United States

Freight

Transportation

Freight traffic in the U.S. is currently at an all-time high and is continuing a consistent upward trend. Because of this and other developments, viable alternatives regarding how to meet future increasing demand for freight transportation became imperative for industry and government. Capacity constraints of the railroad and highway systems for transporting freight need to be addressed along with the levels of investment by both the public and private sectors and the effect of these investments on the industry structure and the economy. Investment in different modes of transportation has a substantial impact on expanding freight transport capacity for the betterment of the transportation network which will then be able to continue producing an efficient and effective transportation network that is indispensable for the economy.

1. Industry/Competitive Analysis

The U.S. freight transportation system is the blood lifeline of the economy. Its historical evolution along with that of U.S. manufacturing have paced the transitions from local to regional to national and recently to the global economy. Each of these transitions created new opportunities and challenges by leading to productive investments in transportation infrastructure while often shaping dramatic reallocations of resources among transportation modes. Along the way, technology and public policy have influenced the transportation landscape.

1.1 The importance of freight transportation in the economy

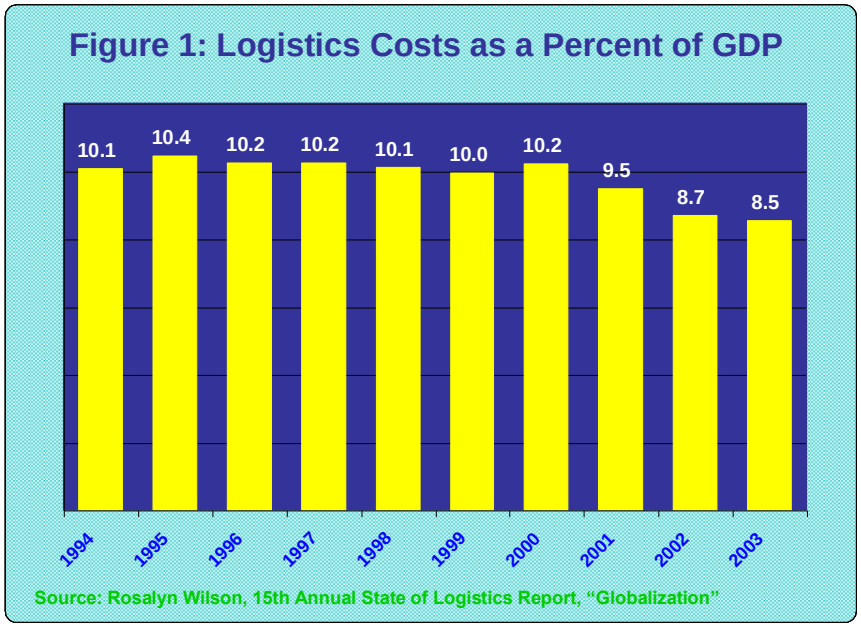
The freight transportation system represents a key competitive advantage for the U.S. in the global economy. In the words of Jeffrey N. Shane, Under Secretary for Policy, U.S. Department of Transportation "The U.S. enjoys a transportation system today that is the envy of much of the world. We have some impressive achievements to look back on — the completion of the Interstate Highway System; deregulation of the airline, trucking and rail industries; and the transition to containerization." [1]

The nation's transportation system comprises all modes of transport: truck, rail, air, water, and pipeline. Their absolute importance to the economy and their significance relative to each other has to be viewed in the context of shifts in corporate and more specifically manufacturing strategy. Over many decades, the U.S. economy has transitioned from being labor-intensive to being capital-intensive, therefore its focus on goods such as technology products that are high-value, low-weight and therefore costly to stock. Furthermore, the outsourcing of labor-intensive manufacturing to less developed countries has created lengthier and more complex supply chains. Yet, the success of just-in-time manufacturing has led to the application of this philosophy throughout supply chains creating time-based competition and eventually lean systems. That is, manufacturers not only have to produce what is needed when it is needed but they also have to focus on reducing the lead time for their products to reach the customers. Furthermore, sustainability has added another layer to this already complex paradigm. The fact that in the global economy products have to travel extensive distances in short periods of time has immediate implications for the U.S. freight transportation system in terms of the volume of goods transported and the choice of transport mode.

These developments help explain why trucking accounts for the vast majority of the U.S. freight system. In 2002 it hauled 86 percent of domestic cargo by value and 67 percent by weight (Appendices I and II)[2]. Rail carried 4 percent of the domestic cargo

by value and 16 percent by weight which represented 40 percent of our nation's ton-miles freight. The ratio of cargo hauled by truck versus rail has remained fairly constant since 1993. Yet, recently rail traffic has soared to new levels[3]. The motor carrier industry also carries cargo in conjunction with all other modes by serving railroad, air cargo, and seaport terminals. The geographical and temporal flexibility of trucking is the main reason for its central role in the U.S. freight system. Cargo transport standardization through containerization has led to increasing synergies between trucking and all other modes. In turn, this has facilitated the growth of intermodal traffic and the formation of alliances among transport companies. The capability to use several modes of transportation in conjunction with each other fairly seamlessly to derive cost and time advantages is one of the cornerstones of the nation's freight system.

A recent Annual State of Logistics Report, sponsored by the Council of Logistics Management[4], expresses the efficiency of the nation's freight system by showing that logistics costs as a percentage of GDP fell for the third year in a row. These costs made up 8.5 percent of the U.S. gross domestic product (GDP). This is highlighted in Figure 1. Total 2003 business logistics costs were $936 billion, $26 billion or 2.9 percent higher than in 2002 (Appendix III).



The report also showed that transportation costs have climbed from a 56 percent share in 2002 to a 63 percent share of total logistics costs in 2003. Generally, in 2003 the cost to move

products was 5 to 15 percent higher than in 2002. In fact, transportation costs have risen 75 percent since 1989. In contrast, carrying costs have increased only 32 percent due to the prevalent just-in-time philosophy and a favorable interest rate environment. For the ninth consecutive year, growth in logistics contract services exceeded U.S. economic growth, indicative of a continuation of the outsourcing trend and the health of supply chain related industries. Transportation accounted for $54 billion of the $77 billion third-party logistics market and the domestic transportation component was $30.4 billion. These figures are illustrative of the fact that world trade continued to grow in 2003 at a rate almost twice that of the world GDP (4.5 percent compared to 2.5 percent). In turn, the U.S. freight system cannot be viewed in isolation any more simply because it is an intrinsic part of the global landscape. Hence, changes in manufacturing geography result in redesign of international and domestic transportation strategies.

