warehousing	221
Transportation Costs	
Motor Carriers	
Public and for Hire	77
Private and for Own Account	87
Local Freight Services	113
	277
Other Carriers	
Railroads	32
Water Carriers	21
Oil Pipelines	9
Air Carriers	13
	75
Shipper-Related Costs	4
Distribution Administration	23
Total	600

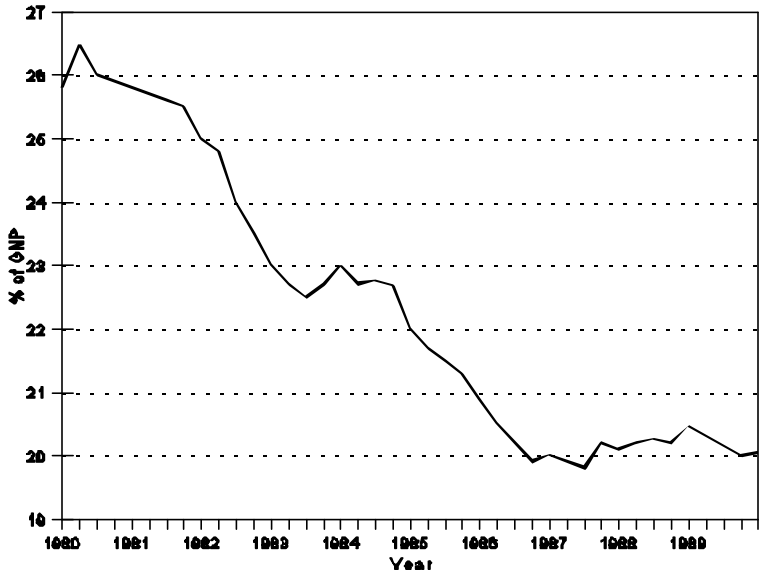
Source: John J. Coyle

Figure IV-1
Business Logistics, Transportation, And Inventory Carrying Costs as a Percentage of GNP



Source: Robert D. Delaney, Cass Logistics, Inc., reprinted with permission.

Figure IV-2
Nominal Ratio of Business Inventories to Final Sales: 1980-1990

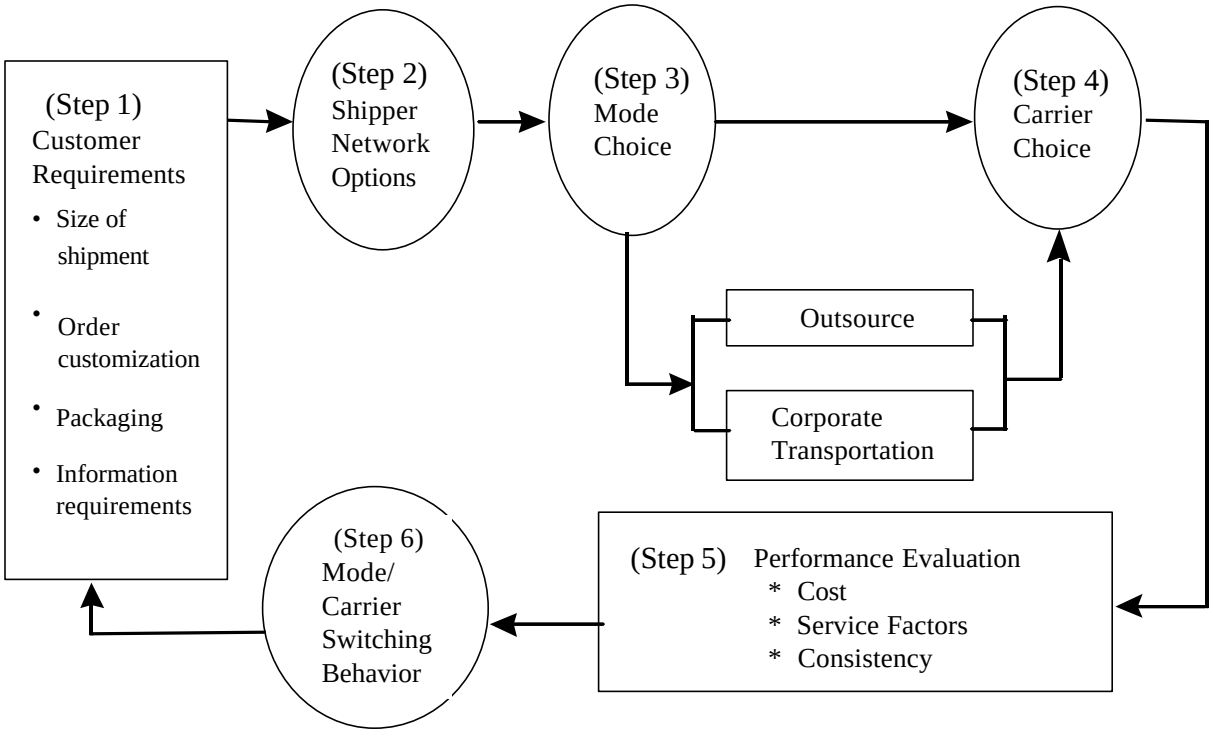


Source: Federal Reserve Board

SHIPPER DECISION MAKING PROCESS

The complexity of the shipper transportation decision process is shown in Figure IV-3. The process begins with understanding customer requirements, then flows into network shipping options, modal choice, carrier choice, and post-choice evaluation processes. The process is continual because shippers select a transportation strategy to meet customer needs and continually evaluate customer requirements which may lead to further changes in the shipping process. The TS&W limits affect all cells in the shipper transportation decision-making process diagram. For example, TS&W limits may effect a carrier's delivery schedule for customers with a time-definite production process. On the other hand, a shipper who has opted to use private trucks may be less likely to purchase new equipment or to switch modes of transport that may be more cost-effective following a change in TS&W limits, given the substantial investment in their existing private truck fleet. This entire process may be noticeably different for a shipper that has outsourced their traffic management or is using for-hire carriers.

Figure IV-3
The Shipper Transportation Decision Making Process



STEP 1: CUSTOMER REQUIREMENTS

A shipper deciding on a "go-to-market" strategy must tie its transportation decisions to customer requirements. A number of factor s have had an impact on this part of the shipper decision process. For example, from 1950 to 1980 most inventory systems in the United States were "push" systems in which the shipper decided when to ship, where to ship, and what packaging to use. During the decade of the 1980s, the large mass merchants grew to maturity. A number of retailers grew very rapidly, and as they did, power shifted away from the shipper downstream to large upstream customers. The inventory systems shifted from the classic "push" system to a "pull" system, in which the customer decided the size of shipment and when and where it would be delivered.

Customer requirements today are multifaceted, and increasingly more diverse. It is no longer satisfactory to simply provide quick transit time for most of the shipments. Customized shipments -- specialized packaging, shipment tracking, and progress reporting -- is the rule for many customers. There is a growing use of "time-definite" shipments, meaning that the customer is not concerned with how long the shipment takes in transit but rather the exact time that it arrives. This, of course, allows the shipper and carrier greater latitude in designing their logistics network in that they are able to manage transit time in the most economical way, using a variety of transportation modes, providing they are able to deliver to the customer on a time-definite basis.

The long-running debate over the relative importance of cost-versus-service quality continues today. There is no doubt that some freight -- due to its low value and high density -- is cost sensitive and, therefore, generally moves by rail, and generally by the lowest costing carrier. At the other end of the scale is a range of products that are service sensitive and, therefore, generally move by truck, not air. However, in between price-sensitive and service-sensitive freight are a range of goods that can move either by rail or truck depending on the service requirements, distance traveled, and total logistics costs to the shipper.

STEP 2: SHIPPER NETWORK OPTIONS

From 1950 to 1980 most firms buffered uncertainty with inventory. This approach involved a network of multiple distribution centers and duplicate inventory throughout the United States and the world. With costs decreasing and the capability of information resources increasing in the 1980s and 1990s, a significant shift took place in logistics architecture. Instead of multiple inventories, forward-thinking companies replaced physical inventories with information resources describing the location and arrival time of new shipments. There is also a trend toward logistics architecture which emphasizes product flow directly to the customer. In these types of systems, product flows from the end of the production line to the ultimate customer or user. If this is not possible, then a process of cross-docking or flow-through distribution is adopted which keeps the goods moving with short delays for sorting and switching.