1.2 The competitive environment of the freight transportation industry

The structure of the U.S. freight railroad industry in 2003 is presented in Table 1. The industry comprised 551 common carriers grouped into five classes[5]. Class I carriers had operating revenue of more than $277.7 million and represented only 1

The U.S. Freight Railroad Industry: 2003

Type of Railroad	Number	Miles Operated*	Employees	Freight Revenue ($ billions)
Class I	7	99,126	154,652	$35.41
Regional	32	15,875	7,877	1.35
Local Linehaul	304	19,750	5,045	0.91
S&T	206	6,641	6,488	0.60
Canadian**	2	570	n/a	n/a
Total	551	141,962	174,062	$38.27

*Excludes trackage rights; includes 453 miles in Canada and Mexico.
**Includes CN and CP operations that are not part of a CN- or CP-owned Class I system. Source: AAR

Table 1

percent of the total number of freight railroads. The seven Class I railroads vary in size as they operated anywhere from 3,000 to 33,000 miles and employed between 2,600 and 46,000 people. The industry is highly concentrated since Class I railroads operated more than 70 percent of the industry's mileage, employed almost 90 percent of its workforce, and produced 93 percent of its revenue. Furthermore, four of those railroads together accounted for 93 percent of operating revenues and 94 percent of the ton-miles of Class I carriers. These railroads focus mainly on long-haul, high-density intercity traffic lanes spread across many states. The whole industry has about 174,000 employees, who are by and large unionized. The 2003 average total compensation of $84,000 made the workforce one of the best compensated in the U.S.

During the 1970s, severe regulatory constraints and heavy competition from trucking drove railroads to the brink of disaster. The railroad industry was unable to produce the capital necessary for track maintenance, and deferred maintenance amounted to billions of dollars. The state of the industry was best characterized by the term "standing derailment" in which stationary railcars simply fell off poorly maintained track. From 1980, when the industry was deregulated, through 2004, Class I railroads spent approximately $340 billion or nearly 45 percent of their operating revenue on capital expenditures and maintenance expenses related to infrastructure and equipment[5]. In 2003, railroading accounted for less than 10 percent of freight related injuries. This high level of capital intensity provided the railroads with the ability to become customer centric by offering high quality, safe, and cost-effective service.

As a result of upgrading their service and infrastructure, the ton-mile (the movement of one ton of freight one mile) rail traffic exhibited a slightly upward trend over the last 10 to 15 years, reversing the downward spiral seen for many decades. Railroads

now haul 40 percent of intercity ton-miles freight, the same proportion as trucking (Appendix I). However, due to their comparatively low rate structure, railroads generate less than 10 percent of intercity freight revenues. Intense competition and significant rate reductions have led to a consistent decrease in the railroads' share of intercity freight revenue.

Rail carries coal, chemicals, motor vehicles and motor vehicle parts, and a variety of agricultural, food, metal, and forest products. The revenue derived from each commodity group by Class I railroads is depicted in Figure 2. Coal is the single most important commodity hauled by rail, representing 21 percent of the total $38.4 billion revenue (and 44 percent of tonnage). Nevertheless, 2003 was the first year when intermodal revenue, by reaching 23 percent of total revenue, surpassed that derived from coal. This is not surprising since rail intermodal traffic has exhibited the fastest rate of growth among all rail segments over the past ten years. The number of trailers and containers has expanded from 3.1 million in 1980 to almost 11 million units in 2004[5]. By combining the flexibility of trucking with the cost advantage of rail, intermodal provides a key answer to the search for efficiency in the longer and more complex global supply chains.

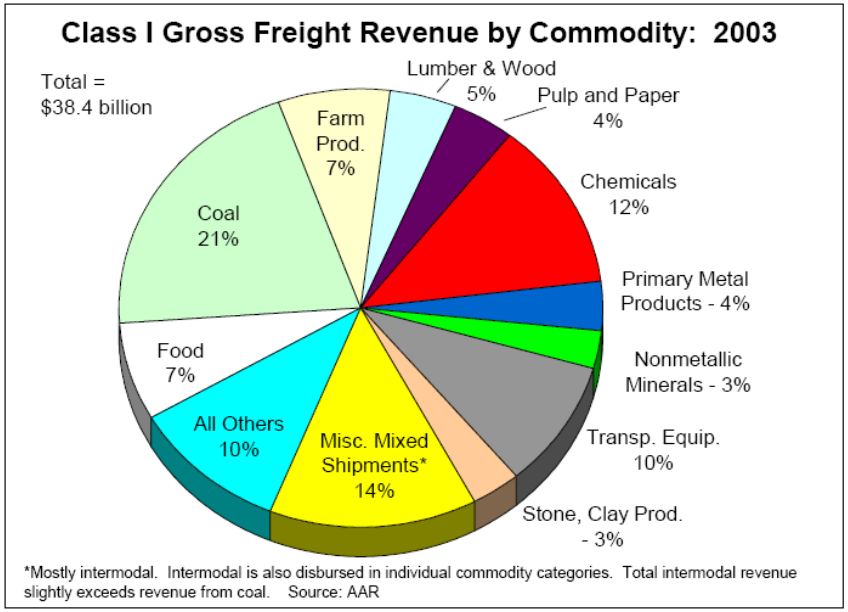


Figure 2

The trucking industry can be viewed along two axes. The first is length of haul. Long haul carriers provide intercity services while short haul companies offer service within a much smaller geographical area, such as one or several adjacent metropolitan

regions. The second distinguishes between the for-hire and private-carriage sectors. The for-hire carriers haul the goods of others for payment. Private carriers own trucks and drivers to move their own goods. To minimize deadheading, many private carriers become for-hire on return trips by backhauling the goods of others. The for-hire segment can be partitioned further by cargo volume. Truckload carriers (TL) move truckloads of goods directly from origin to destination. Less-than-truckload (LTL) companies consolidate, haul, and distribute goods through a network of terminals in LTL lots.

Trucking revenue was $482 billion in 2003[4], representing 81 percent of the nation's freight bill. Intercity trucking remained the largest sector in the U.S. trucking market, accounting for 65.3 percent of the total market value. The trucking market is highly fragmented, with the five largest companies accounting for only 9.5 percent of the total market value in 2003[6]. Prior to 1980 when the industry was deregulated, there were fewer than 20,000 interstate trucking companies. By 2002, there were more than 585,000 U.S. carriers on file with the U.S. Department of Transportation. The vast majority are small businesses with 93 percent of them operating 20 or fewer trucks, and more than 81 percent operating six trucks or less[7]. This tremendous fragmentation leads to intense competition and low profit margins.

Between 1980 and 2002, road infrastructure increased by only 3 percent reaching almost 4 million miles of public roads, while the 142,000 railroad miles in use in 2002 (Table 1) represented a more than 20 percent decrease from the 1980 levels. These two decades saw a large increase in the volume of traffic, as vehicle-miles traveled (VMT) increased 101 percent, while rail shipments (measured in ton-miles) increased by 64 percent. Truck traffic has increased in the same proportion as the VMT and still represents a relatively small percentage of the overall highway traffic. In 2002, commercial truck VMT was approximately 8 percent of the

highway VMT. In 2003, injuries involving trucking account for less than 5 percent of the total number of people injured on the highway that year.

The freight transportation industry is a major employer and employment in many transportation industries has remained steady or grown over the past twenty years. Truck driving represents by far the principal freight transportation and freight transportation-related occupation in the U.S. In 2002, there were about 2.9 million truck drivers[8]. More than half (53 percent) drive heavy trucks (tractor trailer), a third (34 percent) drive light trucks (delivery service), and the rest (13 percent) are drivers/sales workers. In 2003, the trucking industry employed about one-third of the transportation and warehousing workforce. In contrast, rail transportation employed only 5 percent while in 1980 railroads accounted for 18 percent of those working in the transportation and warehousing industry.

This 60 percent decrease in rail employment is due in large part to industry mergers which have reduced the amount of interchanges between railroads and therefore the number of employees needed to perform them. The industry consolidation has also resulted in more efficient use of equipment and track. These factors along with increasing levels of rail traffic have created considerable productivity gains. Figure 3 illustrates that tremendous productivity boosts were also seen between 1990 and 2000 in local trucking due in part to the increasing use of computer technology, such as optimal routing and load matching. During that period, labor productivity in local trucking grew by 5.2% annually and in rail by 5.1%,

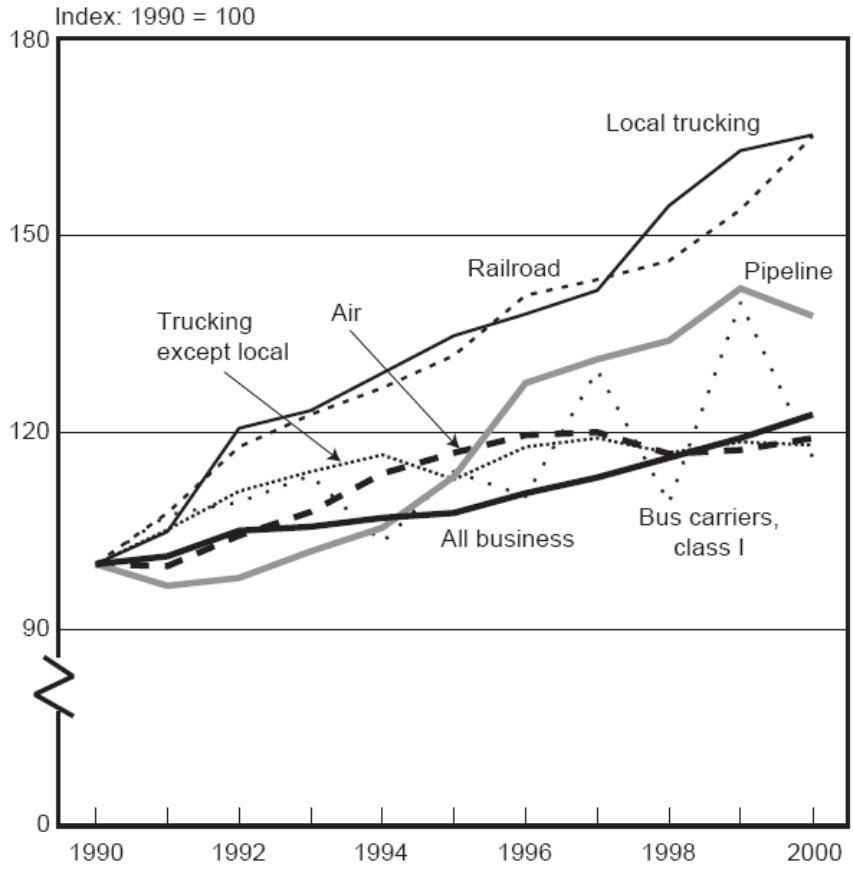


Figure 3: Transportation Labor Productivity by Mode: 1990–2000
Source: BTS, "Productivity Growth In Transportation," 2004

substantially higher than the 2.1% annual increase in the overall U.S. business sector. Productivity in the "trucking except local" segment grew at about the same rate as in the overall economy for an overall increase of approximately 20 percent. Additional data indicates that long distance, general freight trucking productivity grew by 40 percent between 1987 and 2002.

1.3 Factors that affect the competitive rivalry in the industry

Shippers, carriers, and receivers are all involved in determining what shipments will be made and what modes and routes will be used. The resulting freight traffic consists of a multitude of commodities varying widely in price, weight, and other characteristics. Generally speaking trucking hauls an almost equally balanced commodity mix (50:50) between general and bulk traffic while rail carries much more bulk freight (30:70). Freight demand and modal choice is affected by a much greater universe of factors. Some factors have a direct impact on demand while others weigh on the costs and/or levels of service of one or more freight transport modes. In turn, this partly determines if and how demand will be met. Appendix IV[10] indicates the effect of a number of demand factors on several freight demand characteristics including commodity type, shipment, mode, and logistics costs. We discuss this below.

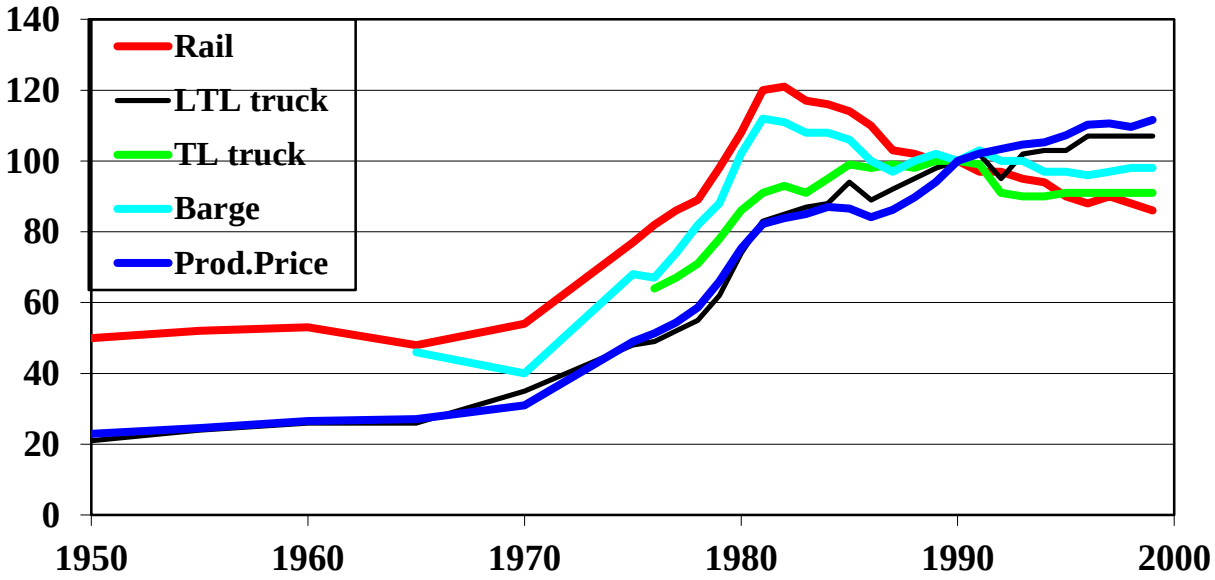
Global or national economic up- or downturns lead to direct increases or decreases in freight traffic. Industrial location patterns affect mode choice, since one mode will be selected for short distances and another for longer distances. Trucks are the preferred mode for short-haul trips averaging less than 170 miles at a cost of 5.0 cents per ton-mile while rail is generally selected for long-haul corridors with origin-destination pairs more than 800 miles apart at a cost of 2.7 cents per ton-mile. Note however that the