Recent improvements to material supply processes, such as JIT inventory practices where needed inputs are not stockpiled but arrive as needed, have supported the shift from traditional flows to

"flow-through" systems. These changes, along with the enabling power of information, allowed the shipper to rethink network options in terms of efficiency and effectiveness. The resulting changes, which include everything from global sourcing to direct store delivery, have and will continue to shape future transportation network options.

STEP 3: MODE CHOICE

After defining the shipments' requirements a shipper must select a mode. Transportation choice used to focus on freight rates and inventory costs. Today, service variables (speed, reliability, and dependability) are more important than just low rates.

A firm needs to choose between managing its own shipping needs or outsourcing the transportation function. If the firm decides to manage its own shipping it may need to purchase, or lease, a trucking fleet. In the United States, private carriers command a 52 percent share of interstate freight movements.[23] However, nationwide, transportation logistics executives are seeking the best mix of service quality options for their companies, which often leads to a combination of private fleet operation and outsourcing. Many third parties not only provide transportation but also logistics services. A single vendor manages the warehousing of a manufacturer's finished goods, transporting them to retailers, and tying together the process with information systems. These parties often combine multiple carriers and modes, taking full advantage of TS&W limits and other factors.

A shipping firm may choose to use a third party for its transportation needs for several reasons. For example, using a third-party logistics provider can support a shipper's overall strategy by allowing it to concentrate on its core competency (such as manufacturing) rather than on transporting freight. In addition, logistics providers may offer better services at lower prices by specializing in transportation and developing superior expertise. Other reasons for choosing contract logistics include avoiding labor problems, removing/keeping assets off balance sheets, and ensuring more flexibility than available with private operations. However, some shippers may choose not to outsource thereby retaining control of freight operations or avoiding dependencies on outside firms.

STEP 4: CARRIER CHOICE

Factors motivating a decision to use an outside carrier or third-party logistics provider cannot be generalized. As a result, shippers find that a detailed analysis on a case-by-case basis is usually the best decision-making approach. Initially, the shipper must question if there is a better way to obtain necessary freight transportation services. To address this question, the shipper identifies alternative methods, including transportation modes and carriers, and gathers service and cost data to evaluate the alternatives. Relevant data includes freight rates; reliability; transit time; over, short, and damaged shipments; shipper market considerations (including customer service, user satisfaction, market competitiveness, and market influences); and carrier considerations

[23] Source: NPTC and ATA.

(such as transport modes and equipment). Usually performance and quality requirements must be satisfied before rates.

STEP 5: PERFORMANCE EVALUATION

The next step is an ongoing performance evaluation for the mode and carrier choice. This is a dynamic and complex process often involving an analysis of multiple modes and carriers. Most firms treat the performance evaluation phase of the selection process as a quality process. Both the shipper and the customer have quality expectations which are expressed in terms of specific metrics. Carriers are usually evaluated on several variables including service quality consistency, on-time pickup and delivery performance, customer complaints, claims experience, prompt shipment tracing, and prices.

Depending upon the relationship between shipper and carrier, the carrier is usually offered an opportunity to correct a variance from shipper or customer expectations. Continued variance can lead to shipper actions ranging from a reduction in the proportion of freight handled by any given mode or carrier to switching carriers completely. Because this is not an unusual action, the carrier evaluation process usually includes the identification of other qualified carriers.

STEP 6: MODE AND CARRIER SWITCHING BEHAVIOR

At some point, a shipper may decide to switch carriers. However, switching carriers may be a high cost action. Switching costs include specialized assets acquired by the carrier for the shipper, shared information systems, and long-term contracts. A carrier may increase potential switching costs by creating proprietary information systems and using dedicated assets. The shipper can decrease these costs by using more than one carrier and using its own accounting/ information systems in addition to that of the third party.

The shipper decision process is continuous. After completing the performance evaluation and making any mode or carrier changes, the shipper evaluates its customers' requirements, which repeats the process.

SHIPPER ISSUES AND TS&W POLICY

Shipper and carrier transportation decisions are not made in a vacuum and vary considerably between and within different industries. Transportation costs are one component of total logistics costs, and these costs vary significantly by industry- and company-specific situations. In addition, the number of transportation options available and differences in TS&W limits further complicate quantitative assessment. However, a number of conclusions may be drawn regarding shipper and carrier considerations and TS&W limits. These conclusions are based on a review of relevant transportation literature, four regional shipper focus group meetings, direct interviews with shippers and carriers, detailed case studies of freight movements in six major corridors,

investigations into selected commodities, and other data collection activities. Table IV-4, Shipper and Carrier Considerations Regarding TS&W Policy, summarizes these conclusions

Table IV-4
Shipper and Carrier Considerations Regarding TS&W Policy

- Shippers consider total logistics systems costs, and will optimize their operations to existing TS&W policies and respond to any TS&W policy changes.
- Shippers prefer simplified supply chains, which will increase the use of third party logistics firms and global alliances between shippers and carriers. Some transportation modes are integrated, and further integration is likely .
- Transportation safety is important to shippers. Safety cannot be compromised by TS&W changes.
- In general, more liberal and more uniform TS&W limits would improve shipper productivity. The amount of improvement is dependent on unique characteristics for each freight shipment and customer's needs.
- Service and quality considerations are a prerequisite to mode selection. Rail is the least expensive mode, but transit time and service consistency limit its use. Rail-truck intermodal services help to bridge the transit time/service quality gap.

Shippers will respond in different ways to changes in a TS&W policy. In general, shippers and carriers who typically fill up the cubic capacity of trailers, before reaching truck weight limits will utilize size increases but not increased weight limits. Similarly, shippers and carriers that typically have heavy freight will benefit from increases in truck weight, but not size limits. Many other factors often dictate the mode for freight travel, including time sensitivity, product value and density, non-transportation logistics costs, facility and capacity constraints, and cost and availability of transportation alternatives. Each of these combine in a unique way which complicates accurate freight forecasting of nationwide impacts of TS&W policy changes.

This research suggests that the tremendous changes of the last 15 years in the freight transportation industry are likely to continue into the next century. The continuing trends are intermodal service, third party logistics providers, shipper/carrier alliances, technology applications, and the use of contracted and preferred carriers. Each of these affect how freight is transported, and many create obstacles to carrier- and mode-switching behavior. For example, more shippers and carriers are developing integrated shipment-tracking systems to monitor product inventory. Once these information systems are installed and linked between shippers and carriers, changing carriers or modes would require an additional investment to develop new information sources and integrate them into shippers' logistics systems. The TS&W regulations are an important aspect, but certainly not the only factor, in how freight is shipped. Even without changes in TS&W policies, shippers will continue to operate in a changing freight transportation environment and will optimize shipments within existing TS&W policies.

There is a consensus in the shipper and carrier communities that safety is a high priority and any changes to TS&W limits have to at least maintain, if not improve, public safety. Shippers said that they were concerned for safety for several reasons, including good community citizenship, protection of the public and freight from harm, and minimization of costs. Several shippers said that preservation of safety justified a Federal role in TS&W regulation to ensure that nationwide protections are in place. Shippers at the group meetings felt that the Federal Government should not delegate TS&W policy and the corresponding safety responsibility entirely to the States.

In general, shippers and motor carriers believe that higher or more uniform TS&W limits would increase productivity. The degree of improvement depends on a number of unique factors which vary for each individual freight movement. However, some shippers felt that higher limits would not improve productivity. For example, many shippers face facility constraints, such as older warehouses, which are not large enough to accommodate longer trailers or LCVs. Another limitation may be insufficient warehouse space to accommodate larger, less frequent, quantities of freight deliveries.

FACTORS AFFECTING SHIPPER MODE CHOICE[24]

Shippers and carriers believe that few commodities are competitive between truck and rail service. However, transportation modes are interrelated and impact each other. Many factors influence the decision between truck and rail shipments, including service quality consistency, transit time, cost, complexity of supply chain, truck driver availability, union agreements, and other factors. The present research supports the contention that service quality issues are as important as cost issues for most freight shipments.

TRANSIT TIME

Companies recognize that time is a critical variable that can determine success in the marketplace. In the past, firms attempted to reduce the lead time required to introduce new products, controlling factors related to product design and manufacturing. In recent years, efforts to compress time have broadened to include other areas, particularly distribution activities. Transportation is an increasingly important component of the new "quick-response" logistics systems. Among the modes, motor carriers have traditionally held the competitive advantage in terms of speed of service relative to cost. However, as companies continue efforts to reduce inventory and lead times, products for which air is competitive with truck may expand.

[24] The material in this section is based on Coyle, op cit.