average for-hire truck trip is more than 500 miles and this average is significantly lowered when also considering private trucks that average only 60 miles per trip (Appendix II). The globalization of business has significantly lengthened the supply chains and necessitated the use of several transport modes, in the process increasing the need for standardization through containerization. Worldwide freight flows are also affected by international trade and transportation agreements, quotas, and tariff restrictions. As a result of NAFTA, trade with Canada and Mexico swelled after 1994, benefiting all U.S. transport modes. Trucking was the primary beneficiary as it carries approximately two-thirds of the value of the goods traded with these countries. The value of goods hauled by truck increased by more than 20 percent between 1997 and 2001.

Lean inventory practices in particular and fast-cycle logistics systems in general have increased the number of shipments and their on-time receipt performance and decreased their length of haul and transport costs. These characteristics affect modal choice since they favor trucking over rail. As time-based competition became one of the cornerstones of the global economy, many shippers' primary needs became speed and reliability and they turned toward the trucking industry to satisfy these requirements. The trucking industry established a benchmark with on-time service well into the 90 percent range. Recently, U.S. railroads have responded with a similar performance for their top intermodal customers on high-density corridors. However, the overall industry performance is much weaker with on-time performance below 70 percent and transit times stretching into weeks. Carrier-shipper alliances have resulted in lower logistics costs per unit of commodity, higher reliability of on-time delivery, and lower probability of loss or damage claims. Time-based competition has also brought about warehousing and distribution consolidation often achieved through outsourcing. While lowering carrying costs, it has increased the demand for transportation services which are also frequently outsourced. As discussed in

Section 1.1, transportation costs accounted for a 63 percent share of the nation's freight bill in 2003 and the growth in logistics contract services is continuing at a steady pace. The evolution of packaging toward more lightweight materials has increased the volume of low-density shipments, which in turn has produced a demand for larger shipping containers and truck trailers. Aluminum and other commodities are being recycled in larger and larger volumes impacting their transportation patterns, lengths of haul, and mode choice.

The deregulation of the nation's surface transportation system, most of which occurred in 1980, created the basis for cost and service competition in freight transportation. As seen in Figure 4, rail rates saw the biggest decline as historically they had been the



highest. Trucking rates dropped in the early 1990s as a result of further industry deregulation and the intense competition within the

industry created by its tepid growth. Deregulation further led to the intensification of intermodal traffic and the creation of multimodal alliances and transport companies. The recent trends shown in Figure 4 shed some light on the growth of intermodalism. Governmental policies and legislation regarding the rail and trucking industries will be discussed further in Section 1.5. Operating agreements and joint ventures within and across modes are growing in popularity, clearly indicating the value of collaborative relationships. By moving away from the adversarial relationships of the past, carriers can broaden and customize their services resulting in lower costs and higher levels of service for shippers. Fuel is a sizable and generally unpredictable cost component for any transportation company. Higher fuel prices will increase transportation rates and often lead to demand changes for particular products and possible mode shifts.

The highway infrastructure is publicly financed and maintained through the federal Highway Trust Fund and state transportation trust funds. The government relies heavily on user charges such as fuel taxes, an annual heavy vehicle use tax, and excise taxes to fund the federal and state highway programs. The available funding sources for highway and rail will be explored at length in Section 2. Shippers and carriers would generally like infrastructure systems to provide enough capacity for smooth operations. However, the rate of expansion is not always adequate and therefore local infrastructure and congestion have a bearing on shippers in their choice of transport mode and transfer facilities. Transportation companies also pay business, sales, and property taxes. The end result of all user fees and taxes is higher rates and prices for all supply chain participants, which in turn impedes on the competitive position of the trucking industry. Competition between classes of carriers and between modes is further affected by government subsidies. The primary U.S. freight railroad companies are not, on the whole, government subsidized but benefited from

historic subsidies involving the right-of-way and land. Since they own most of their track networks they are faced with property taxes on their right-of-way and facilities. All other industries use public infrastructures and the issue of whether they pay their fair share of taxes continues to be controversial.

The social welfare benefits of environmental policies and constraints come at the expense of appreciable freight transportation cost increases. The trucking industry is most affected by emissions controls and clean fuel requirements. Environmental policies also alter industrial location and raw materials production decisions, thereby impacting freight demand. On the other hand, these policies generate increasing freight demand through the recycling of packaging and component parts. Reverse logistics is growing at a fast pace in the global economy. Safety regulations have a relatively small effect in comparison to the other factors discussed. The most pronounced effect on costs and competition is hazardous materials transport.