SERVICE QUALITY

Recent trends to improve overall quality, particularly through total quality management initiatives, have been extended to include distribution programs. Shipper demands related to transportation service levels, especially consistency, have become more intense. Companies recognize that transportation is a visible and important part of their relationship with the consumer.

ASSET PRODUCTIVITY

As companies seek ways to improve on asset productivity, investments in fixed facilities such as warehouses and private carrier trucking fleets are being closely scrutinized. There is a definite trend toward lowering private warehousing requirements either by reducing inventory and/or increased reliance on public warehousing. Further, many larger companies are also reducing their use of private motor carrier operations.

CARRIER USE

The ways in which shippers interact with carriers are changing as shippers attempt to leverage their transportation buying power especially through reducing the number of carriers they contract with. These practices reflect deregulation as well as the increased emphasis on JIT practices. Shippers and carriers are forging partnerships consistent with requirements for lower rates and enhanced efficiency.

CUSTOMER SATISFACTION

As indicated earlier, companies are emphasizing their relationship with the consumer. They are looking for ways to improve customer satisfaction and are tracking transportation related statistics such as delivery times and satisfaction in orders received (e.g., loss and damage considerations). Transportation companies are recognized as an integral component of efforts to achieve high levels of customer satisfaction. Frequently, shippers and carriers are even sharing data as they build “win-win” partnerships.

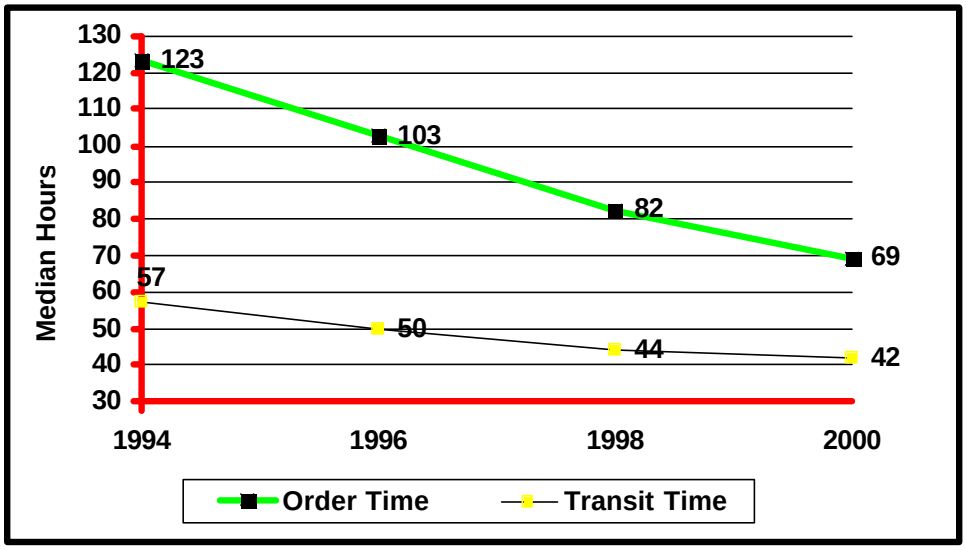
CONTINUING TRENDS IN SHIPPER DECISION-MAKING

Significant transportation changes in the logistics functions of shippers over the last 15 years have reduced transportation costs in many industries. It appears that many changes, such as increased time-definite freight shipments, reduced overall transit times, and closer relationships in the supply chain will continue into the 21st Century. This section presents the results of the

Career Patterns Survey[25] participants, consisting of 200 chief logistics executives of large, Fortune-100 United States firms.

Quick movement of goods to market is a concern for shippers. This includes many shipper practices such as JIT, QR, and vendor-managed inventory, continuous replenishment and direct store delivery. The time from when an order for freight is placed and when it is received on the customers dock, has fallen sharply in recent years, and the trend is expected to continue. Figure IV-4 shows that in 1994, average order time was over 5 days; it is expected to be less than 3 days by the year 2000. Similarly, the time freight actually spent in transit has decreased, from 57 hours in 1994 to 50 hours in 1996 and is projected to decline to 42 hours in 2000.

Figure IV-4
Freight Order and Transit Times



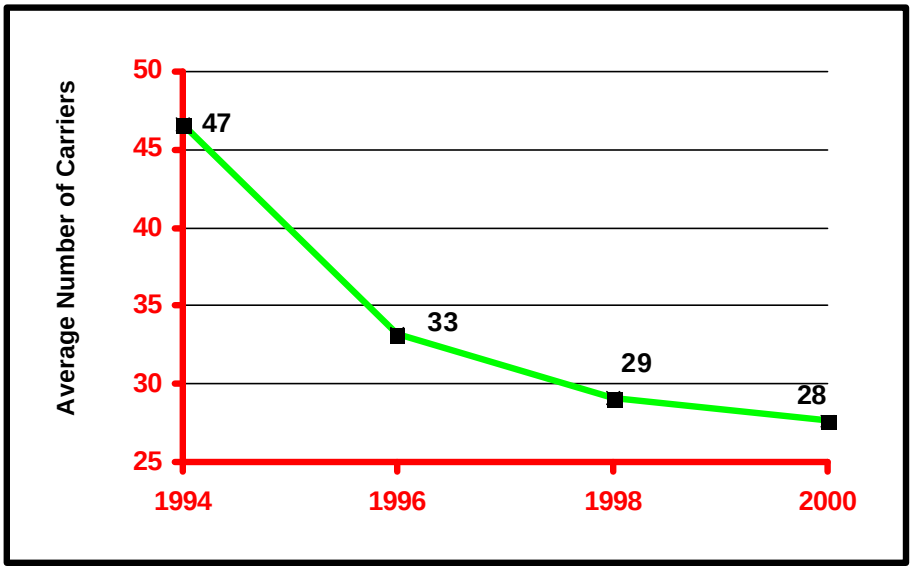
Source: Career Patterns Survey

There has been a clear trend among shippers toward the development of strong, long-term relationships with several preferred carriers. As illustrated in Figure IV-5 the average number of transportation carriers (excluding overnight/express deliveries) is expected to drop dramatically between 1994 and 2000. As contractual relationships develop, it is consistent that firms will do more business with fewer carriers and continue to "rationalize their carrier base." The practice of shippers doing business with fewer carriers and continually rationalizing their carrier base allows

[25] From presentation of Bernard J. LaLonde and James M. Masters, Ohio State University Career Patterns -1996 at Council of Logistics Management Conference. Respondents were asked to provide actual company data for 1994 and 1996 and estimate changes for 1998 through 2000. Respondents represented a mixed group of large firms, including the food products, chemicals, electronics, pharmaceutical, and automotive industries.

for greater learning on both sides of the partnership and presumably more efficient transportation results.

Figure IV-5
Average Number of Carriers Used Regularly by Shippers



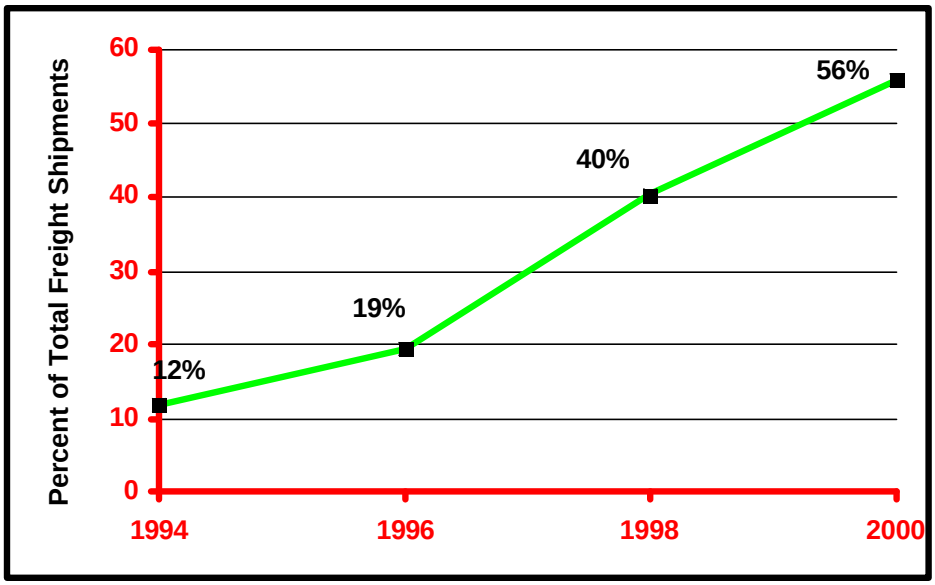
Source: Career Patterns Survey

Communications technology will probably have the single most important impact on the transportation industry through EDI[26] usage. As indicated in Figure IV-6, a 3-fold increase in the percent of shipments using EDI is anticipated between 1996 and 2000, with 6 of 10 shipments being initiated and tracked using EDI capability. The flip side of the data would seem to suggest that carriers who are not able to "match up" with the shipper and the downstream customer would be considered less competitive by an increasing number of shippers. It is interesting to note that the same profile emerges for vendors and customers, indicating that the vendor, customer, and third parties will be part of a rapidly expanding EDI or electronic commerce network.