Congestion is a major problem for all modes of freight transportation with considerable negative consequences in terms of operating cost and level of service. The question of how changes in truck size and weight limits will affect highway congestion and mode competition is of strong current interest. The tradeoff between traffic volume reduction because of truck size and weight limits increases and traffic volume increase due to additional diversion of freight from rail to truck is yet to be determined. In many metropolitan areas highway congestion is escalating thereby increasing the number of driver hours and vehicles required to carry a given amount of freight and reducing reliability and truck fuel economies. Figure 4 clearly illustrates that congestion costs have increased over the last two decades at an alarming rate. For the 85 areas studied in the 2005 Urban Mobility Report[11] the 2003 total congestion cost was about $63 billion, up from around $62 billion in 2002. This cost was calculated based on 3.7 billion hours of delay and 2.3 billion gallons of fuel consumed due to congestion. Other effects of congestion such as unreliable and often longer delivery times, missed meetings, and business relocations were not included. Congestion has other significant yet hidden negative implications. Since the freight transportation network is comprised of interconnected components, local bottlenecks have multiple system-wide impacts. Technological advances will be

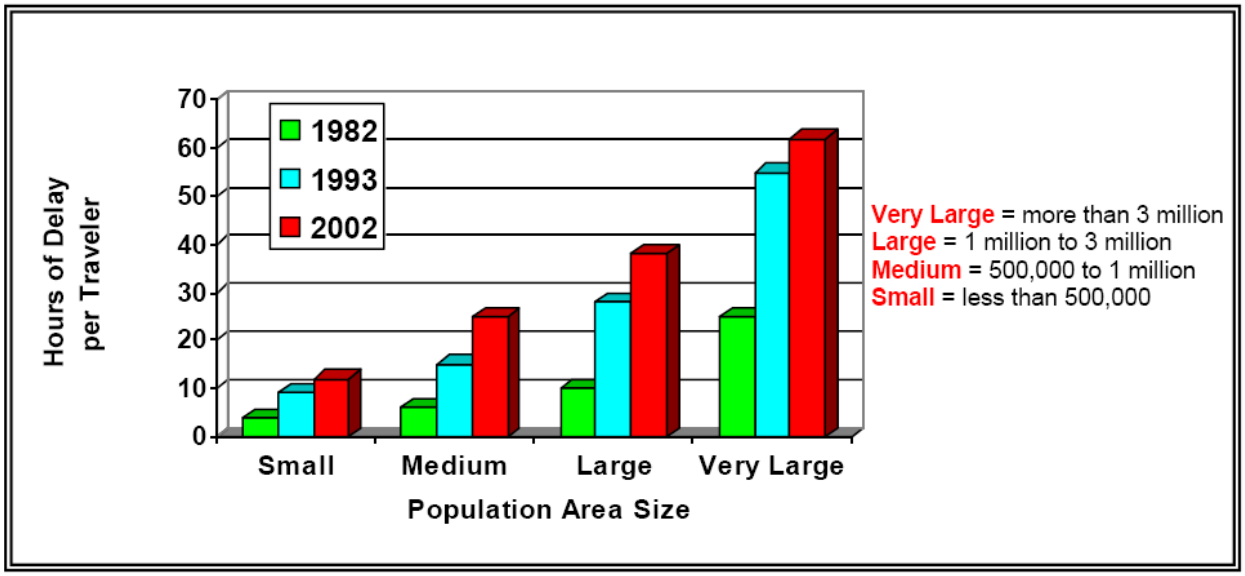


Figure 4: Congestion Growth Trend
Source: The 2005 Urban Mobility

discussed in the next section.

1.4 The impact of technology

Freight transportation has proved to be a very fertile yet challenging area for technological applications. Noteworthy developments in equipment and information technology have changed the face of freight transportation and have made possible the technologically enabled global supply chains of today. Containerization, double-stack and tandem technology, automation and robotics, handling and interchange systems, and automated terminals have paved the way toward the high-volume, fast cycle global multimodal freight transport.

From the early days of bar-coding and electronic data interchange (EDI) the information technology explosion led to applications of Intelligent Transportation Systems (ITS) to commercial vehicle operations, global positioning systems, cargo/container routing and tracking systems, and automated equipment identification. As everywhere else, technological applications created significant productivity gains. In the last few years, a great deal of freight transportation information moved to the web. Many participants in the supply chain are now able to acquire and share information across the globe further increasing productivity many fold. Web migration is also an example of a technological innovation that required comparatively little capital to implement. However, other advances are capital intensive. Among the technologies now being tested in the freight transportation industry are embedded processors used for the identification and monitoring of shipments. In particular, radio frequency identification (RFID) tags automatically identify an asset or its declared contents, or both. RFID tags are however very expensive. Currently, a tag costs 50 cents

and the Gartner Group predicts this cost will slowly decline to 20 cents within the next five years. In addition to financial justification, regulatory, market, and institutional obstacles affect the pace of technological innovation within the freight industry.

The information technology (IT) and telecom spending within the U.S. Transportation and Warehousing Services markets totaled $30.3 billion in 2004[12]. The trucking industry has evolved from being one of the least computerized segments in American business in the early 1980s to being on the forefront of many new technologies in the computer industry. New technology is now an accepted fact in every facet of trucking, from dispatch and mobile communications to vehicle maintenance, electronic engines, and computer diagnosis on the maintenance side. Furthermore, Figure 5 highlights that trucking and warehousing are economy leaders in terms of using the most

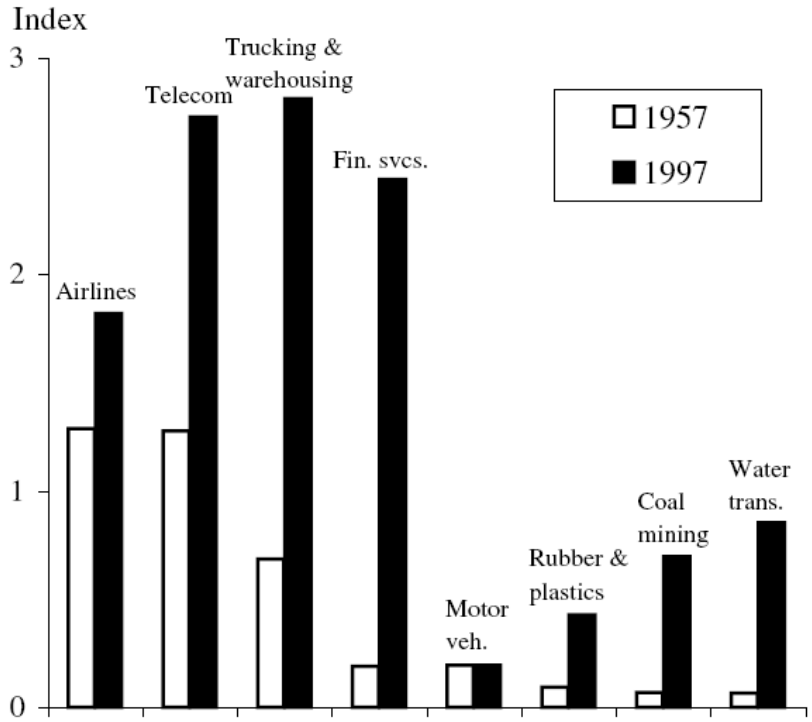


Figure 5: R & D Index for Selected Industries
Source: FRBSF ECONOMIC LETTER, 2003

innovative capital — as measured by an R&D index — that is, capital that is undergoing rapid technological change. This shows that innovation along with IT lead to fast productivity growth[13]. This R&D index indicates that industries with more R&D intensity tend to have faster productivity growth than others. It is of particular interest to note the superiority of trucking with respect to the water transportation industry.