The indicators just highlighted suggest continued increases in transportation efficiency. The data suggest that creative solutions to lowering transportation costs and providing higher service capability to the customers will continue into the 21st Century. Further, the data suggest that consumers will have increasing service requirements.

[26] Traditional communications systems, such as mail and telex, are quickly being replaced with systems such as facsimiles (faxes) and EDI. These changes are occurring in communication and information systems between carriers, shippers and ancillary services as well as within the operations of those entities. (*Intermodal Freight Transportation*, 3rd Edition, Gerhardt Muller, 1995.)

Figure IV-6
Percent of Shipments Using EDI



Source: Career Patterns Survey

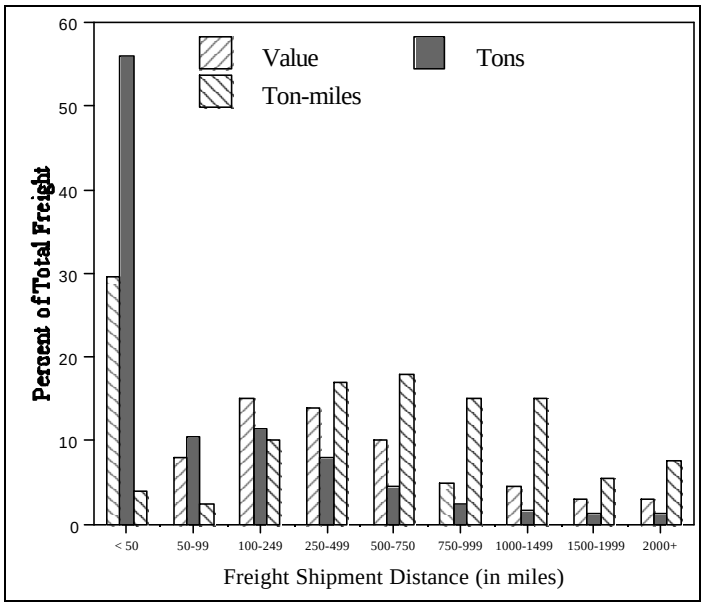
MODALLY COMPETITIVE AND NON-COMPETITIVE FREIGHT COMMODITIES

To understand why different modes are competitive for transporting various commodities, one should understand how freight generally moves in this country. Local and regional transportation are important segments of the Nation's commerce, as reflected in the distribution of freight shipments by distance. About 30 percent of the value and 56 percent of the commodity tonnage are shipped between places less than 50 miles apart. This is highlighted in Figure IV-7.

Given that over half of all freight, by weight, is transported less than 50 miles, it is not surprising that trucks are the dominant mode of freight transportation. This is because the other modes face considerable competitive difficulties hauling freight short distances. About two-thirds of all freight moved in the United States, measured in gross tons, is moved by truck, with rail moving about 16 percent of all freight tonnage. However, rail shipments typically travel much farther

distances -- nearly twice as far as the average truck shipment. Consequently, rail accounts for the highest proportion of total ton miles of freight transportation -- almost 39 percent of all freight ton miles, with trucks accounting for over 36 percent.[27]

Figure IV-7
Total 1993 Freight Value, Tons, and Ton-miles by Distance of Haul



Source: 1993 CFS, Conducted by the Bureau of the Census and Bureau of Transportation Statistics

Table IV-8 shows the distribution of the total freight movements in the United States, measured in dollar value, tons and ton-miles, for each mode: truck, air, rail, water, pipeline, multimodal (combination of two or more modes), and other (mode not specified).

COMPETITIVE AND NON-COMPETITIVE COMMODITIES IDENTIFIED IN FREIGHT DATABASES

One approach to the truck and rail competition issue is to examine the traffic lanes (by miles) and their density (by tons) by selected/popular vehicle equipment or by value. Five factors, which bear on the service and total cost profile involved in modal selection, are examined in detail:

[27] These numbers are from the CFS which does not include imports, a greater percentage of which is moved by rail, but comparable data is not available.

Table IV-5
1993 United States Shipment Characteristics by Transportation Mode

Transportation Mode	Freight Value		Tons		Ton-miles		Average Miles Per Shipment
	Dollars (Millions)	Percent	Tons (Thousands)	Percent	Ton-miles (Millions)	Percent	
Truck[1]	4,966,772	**85.0**	6,404,807	**66.2**	882,687	**36.4**	362
Air	5,200	**--**	148	**--**	139	**--**	1,180
Rail	247,394	**4.2**	1,544,148	**15.9**	942,561	**38.9**	766
Water	64,077	**1.1**	518,912	**5.1**	271,981	**11.2**	1,744
Pipeline[2]	89,849	**1.5**	483,645	**5.0**	--	**--**	--
Multimodal	230,346	**3.9**	190,832	**1.9**	152,374	**6.4**	1,049
Other	242,691	**4.2**	544,335	**5.6**	96,972	**4.0**	229
Total[3]	5,846,334	**100.0**	9,688,493	**100.0**	2,420,915	**100.0**	424

[1] Includes mail and parcel services. -- Represents zero or less than 1 unit of measure
[2] Excludes most shipments of crude oil.
[3] Some data may be included in the total, but is excluded from the modal categories, due to CFS publishing standards.
Source: 1993 CFS for the United States (Bureau of the Census)

- *Mileage* - bears directly on transport cost;
- *Product Value* - factor in logistics cost and influences service requirements;
- *Product Density* - affects loading characteristics and thus transport cost;
- *Lane Density* - affects operating cost and service levels, especially in rail; and
- *Equipment* - incorporates multiple characteristics influencing service and cost.

Data that highlights truck-dominated freight, rail-dominated freight, and modally competitive freight is summarized in Tables IV-6 through IV-11. In general, shorter trip lengths with lower lane densities are dominated by trucks, while longer trip lengths with higher lane densities are dominated by rail. Lower value products that must travel longer distances are dominated by rail, whereas higher value products traveling shorter distances are dominated by truck.

Table IV-6
Freight Modal Shipments by Distance and Product Density
(Thousands of 1994 Tons)

HIGHWAY MILES	Product Density: >60 pounds/ cubic feet			Product Density: 36-60 pounds/ cubic feet			Product Density: 1-35 pounds/ cubic feet		
	ALL	TRUCK	RAIL	ALL	TRUCK	RAIL	ALL	TRUCK	RAIL
<100	521,941	502,670	19,271	500,523	340,327	160,195	188,047	170,535	17,512
100-200	211,292	188,139	23,153	395,492	282,498	112,995	150,750	139,894	10,855
201-300	138,868	114,758	22,110	246,030	135,889	110,141	96,872	83,574	13,298
301-500	128,622	104,735	23,887	290,486	133,158	157,327	124,266	103,973	20,294
501-700	73,564	54,966	18,599	139,237	62,136	77,101	86,086	64,739	21,347
701-1000	61,386	38,400	22,986	205,522	55,051	150,470	92,144	63,987	28,157
1001-1500	36,268	16,494	19,774	172,123	45,910	126,213	58,605	40,938	17,667
>1500	26,326	14,656	11,670	46,674	24,608	22,066	53,719	30,951	22,768
TOTAL	1,198,268	1,034,817	161,450	1,996,086	1,079,577	916,509	850,489	698,591	151,899

Source: Reebie Associates

Table IV-7
Freight Modal Shipments by Distance, Product Value, And Product Density
Truck (Shaded Columns) and Rail
(In Thousands of 1994 Tons)

HIGHWAY MILES	VALUE PER POUND										INTER-MODAL FAK [1]
	<$0.05		$0.05-0.14		$0.15-0.39		$0.40-0.99		$1.00 or more		
	PRODUCT DENSITY: > 60 POUNDS/CUBIC FOOT										
<100	382,62	2,194	55,346	2,112	45,181	10,077	14,855	4,887	4,663	2	
100-200	98,619	10,497	30,829	2,406	41,856	8,511	11,650	1,711	5,186	27	
201-300	65,195	7,034	16,233	2,469	21,550	11,017	7,799	1,533	3,979	58	
301-500	52,589	7,723	17,592	3,141	20,004	9,315	9,256	3,27	5,294	182	
501-700	22,688	4,393	8,761	2,902	11,826	7,743	5,939	3,482	5,751	79	
701-1000	8,017	4,144	6,777	2,555	13,064	10,080	5,905	6,015	4,637	192	
1001-1500	3,653	3,897	2,636	1,324	4,616	8,182	3,547	6,036	2,043	334	
>1500	1,162	935	1,697	875	7,434	5,408	2,665	4,150	1,699	303	
TOTAL	634,54	40,816	139,87	17,782	165,53	70,333	61,615	31,340	33,252	1,178	
	PRODUCT DENSITY: 36-60 POUNDS/CUBIC FOOT										
<100	182,17	146,563	81,041	9,991	43,218	3,330	25,257	179	8,633	133	
100-200	178,28	97,371	45,761	10,647	32,471	4,643	18,648	286	7,330	47	
201-300	70,045	93,546	29,143	10,211	16,385	5,978	13,969	314	6,346	92	
301-500	57,042	128,032	33,232	17,852	15,530	10,317	18,487	667	8,868	460	
501-700	25,008	53,688	10,279	12,580	9,985	9,486	9,771	1,149	7,093	199	
701-1000	14,364	120,777	11,530	13,868	9,836	13,504	11,617	1,838	7,705	484	
1001-1500	14,194	107,126	10,459	10,071	5,007	6,684	8,756	2,098	7,495	234	
>1500	7,636	2,734	2,457	6,623	4,198	4,706	6,208	7,181	4,110	820	
TOTAL	548,75	749,838	223,90	91,842	136,62	58,648	112,71	13,711	57,579	2,469	
	PRODUCT DENSITY: 1-35 POUNDS/CUBIC FOOT										
<100	N/A	N/A	43,295	11,414	18,871	1,721	46,952	2,321	61,416	2,057	222
100-200	N/A	N/A	42,668	5,735	16,672	1,804	35,965	2,365	44,589	952	1,679
201-300	N/A	N/A	24,968	5,053	10,179	2,173	22,503	2,200	25,923	3,872	2,078
301-500	N/A	N/A	23,023	7,903	13,077	2,963	29,453	3,432	38,419	5,996	13,362
501-700	N/A	N/A	11,955	6,527	4,733	2,780	18,511	3,902	29,540	8,138	8,750
701-1000	N/A	N/A	11,8	9,66	2,96	4,13	18,4	5,41	30,6	8,94	18,081
1001-	N/A	N/A	8,62	5,54	2,18	3,27	11,1	3,77	18,9	5,07	7,516
>1500	N/A	N/A	3,78	6,40	847	3,57	8,43	4,40	17,8	8,39	38,062
TOTAL	N/A	N/A	170,	58,2	69,5	22,4	191,	27,8	267,	43,4	89,750

[1] Freight, all kinds

Source: Reebie Associates

Table IV-8
Freight Modal Shares by Distance, Product Value, And Product Density Truck/rail Ratio (Shaded Cells = Competitive)

HIGHWAY MILES	VALUE PER POUND					INTERMODAL FREIGHT ALL KINDS
	<$0.05	$0.05-0.14	$0.15-0.39	$0.40-0.99	$1.00 or more	
	PRODUCT DENSITY: > 60 POUNDS/CUBIC FOOT					
<100	99/1	96/4	82/18	75/25	100/0	
100-200	90/10	93/7	83/17	87/13	99/1	
201-300	90/10	87/13	**66/34**	84/16	99/1	
301-500	87/13	85/15	68/32	72/28	97/3	
501-700	84/16	75/25	**60/40**	**63/37**	99/1	
701-1000	**66/34**	72/27	**56/44**	**50/50**	96/4	
1001-1500	**48/52**	**67/33**	**36/64**	**37/63**	86/14	
>1500	**55/45**	**66/34**	**58/42**	**39/61**	85/15	
	PRODUCT DENSITY: 36-60 POUNDS/CUBIC FOOT					
<100	**55/45**	89/11	93/7	99/1	98/2	
100-200	**65/35**	81/19	87/13	98/2	99/1	
201-300	**43/57**	74/26	73/27	98/2	99/1	
301-500	31/69	**65/35**	**60/40**	97/3	95/5	
501-700	32/68	**45/55**	**51/49**	89/11	97/3	
701-1000	11/89	**45/55**	**42/58**	86/14	94/6	
1001-1500	12/88	**51/49**	**43/57**	81/19	97/3	
>1500	74/26	27/73	**47/53**	**46/54**	83/17	
	PRODUCT DENSITY: 1-35 POUNDS/CUBIC FOOT					
<100	**N/A**	79/21	92/8	95/5	97/3	0%
100-200	**N/A**	88/12	90/10	94/6	98/2	2%
201-300	**N/A**	83/17	82/18	91/9	87/13	2%
301-500	**N/A**	74/26	82/18	90/10	87/13	15%
501-700	**N/A**	**6535**	63/37	83/17	78/22	10%
701-1000	**N/A**	**55/45**	42/58	77/23	77/23	20%
1001-1500	**N/A**	**61/39**	4060	75/25	79/21	8%
>1500	**N/A**	**37/63**	19/81	**66/34**	68/32	42%

Source: Reebie Associates

Table IV-9
Modal Freight Shipments by Distance, Lane Density, And Equipment Group Truck/rail Ratio (Shaded Cells = Competitive)

HIGHWAY MILES	LANE DENSITY (Thousands of Annual 1994 Tons)				
	<25	25-100	101-500	501-2000	>2000
EQUIPMENT CLASS: BULKS					
<100	86/14	96/4	92/8	92/8	73/27
100-200	97/3	89/11	78/22	78/22	56/44
201-300	94/6	85/15	69/31	59/41	43/57
301-500	92/8	77/23	63/37	57/43	17/83
501-700	81/19	64/36	54/46	47/53	1/99
701-1000	75/25	54/46	50/50	29/71	3/97
1001-1500	72/28	47/53	44/56	19/81	4/96
>1500	61/39	42/58	37/63	50/50	18/82
EQUIPMENT CLASS: DRY VAN					
<100	99/1	99/1	96/4	93/7	95/5
100-200	99/1	96/4	92/8	92/8	92/8
201-300	97/3	92/8	87/13	86/14	85/15
301-500	96/4	87/13	82/18	76/24	72/28
501-700	93/7	82/18	73/27	69/31	28/72
701-1000	90/10	74/26	67/33	52/48	32/68
1001-1500	88/12	71/29	66/34	58/42	29/71
>1500	79/21	64/36	50/50	33/67	9/91
EQUIPMENT CLASS: FLATBED					
<100	100/0	100/0	85/15	84/16	89/11
100-200	97/3	93/7	87/13	84/16	90/10
201-300	97/3	92/8	85/15	81/19	79/21
301-500	96/4	86/14	80/20	83/17	71/29

Source: Reebie Associates Transearch Database

Table IV-10
Modal Freight Shipments by Distance, Lane Density, and Equipment Group
Truck (Shaded Columns) and Rail