Carriers are continuing to invest in and develop their Web sites with advanced quoting, planning, and routing functions. Faced with rising fuel prices and security-related costs, commercial freight carriers are deriving operational improvements through the use of IT/telecom technologies that increase their fleet management capabilities. To fulfill growing customer demand, most logistics service providers are investing in vehicle-tracking systems to enhance asset utilization and produce more efficient vehicle routing and crew scheduling. Some carriers are also making considerable investments in cargo tracking technologies such as RFID.

Apart from its innumerable benefits, freight transportation technology is currently experiencing considerable challenges. These stem from the need to balance productivity with security concerns in the huge U.S. freight system where traffic is constantly growing. Ever mounting volumes of freight along with a greater-than-ever emphasis on security have gridlocked key points of the freight transportation network. Along with congestion, the lack of information sharing is also alarming. Container ownership, contents and location information throughout its transit route is critical to enhancing the security and productivity of the transportation network.

To improve freight mobility and enhance security, the Federal Highway Administration has shown the potential benefits to be derived from several initiatives, such as the use of the Electronic Supply Chain Manifest system — which provides the secure transfer of information from manufacturer to motor carrier to airline — electronic seals, and asset cargo tracking[14]. Freight rail

provides terrorists other opportunities even in the absence of high passenger density targets. In particular, freight rail transports half of the nation's hazardous materials, other dangerous cargoes, and the chemicals used to purify water supplies. These cargoes are often transported through densely populated urban areas. Even though a Freight Railroad Security Plan is in place[15] and improvements are being considered[16], freight rail could benefit from programs directed at technological advances such as those carried out by the Federal Highway Administration. Finally, the potential vulnerability of the freight transportation information systems to terrorist attacks is another serious concern for Homeland Security[17].

1.5 Governmental policies and legislation

The "golden era" of the railroads began in 1865 and the industry thrived for the next fifty years. At its peak during the second decade of the 1900s, more than 1,500 railroads operated a rail network of 254,000 miles and employed 1.8 million people, making it by far the largest U.S. industry. A more detailed historical perspective is presented in Appendix V[15].

The struggle to control the industry became apparent shortly after it started booming. In 1887, Congress passed the Interstate Commerce Act, making railroads the first U.S. industry to become subject to comprehensive federal economic regulation, and created the Interstate Commerce Commission (ICC) to oversee the industry. The federal government maintained its control of the railroads until 1980 and in the process severely distressed them. Due to very restrictive regulation, the industry was unable to compete on an equal footing with other growing modes of transportation such as trucking. The 75 percent rail share of intercity freight experienced in the 1920s consistently declined to only 35 percent in 1978. The following year, the industry's rate of return on investment was a

meager 2.9 percent even though traffic levels were at an all-time high.

With railroads on the verge of collapse, Congress finally passed the Staggers Rail Act of 1980 to deregulate the industry. The Staggers Act reestablished the railroads' competitive viability by permitting them to act much as other businesses in managing their assets and pricing their services. In enacting the Staggers Act, Congress acknowledged the dire economic condition of the railroads, the intense intermodal competition, and the often-conflicting needs of shippers, consumers, and taxpayers. In the new deregulated environment railroads could set up their own routes, differentiate rates on the basis of demand, and adjust them based on market conditions.

In the post-1980 deregulated environment the railroads were finally able to prosper. Even though they were confronted with stiff competition from a mature trucking industry, they were able to increase their profitability while at the same time sharply reducing rates for shippers — tariff rates dropped 46% over a twenty year period[15]. The industry accomplished this through significant productivity increases as measured on a revenue ton-mile basis. The remarkable productivity gains also enabled railroads to upgrade their systems, reinvest in productive rail infrastructure, generate higher levels of service and greater volumes of traffic, and improve safety. Since 1980, railroading has become much safer with a drop in injuries of more than 80 percent.

The Staggers Act also freed the large railroads, or Class I, to spin off unprofitable lines, which were acquired by smaller railroads. These nearly 600 smaller railroads, or Shortlines, are an integral part of the overall U.S. traffic network. In general most shortline railroads interchange with or transfer traffic to the large railroads.

Overall, deregulation proved invaluable to shippers, railroads, and the national economy. Competition is now requiring

railroads to act as service providers and focus on the customer and not the trains. This strategic transformation has had a positive effect on the bottom line. The average rate of return on shareholders' equity for the Class I railroads has averaged nine percent over the past twenty years. The Office of Economics of the Surface Transportation Board reported in its 2000 Rail Rate Study that shippers saved more than $30 billion in 1999 due to deregulation[16].

The trucking industry became regulated in 1935 due to unrelenting lobbying by the railroads — which were already severely affected by motor carriage — state regulators, and the ICC itself. After World War II, the trucking industry experienced an unprecedented growth rate. This was spurred by the booming post-war economy, the sizeable excess industrial capacity of American automobile and truck manufacturers, and the construction of the Interstate superhighway network.

Nevertheless, regulation created major barriers to efficiency and stifled competition within the industry. One of the major advantages of this mode of transportation — the flexibility of pickup and delivery points — was muted by the regulatory environment that narrowly defined routes and the products that could be hauled over them. Backhauling, or carrying cargo on a return trip, was the exception rather than the rule. Regulation negatively impacted costs, rates, and service quality. Studies in the U.S. showed a 20 to 40 percent rate differential between regulated and unregulated products. International comparisons between countries that regulated trucking and others that didn't highlighted a 75 percent gap in charges[17].

These obstacles to economic growth led Presidents Kennedy, Ford, and Carter to advocate deregulation. Finally, Congress ratified the Motor Carrier Act of 1980. This act was not as wide ranging as the Staggers Act as it only limited the ICC's authority over motor carriage. However, in conjunction with a laissez-faire ICC, it essentially deregulated trucking. Full deregulation finally occurred

during the Clinton Administration when in 1996 Congress terminated the ICC and eliminated various regulatory functions. The Act created a much smaller independent entity called the U.S. Surface Transportation Board or STB as part of the Department of Transportation (DOT), which oversees only railroad pricing and merger issues. The Act sun setting the ICC also transferred licensing and certain non-licensing motor carrier functions to the Federal Highway Administration within DOT.

Deregulation proved successful for trucking as it did for rail. Nonunion workers joined the industry in large numbers and in the process reduced the percentage of unionized workers from 60 percent in the late seventies to 28 percent in 1985. Twenty thousand trucking companies entered the industry in its first deregulated decade equaling the number of firms in operation in 1980. The synergy between the two deregulated industries, rail and trucking, started taking shape and the trailer-on-flatcar concept propelled intermodal cargo to grow 70 percent between 1981 and 1986. Efficiency gains achieved through backhauling, price flexibility, and small payroll decreases led rates to drop. Despite a rise in the amount of large truck travel, the number of fatalities involving large trucks declined 16 percent from 1980 to 2003.