HIGHWAY MILES	LANE DENSITY (Thousands of Annual 1994 Tons)									
	<25		25-100		101-500		501-2000		>2000	
EQUIPMENT CLASS: BULKS										
<100	**20**	3	**761**	34	**7,844**	699	**58,929**	4,786	**396,43**	148,059
100-200	**229**	8	**2,979**	366	**19,094**	5,432	**64,158**	17,973	**107,81**	85,071
201-300	**890**	54	**5,142**	940	**20,796**	9,437	**30,098**	20,552	**59,738**	79,083
301-500	**2,835**	248	**10,831**	3,197	**30,670**	17,900	**38,923**	27,775	**21,880**	105,984
501-700	**3,255**	759	**8,349**	4,755	**17,115**	14,660	**14,943**	17,159	**337**	38,844
701-1000	**3,854**	1,274	**6,950**	5,838	**12,289**	12,345	**6,637**	18,471	**3,322**	113,848
1001-1500	**3,323**	1,305	**4,410**	5,024	**6,760**	8,879	**2,694**	11,785	**4,033**	102,861
>1500	**1,848**	1,176	**2,338**	3,219	**2,775**	4,749	**3,079**	3,039	**955**	4,289
Total	**16,303**	4,826	**41,760**	23,373	**117,34**	73,900	**217,46**	119,540	**594,28**	677,839
EQUIPMENT CLASS: DRY VAN										
<100	**110**	1	**1,000**	14	**9,360**	350	**42,565**	3,163	**255,43**	12,612
100-200	**565**	7	**5,682**	236	**32,048**	2,872	**78,116**	6,945	**108,08**	9,022
201-300	**1,643**	42	**10,051**	830	**36,086**	5,243	**41,779**	6,754	**36,089**	6,457
301-500	**7,075**	320	**21,361**	3,067	**55,921**	12,476	**38,009**	12,045	**31,867**	12,540
501-700	**10,449**	831	**22,486**	5,007	**38,035**	13,995	**24,466**	11,071	**1,641**	4,326
701-1000	**15,372**	1,771	**20,352**	6,996	**31,108**	15,278	**14,595**	13,637	**6,560**	13,779
1001-1500	**13,227**	1,844	**15,299**	6,309	**19,443**	10,018	**10,834**	7,887	**1,732**	4,277
>1500	**9,363**	2,475	**10,922**	6,165	**12,719**	12,686	**6,709**	13,598	**2,470**	26,014
Total	**57,805**	7,291	**107,15**	28,623	**234,72**	72,918	**257,07**	75,101	**443,87**	89,027
EQUIPMENT CLASS: FLATBED										
<100	**16**	-	**266**	1	**4,062**	719	**26,074**	4,811	**171,75**	20,258
100-200	**163**	5	**1,850**	135	**13,493**	2,093	**40,626**	7,752	**96,668**	10,328
201-300	**466**	15	**3,847**	346	**15,950**	2,722	**23,774**	5,711	**23,896**	6,337
301-500	**1,809**	81	**6,879**	1,074	**17,617**	4,291	**19,105**	3,842	**11,845**	4,884
501-700	**2,452**	220	**5,250**	1,357	**8,531**	3,869	**5,987**	2,676	**777**	1,753
701-1000	**2,821**	502	**4,001**	1,715	**5,048**	3,449	**2,233**	3,469	**3,820**	3,309
1001-1500	**2,214**	660	**2,134**	1,648	**2,532**	2,432	**1,189**	2,574	**167**	405
>1500	**1,892**	912	**1,664**	1,929	**1,694**	2,990	**1,078**	1,832	**1,016**	1,804
Total	**11,833**	2,397	**25,891**	8,204	**68,926**	22,565	**120,06**	32,667	**309,94**	49,077

Source: Reebie Associates

Table IV-11
Modal Freight Shipments
by Distance, Lane Density, and Equipment Group

HIGHWAY MILES	TOTAL TONS			DISTRIBUTION BY MILES			TRUCK % ALL
	ALL	TRUCK	RAIL	ALL	TRUCK	RAIL	
	EQUIPMENT CLASS: BULKS						
<100	617,571	463,989	153,582	33%	47%	17%	75%
101-200	302,924	194,074	108,851	16%	20%	12%	64%
201-300	226,730	116,663	110,057	12%	12%	12%	51%
301-500	258,242	103,139	155,104	14%	10%	17%	40%
501-700	119,975	43,998	75,976	6%	4%	8%	37%
701-1000	182,827	33,052	149,775	10%	3%	17%	18%
1001-1500	150,895	21,241	129,654	8%	2%	14%	14%
>1500	27,466	10,995	16,471	1%	1%	2%	40%
TOTAL	1,886,629	987,151	899,479	100%	100%	100%	52%
	EQUIPMENT CLASS: DRY VAN						
<100	324,607	308,467	16,139	24%	28%	6%	95%
101-200	243,578	224,648	19,082	18%	20%	7%	92%
201-300	144,681	125,648	19,327	11%	11%	7%	87%
301-500	194,681	154,233	40,448	14%	14%	15%	79%
501-700	132,308	97,078	35,230	10%	9%	13%	73%
701-1000	139,448	87,988	51,460	10%	8%	19%	63%
1001-1500	90,871	60,535	30,336	7%	6%	11%	67%
>1500	103,122	42,184	60,938	8%	4%	22%	41%
TOTAL	1,373,590	1,100,629	272,960	100%	100%	100%	80%
	EQUIPMENT CLASS: FLATBED						
<100	227,959	202,171	25,788	35%	38%	22%	89%
101-200	173,113	152,800	20,313	27%	28%	18%	88%
201-300	83,065	67,934	15,131	13%	13%	13%	82%
301-500	71,430	57,256	14,173	11%	11%	12%	80%
501-700	32,873	22,998	9,875	5%	4%	9%	70%
701-1000	30,366	17,923	12,444	5%	3%	11%	59%
1001-1500	15,954	8,235	7,718	2%	2%	7%	52%
>1500	16,811	7,343	9,468	3%	1%	8%	44%
TOTAL	651,570	536,659	114,911	100%	100%	100%	82%

Source: Reebie Associates

INSIGHTS FROM THE CORRIDOR AND COMMODITY CASE STUDIES

The TS&W Study includes a number of case studies reflecting selected commodities, regional freight movements, and major traffic corridor movements. The purpose of the case studies is to provide specific insight and first-hand knowledge of how freight is moved and the decision-making considerations by a variety of freight players: shippers, carriers, third parties, and regulators. Table IV-12 highlights insights regarding modal competitiveness or lack of competitiveness from the case studies.

Table IV-12
Insights on Modal Competitiveness from Case Studies
(See Chapter 3 for Details)

Regional Freight	/	Along the western United States/Canadian border, trucks dominate freight movements, usually operating above 80,000 pounds GVW. These heavier weights are allowed by Canadian laws and the border States' regulations. Common configurations include 3-axle tractors with 3-axle semitrailers.
	/	In the eastern States, LCVs are only allowed to operate on a few turnpikes. On these limited routes, LCVs are a small portion of all traffic, but LCV trips tend to be longer than average non-LCV truck trips.
Major Traffic Corridors	/	Some traffic corridors have good rail-intermodal service, for example the Chicago-Seattle and Chicago-Los Angeles Corridor.
	/	Rail-intermodal has a lower share in other traffic lanes, including Michigan-Florida (Interstate 75 Corridor) and Minnesota-New Orleans (Mississippi River Corridor).
	/	Shippers and carriers frequently customize their equipment to take advantage of TS&W limits within their immediate region (including permitted operations).

PERSPECTIVES FROM THE TS&W STUDY DOCKET COMMENTS

Thousands of comments to the docket were received in response to three separate notices placed in the Federal Register concerning this Study. One of the many purposes of a docket is to gather insights and points of view from a variety of sources. The major docket comments on modal competitiveness are summarized in Table IV-13.

RECENT TRENDS IN MODAL COMPETITION

During the past 15 years, there have been tremendous changes in the transportation of freight in the United States. Although all modes of freight transportation have been affected, significant changes have occurred in truck and rail freight transportation. Truck and rail changes have been national and international in nature, with some structural and some operational changes. The consequences of deregulation of the truck, rail, and air transportation industries include: (1) blurring the line between separate types of trucking, such as TL, LTL, and parcel services; (2) reorganization of the rail freight industry with improved financial performance and

concentration among the Class I railroads, and the proliferation of short rail lines; and (3) the restructuring of air freight systems in favor of integrated operations. Much of the discussion and analysis in the balance of this chapter has been excerpted from a background report and analysis prepared for the TS&W Study by DRI/McGraw-Hill, including a forecasting model for freight and modal shares. It was prepared in 1996 and has not been updated. It is intended to provide general background on freight trends as of that date.

Table IV-13
Perspectives on Modal Competitiveness from TS&W Docket Comments

/	Several organizations, many affiliated with the railroad industry, said that increased TS&W limits would lower truck operating costs, which would thus divert freight traffic from rail to trucks for long haul transport. This diversion would increase the cost of the remaining rail operations which would lead to even further losses of rail shipments and increased rates for captive shippers.
/	Some motor carrier and other industry associations claimed that freight diversion would not occur, and suggest that rail shipments could not possibly decrease, because the rail industry has been extremely competitive (as evidenced by significant improvements in service quality and reliability in recent years). For example, carriers could more easily utilize rail for shipping intermodal containers if trucks were able to legally carry higher container loads for drayage operations.
/	Several industry associations stated that the Federal Government should not be concerned about the diversion of freight from rail to truck--market forces should determine the mode that is best suited for each freight shipment.

RAIL INDUSTRY TRENDS

In 1995, Class I railroads turned-in their best performance in recent history. Indeed, excluding grain and coal; the 6.8 percent rise in primary rail tonnage surpassed the rise in manufacturing output (excluding computers and semiconductors). This is a turnaround from the 1980s, when railroads lost modal share in terms of freight tons handled. However, in terms of ton-miles, the railroads had a turnaround in the 1980s and the industry has continued to gain mode share since that time.

Rail freight is projected to post steady gains into the next century; however, there could be varying degrees of growth in the three primary rail sectors -- bulk freight, general freight, and intermodal shipments. Moreover, growth should differ according to the railroad class, with non-Class I railroads enjoying most of the growth. In all, total rail shipments are expected to rise slightly from 16 percent of domestic primary shipments (tons) in 1994 to 16.4 percent in 2000.

The majority (about two-thirds) of rail shipments are bulk commodities. These are expected to grow an average of 2.1 percent annually from 1994 to 2000 (see Table IV-14). In Class I primary tonnage growth through 2000, nonmetallic minerals, coal, petroleum products, and crude petroleum are expected to rank among the lower growth commodities, averaging 0.5-l.5 percent annual gains. Faster growth in manufacturing commodities (e.g., transportation equipment, printed matter, and non-electrical machinery) is projected to spur general freight somewhat

faster. General freight, which constitutes a smaller share of rail traffic, is anticipated to grow 2.2 percent per year through 2000.

Table IV-14
Rail Shipments by Major Commodity Grouping
(Millions of Tons)

	1994	2000	Average Annual Growth 1994-2000
Bulk	1,083.6	1,225.7	2.1%
General Freight	530.7	610.7	2.2%
Total	1,614.3	1,836.4	2.2%

NOTE: Bulk commodities are constituted by STCC 1, 8-14, and 29.

Class I railroads, which originate about 75 percent of total volume of rail shipments, are projected to grow 1.8 percent per year between 1994 to 2000. Non-Class I railroads are expected to continue to grow in importance through a focus on specialized niche markets where they are extremely aggressive in marketing their services and capturing freight. Shipments handled by non-Class I railroads are forecast to grow at a significantly higher rate -- 6.1 percent per year. Non-Class I railroads carry significant volumes of only a few specialized commodities: metallic ores is among the fastest-growing (except for pulp).

The 1990s are shaping up as a transitional period for railroads -- from the traffic losses of the 1980s to rising tonnage and improving industry fundamentals, which should make for stable growth in the future. Furthermore, this is projected to be accomplished with only a slight increase in the size of the rail fleet, as railroads continue to make equipment improvements and productivity gains, holding down rail costs.

The future is, however not certain. Unsettled labor negotiations, competition from other modes, and the difficulty of railroads to achieve a return-on-investment equal to the industry cost of capital are potential risks. On the other hand, the opening up of Mexico, the strong outlook for global trade, faster-than-expected cost and productivity improvements, and strong projected growth in intermodal traffic all argue for a healthy future.

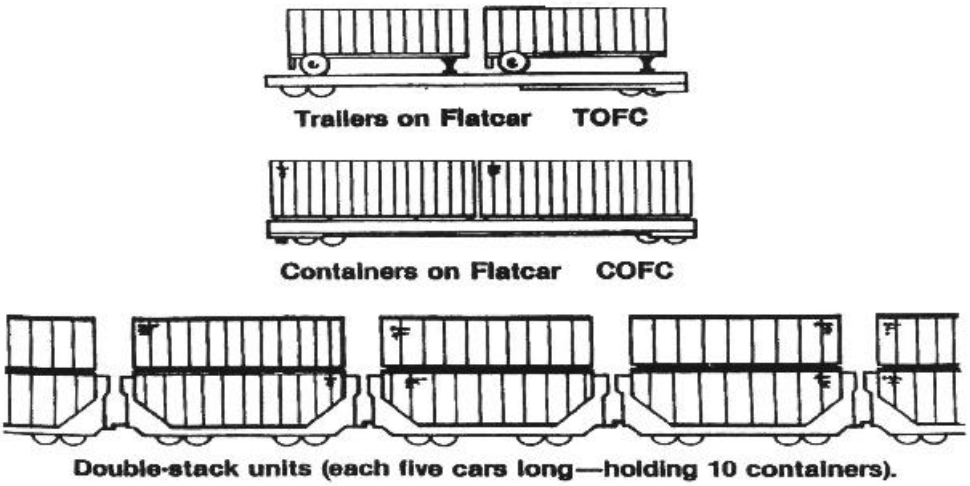
TRENDS IN RAIL INTERMODAL FREIGHT[28]

"Rail intermodal" refers to a broad range of services, the most common being: Trailer-On-Flat-Car (TOFC) commonly referred to as "piggyback", Container-On-Flat-Car (COFC), Double-

[28] This discussion illustrates the complexity of forecasting freight shares and the constrained role of TS&W limits in influencing the distribution of freight among modes.

Stack Train (DST) and carless technologies such as the best known example, RoadRailer.[29] Figure IV-8 illustrates the services noted above.

Figure IV-8
Rail Intermodal Services in Use



In recent years railroads have responded to the increased emphasis on intermodal and past criticisms that rail intermodal service was slow, difficult to work with, and prone to damage. Establishment of separate intermodal train operations for the movement of traffic on dedicated intermodal trains has improved on-time performance and significantly reduced damage. Railroads have increased the use of automated systems, improving billing and customer service. The use of new types of equipment, such as multiple platform articulated intermodal rail cars, has contributed to reduced loss and damage claims. Consequently, the rail intermodal business has grown rapidly and annual growth rates continue to increase.[30]

Over the next 10 years, assuming no change in current TS&W limits, strong growth in rail intermodal traffic is projected.[31] Intermodal volume is expected to rise an average 5.5 percent per year, through 2000. Recent years, particularly 1994, saw much higher growth; however, it occurred as a result of several factors that have since reversed; a surge in domestic economic

[29] TOFC refers to movement of highway trailers on rail flatcars, COFC refers to containers moving on flatcars without chassis, DST refers to containers moving on equipment that can be loaded with one container placed on top of another in single cars, multiple platform cars or groups of such cars, and carless technologies generally refers to equipment consisting of a highway semi-trailer with attached rail wheels or a separate specially modified rail truck that can be placed on railroad tracks (Source: *Intermodal Freight Transportation,* 1995 previously cited).

[30] Summarized from *Intermodal Freight Transportation,* previously cited, pg. 47.

[31] DRI/McGraw-Hill and Reebie Associates analysis for this CTS&W Study.

growth, equipment and labor capacity problems in the trucking sector, movement of LTL truck traffic to rail, and strong export traffic to Mexico. Railroads raised some intermodal rates just as significant truck equipment purchases were being delivered to motor carriers. The reduction in cross-border freight volumes resulting from the devaluation of the peso prompted some trucking capacity to re-enter the domestic market. Rail intermodal growth was further dampened by deteriorating service levels, which caused some freight to shift back to truck. Finally, the trucking labor shortage, although somewhat eased during the economic soft landing, is likely to reemerge as economic expansion resumes.

In large part, worries about equipment capacity constraints in rail intermodal have disappeared. Despite the rapid growth in 1994 (up 14 percent from 1993), the increased production by rail equipment manufacturers actually created a surplus of equipment.[32]

Although there are no long-term constraints to growth, short-term local capacity and terminal constraints exist. As a result of mergers, some railroads are not in a financial position to invest in remedying the problem as fast as they would like to. They are being conservative about substantial capital expenditures and are waiting for the traffic before changing investment strategies. In the near future, this will dampen the growth of rail intermodal traffic on routes directly affected by line and terminal constraints.

Table IV-15 presents a forecast for rail intermodal traffic volume, with a breakout of international, TL, LTL, and empty rail car segments of the market. International container traffic is expected to grow at a strong 5.4 percent per year. This growth will sustain the international share of total intermodal, accounting for around half of total intermodal tonnage.