The superior transportation services made possible by the Motor Carrier Act of 1980 and the Staggers Act paved the way to the agile supply chains of today. Trucking and rail were able to support just-in-time pickup and delivery, thereby permitting sizeable inventory decreases. In 1990, the Department of Transportation estimated that the savings to U.S. industry in shipping, merchandising, and inventories was between $38 and $56 billion per year.

Even though deregulation was initially broader under the Staggers Act than under the Motor Carrier Act of 1980, the motor carrier industry today is completely deregulated due to further reforms passed over the last twenty-five years. On the other hand, the

rail industry is still imposed limits on business practices such as abandonment, mergers, labor usage, ownership of other modes, and even, in certain situations, pricing. This vestige regulation is anti-competitive and counterproductive.

After the 9/11 attacks, border and transportation security became crucial in protecting the nation from terrorists. Specific measures put in place include the creation of the Transportation Security Administration in the Aviation and Transportation Security Act and the passage of the PATRIOT Act and other laws directed at strengthening security at the border. Congress is currently examining more comprehensive approaches to address other modes of transportation — rail and mass transit, air cargo, trucking, and buses[18].

References

1. Jeffrey N. Shane, Under Secretary for Policy, U.S. Department of Transportation, "Keeping America Moving: The Importance of Freight," Remarks made at the National Transportation Week, Transportation & Travel Conference and NDTA Exposition, Washington, DC, May 18, 2004, available at http://www.dot.gov/affairs/shanesp051804.htm.

2. Bureau of Transportation Statistics and U.S. Census Bureau, 2002 Commodity Flow Survey, December 2004, available at http://www.census.gov/svsd/www/02CFSdata.html.

3. Congressional Budget Office, "Freight Rail Transportation: A Review of the 2004 Experience," May 2005, available at http://www.cbo.gov/showdoc.cfm?index=6350%20 &sequence=0.

4. Rosalyn Wilson, 15th Annual State of Logistics Report, "Globalization," Sponsored by the Council of Logistics Management, National Press Club, Washington, DC, June 7, 2004, available at http://www.nesupplychainconference.org/2004/presentations.asp.

5. Association of American Railroads, "Overview of U.S. Freight Railroads," February 2005, available at http://www.aar.org/PubCommon/Documents/AboutTheIndustry/Overview.pdf.

6. Euromonitor International, "Trucking in USA," October 2004, available at http://www.euromonitor.com/Trucking_in_USA.

7. American Trucking Associations, Inc., "American Trucking Trends 2003," available at http://www.atri-online.org/industry/.

8. The Federal Highway Administration, "Freight Facts and Figures, 2004," available at http://www.ops.fhwa.dot.gov/freight.

9. Thomas R. Brown and Anthony B. Hatch, "The Value of Rail Intermodal to the U.S. Economy," available at http://www.aar.org/pubcommon/documents/govt/brown.pdf.

10. The Federal Highway Administration, "Quick Response Freight Manual Final Report," 1996, available at http://tmip.fhwa.dot.gov/clearinghouse/docs/quick/index.stm.

11. Texas Transportation Institute, "The 2005 Urban Mobility Report," May 2005, available at http://mobility.tamu.edu/ums/report/.

12. Supply & Demand Chain Executive, "Logistics Services Providers Seen Boosting IT/Telecom Investments," April 12, 2005,

available at http://www.sdcexec.com/article_arch.asp?article_id=7019.

13. Daniel Wilson, "Where to Find the Productivity Gains from Innovation?" FRBSF ECONOMIC LETTER, Number 2003-04, February 21, 2003, available at http://www.frbsf.org/publications/economics/letter/2003/el2003-04.html.

14. The Federal Highway Administration, "Intermodal Freight Technology," available at http://ops.fhwa.dot.gov/freight/intermodal/.

15. Freight Railroad Security Plan, available at http://www.aar.org/rail_safety/rail_security_plan.asp.

16. Jack Riley, "Terrorism and Rail Security," Testimony presented to the Senate Commerce, Science, and Transportation Committee on March 23, 2004, available at http://www.rand.org/publications/CT/CT224/CT224.pdf.

17. Transportation Research Board, "Cybersecurity Of Freight Information Systems," Special Report 274, available at http://www.trb.org/publications/sr/sr274.pdf.

18. Association of American Railroads, "A Trip through Railroad History," 2003, available at http://www.tomorrowsrailroads.org/history.asp.

19. Federal Railroad Administration: Press Room, "11/12/03 Remarks Prepared for FRA Administrator Before the European Union Conference on Eurail Liberalization: Analysis and Changeover," Rome, Italy, 2003, available at http://www.fra.dot.gov/us/content/1309.

20. Thomas Gale Moore, "Moving Ahead," 2002, available at http://www.stanford.edu/~moore/MovingAhead.html.

21. Thomas Gale Moore, "Trucking Deregulation," 2002, available at http://www.econlib.org/library/Enc/TruckingDeregulation.html.

22. Congressional Research Service, "Border and Transportation Security: Selected Programs and Policies," March 29, 2005, available at http://www4.nas.edu/trb/homepage.nsf/web/security#CRSBTS

23. U.S. Department of Transportation, Federal Highway Administration, available at http://www.fhwa.dot.gov.

Appendix I: Shipment Characteristics by Mode of Transportation for the United States: Percent of Total for 2002, 1997, and 1993

[Estimates are based on data from the 2002, 1997, and 1993 Commodity Flow Surveys. Because of rounding, estimates may not be additive]

Mode of transportation	Value (percent)			Tons (percent)			Ton-miles[1] (percent)		
	2002	1997	1993	2002	1997	1993	2002	1997	1993
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Single modes	**83.9**	**82.7**	**84.5**	**95.0**	**94.0**	**92.1**	**91.4**	**89.4**	**88.3**
Truck[2]	74.3	72.0	75.3	67.2	69.0	65.9	40.0	38.5	35.9
For-hire truck	44.7	42.2	44.9	31.3	30.8	29.0	30.6	28.2	26.0
Private truck	29.1	29.2	30.0	35.6	36.8	36.6	9.3	9.8	9.7
Rail	3.7	4.6	4.2	16.1	14.6	15.9	40.2	39.4	38.9
Water	1.1	1.1	1.1	5.8	5.1	5.2	9.0	9.3	11.2
Shallow draft	.7	.8	.7	3.9	3.8	3.7	6.7	7.0	6.8
Great Lakes	–	–	S	.3	.4	.3	.4	.5	.5
Deep draft	.4	.3	.3	1.6	.9	1.1	1.8	1.8	3.9
Air (includes truck and air)	3.2	3.3	2.4	–	–	–	.2	.2	.2
Pipeline[3]	1.8	1.7	1.5	5.9	5.2	5.0	S	S	S
Multiple modes	**12.9**	**13.3**	**11.3**	**1.9**	**2.0**	**2.3**	**7.2**	**7.8**	**7.9**
Parcel, U.S. Postal Service or courier	11.8	12.0	9.6	.2	.2	.2	.6	.6	.5
Truck and rail	.8	1.1	1.4	.4	.5	.4	1.5	2.1	1.6
Truck and water	.2	.1	.2	.2	.3	.7	1.0	1.3	1.7
Rail and water	–	–	–	.9	.8	.8	3.7	3.0	2.9
Other multiple modes	–	–	–	.2	.2	.2	.4	.7	S
Other and unknown modes	**3.2**	**4.0**	**4.1**	**3.1**	**4.0**	**5.6**	**1.4**	**2.8**	**3.8**