Table IV-15
Rail Intermodal Traffic by Volume
(Million of Tons)

	1994	2000	Annual Growth Projected to 2000
International	59.4	77.3	5.4%
TL	54.6	66.4	4.0%
LTL	7.3	11.2	8.9%
Empty Rail Cars	6.4	7.7	3.7%
Total	127.8	162.6	5.5%

The LTL intermodal freight is forecast to grow by about 9 percent per year. A recent labor agreement allows carriers to send up to 28 percent of their shipments via intermodal. Because

[32] The DRI analysis assumes availability of equipment will not be a limiting factor in the growth of rail intermodal during the forecast period.

most carriers are currently utilizing intermodal traffic to a much smaller degree, the agreements yield significant room for growth in intermodal volumes. Although conservative estimates indicate that carriers will remain below the 28 percent ceiling, an increase is expected. This will raise LTL rail intermodal volumes from 7.3 million tons in 1994 to 11.2 million in 2000. Non-union LTL carriers, especially the regional LTL carriers, were never subject to the ceiling so their use of rail intermodal may go higher.

Use of rail intermodal by TL carriers is forecast to increase an average 4 percent per year. Many of the major TL carriers have already shifted to moving long haul TL shipments via rail intermodal. These TL carriers will not sustain their recent annual increases in rail intermodal that were partially caused by driver shortages and are currently being attenuated by equipment surpluses. Still, the forecasts predict that TL use of rail intermodal will grow faster than the overall TL freight volume.

MOTOR CARRIER INDUSTRY TRENDS

Overall, trucking is expected to continue to experience steady, if moderate, growth during the next decade. Bolstering profits, however, will depend on absorbing excess capacity and shoring up prices. Furthermore, traditional truck industry boundaries are changing, and intra-industry shifts are occurring. Indeed, about 10 percent of private truck tonnage will be transferred to the for-hire truck sector during the forecast period.

Trucking remains by far the largest freight transportation mode, carrying two-thirds of the tonnage for all primary goods shipments. The importance of trucking is magnified even further when intermodal traffic, ground package, and air freight -- a significant percentage of air freight actually travels by truck -- are included.

The analysis below presents projections for truck freight through 2000 with separate forecasts for the private and for-hire segments[33]. Due to data availability, this discussion will emphasize primary manufactured goods shipments. Nonetheless, these findings should assist in the analysis of modal market shares. In addition, industry dynamics, equipment sales, revenue, and costs are discussed.

THE RECENT PAST

From 1993 and 1994 (the last available data), rapid growth in motor carriers occurred primarily in the area of manufactured shipments. It climbed 6.2 percent in 1993, to 2,558 million tons. In 1994, a 5.2 percent rise in manufactured goods output (its best gain since 1987) propelled truck tonnage a further 6 percent.[34] Tonnage reached a strong 2,712 million tons, the result was total for-hire and overall trucking volumes rose. All told, TL traffic climbed almost 9 percent in 1994

[33] This is based on the DRI Model.

[34] It is noted that the truck gain surpassed the rise in manufactured output.

and saw its share of total traffic rise 2.5 percent. In contrast, LTL carriers managed a below-average 4.5 percent increase and a 1.4 percent drop in their market share.

At the time of this report historical trucking activity data were not available for 1995. Nevertheless, it is clear that the industry was beset by slower growth in end-markets, excess capacity, and rate discounting. As the economic soft-landing took hold in the spring, last year saw more trucks chasing fewer shipments. A record 201,000 Class VIII trucks (with a GVW rating above 33,000 pounds) were purchased in 1995. Meanwhile, for-hire volumes shrank, despite beginning the year with double-digit gains. Since proposed rate hikes could not be enforced, prices and revenues tumbled. This was particularly true in the LTL sector, though weakness was not confined to it. The TL carriers, which had managed steady growth throughout 1994, saw revenue and prices plateau in the first few months of 1995, and then fall. Producer price index (PPI) growth for LTL general freight steadily declined, while the TL PPI stabilized at 2 percent. For 1995 as a whole, LTL PPI slid, from its 3.6 percent run up in 1994, to 2.0 percent. The TL rates actually accelerated from a 1.0 percent gain in 1994 to a 2.6 percent rise in 1995.

THE FUTURE

Transportation of freight for United States manufacturers, construction firms, and mining businesses is highly sensitive to the business cycle in the United States. The long-term trend forecast commissioned for this study[35] assumes gains consistent with the economy's "trend" rate of growth. Thus, the forecasts do not fully reflect peaks or troughs. The forecast captures long-run trends affecting truck volumes. Truck tonnage should be consistent with these long-run factors. The freight transportation outlook is for potential growth in the freight market. The United States economy is not expected to match its robust 1994-1995 pace over the next 10 years. Instead, real GDP growth should downshift into its 2.5 percent trend rate. This steady, albeit less spectacular, overall growth is forecast to permit trucking volumes to post a 1.4 percent average annual gain through 2000. This compares with the forecast of 1.6 percent anticipated growth in manufactured goods shipments by railroads.

Along with potential market growth, truck shipments will be shaped by their composition. Primary general freight shipments make up around half of total movements. Six sectors -- food, lumber, paper, chemicals, petroleum, and stone, clay and glass -- comprise more than 80 percent of all manufactured shipments. Indeed, these six commodities determine overall freight growth. In combination, they are expected to post average annual growth of only 1.3 percent over the forecast period, placing them among the low-growth performers. Only one of the six components, chemicals, will experience high growth during the next 10 years. The relatively slow pace of growth in most shipment categories will constrain the growth of total shipments.

Food, the second-largest truck commodity, is expected to post an average annual gain of less than 1 percent over the forecast period. Last year, the trucking industry transported about 520 million tons of food products. This represented 20 percent of total general freight shipments. About

[35] DRI and Reebie Associates analysis.

one-half of the food movements are made by private carriers that retain their own fleets for transporting merchandise. Typically, food demand is determined by domestic population growth and export prospects. Over the forecast interval, real United States food exports are expected to rise an average 2.0 percent annually (in billions of 1987 dollars), below their pace of the past decade. Moreover, domestic demographics will limit gains in this category to only 0.9 percent a year. Excluding chemicals, the high-growth sectors are forecast to be rubber, machinery, and transportation equipment. They constitute only about 4 percent of total manufactured shipments, limiting their ability to boost overall growth.

Trucking industry advances are forecasted to be in line with those of their rail counterparts. Trucks and railroads do not compete head-to-head for each commodity. Typically, trucks have a higher concentration of high-value items. The rise of truck/rail joint ventures and the use of new intermodal technology has changed the playing field. In many areas, truck and rail traffic can grow in unison, taking advantage of new opportunities in a dynamic marketplace.

SHIFTS

New means of transport are not limited to inter-industry changes; intra-industry shifts are also underway. During the past several years, the trend among manufacturers to out source distribution and logistics functions has resulted in a decline in private carrier tonnage and a rise in for-hire tonnage. Companies are placing greater emphasis on their core businesses and paring costs. This trend toward a few "core" for-hire carriers is projected to accelerate over the next 10 years. The shift will be particularly noticeable in the food, primary metals, and transportation equipment markets, which currently have a high concentration of private tonnage.

EQUIPMENT, REVENUE, AND COSTS

The trucking industry should be well-equipped to handle the modest pace of freight gains. The 1995 heavy truck sales figure of 201,000 units was a record high. Indeed, as mentioned, these equipment purchases gave rise to excess capacity. As the economic soft landing took hold and over-supply became apparent, orders and sales softened. Indeed, the forecast is that heavy truck sales have peaked. Although sharp, this drop would be in line with prior downturns. Thereafter, sales should stabilize at about 169,000 vehicles per year.

Two important areas influencing the bottom line should be emphasized: fuel and labor costs. The trucking industry uses almost 40 percent of the petroleum consumed in the United States. Also, many industry experts agree that the shortage of drivers is a major risk facing the industry. Although somewhat offset during the economic slowdown, the shortage is likely to reemerge during economic growth. To help ease the shortage, some motor carriers are operating driver training schools. But finding and training drivers is only half the battle; driver retention is also necessary for motor carriers. Relatively low salaries and few benefits encourage veteran long-haul drivers to leave. To combat this, companies commonly attempt to arrange routes to ensure that drivers are able to return home frequently. While reducing driver turnover is necessary for the long-term health of the industry, it also affects costs, profits, and competitiveness.

SUMMARY

There is growing evidence that the productivity improvement of U.S. businesses through reduced logistics cost will continue. The reduced logistics costs are realized through reductions in inventories, reduced interest rates, lower transportation costs, and warehousing costs. Reduced inventory and warehousing costs are attributed to better logistics management and transportation services, which allow reduced stock levels and stocking points, warehouses and distribution centers.

Carriers will need to continue being responsive to shipper requirements. They will need to provide more value-added services and cooperate more with other modes to meet shipper demands for reduced warehousing costs and enhanced service reliability with reduced rates for freight traffic.