– Represents data cell equal to zero or less than 1 unit of measure.
S Estimate does not meet publication standards because of high sampling variability or poor response quality.

[1]Ton-miles estimates are based on estimated distances traveled along a modeled transportation network. See "Mileage Calculations" section for additional information.
[2]"Truck" as a single mode includes shipments that were made by only private truck, only for-hire truck, or a combination of private truck and for-hire truck.
[3]Estimates for pipeline exclude shipments of crude petroleum.

Note: Value-of-shipments estimates have not been adjusted for price changes. Appendix B tables provide estimated measures of sampling variability. The Introduction and appendixes give information on confidentiality protection, sampling error, nonsampling error, sample design, and definitions. Links to this information on the Internet may be found at *www.census.gov/cfs*.

Note: Coverage for the 2002 Commodity Flow Survey (CFS) differs from the previous surveys due to a change from the 1987 Standard Industrial Classification System to the 1997 North American Industry Classification System and other survey improvements. Therefore, data users are urged to use caution when comparing 2002 CFS estimates with estimates from prior years.

Source: Bureau of Transportation Statistics and U.S. Census Bureau, 2002 Commodity Flow Survey.

Appendix II: Shipment Characteristics by Mode of Transportation for the United States in 2002

[Estimates are based on data from the 2002 Commodity Flow Survey. Because of rounding, estimates may not be additive]

Mode of transportation	Value		Tons		Ton-miles[1]		Average miles per shipment
	2002 (million dollars)	Percent of total	2002 (thousands)	Percent of total	2002 (millions)	Percent of total	
Total	**8 397 210**	**100.0**	**11 667 919**	**100.0**	**3 137 898**	**100.0**	**546**
Single modes	**7 049 383**	**83.9**	**11 086 660**	**95.0**	**2 867 938**	**91.4**	**240**
Truck[2]	6 235 001	74.3	7 842 836	67.2	1 255 908	40.0	173
For-hire truck	3 757 114	44.7	3 657 333	31.3	959 610	30.6	523
Private truck	2 445 288	29.1	4 149 658	35.6	291 114	9.3	64
Rail	310 884	3.7	1 873 884	16.1	1 261 612	40.2	807
Water	89 344	1.1	681 227	5.8	282 659	9.0	568
Shallow draft	57 467	.7	458 577	3.9	211 501	6.7	450
Great Lakes	843	–	38 041	.3	13 808	.4	339
Deep draft	31 034	.4	184 610	1.6	57 350	1.8	664
Air (includes truck and air)	264 959	3.2	3 760	–	5 835	.2	1 919
Pipeline[3]	149 195	1.8	684 953	5.9	S	S	S
Multiple modes	**1 079 185**	**12.9**	**216 686**	**1.9**	**225 715**	**7.2**	**895**
Parcel, U.S. Postal Service or courier	987 746	11.8	25 513	.2	19 004	.6	894
Truck and rail	69 929	.8	42 984	.4	45 525	1.5	1 413
Truck and water	14 359	.2	23 299	.2	32 413	1.0	1 950
Rail and water	3 329	–	105 107	.9	114 986	3.7	957
Other multiple modes	3 822	–	19 782	.2	13 788	.4	S
Other and unknown modes	**268 642**	**3.2**	**364 573**	**3.1**	**44 245**	**1.4**	**130**

– Represents data cell equal to zero or less than 1 unit of measure.
S Estimate does not meet publication standards because of high sampling variability or poor response quality.

[1]Ton-miles estimates are based on estimated distances traveled along a modeled transportation network. See "Mileage Calculations" section for additional information.
[2]"Truck" as a single mode includes shipments that were made by only private truck, only for-hire truck, or a combination of private truck and for-hire truck.
[3]Estimates for pipeline exclude shipments of crude petroleum.

Note: Value-of-shipments estimates have not been adjusted for price changes. Appendix B tables provide estimated measures of sampling variability. The Introduction and appendixes give information on confidentiality protection, sampling error, nonsampling error, sample design, and definitions. Links to this information on the Internet may be found at *www.census.gov/cfs*.

Note: Coverage for the 2002 Commodity Flow Survey (CFS) differs from the previous surveys due to a change from the 1987 Standard Industrial Classification System to the 1997 North American Industry Classification System and other survey improvements. Therefore, data users are urged to use caution when comparing 2002 CFS estimates with estimates from prior years.

Source: Bureau of Transportation Statistics and U.S. Census Bureau, 2002 Commodity Flow Survey.

Appendix III: U.S. Business Logistics System Costs in 2003

	$ Billions
Carrying Costs - $ 1.493 Trillion All Business Inventory	
Interest	17
Taxes, Obsolescence, Depreciation, Insurance	205
Warehousing	78
Subtotal	300
Transportation Costs	
Motor Carriers:	
Truck - Intercity	315
Truck - Local	167
Subtotal	482
Other Carriers:	
Railroads	38
Water (International 21 Domestic 5)	26
Oil Pipelines	9
Air (International 8 Domestic 20)	28
Forwarders	10
Subtotal	111
Shipper Related Costs	7
Logistics Administration	36
TOTAL LOGISTICS COST	936

Source: Rosalyn Wilson, 15th Annual State of Logistics Report, "Globalization."

Appendix IV: Demand Factors vs. Freight Characteristics

FREIGHT CHARACTERISTICS / FACTORS	1 The Economy	2 Industrial Location Patterns	3 Globalization of Business	4 International Trade Agreements	5 International Transportation Agreements	6 Just-in-Time Inventory Practices	7 Carrier-Shipper Alliances	8 Centralized Warehousing	9 Packaging Materials	10 Recycling	11 Economic Regulation/Deregulation	12 Intermodal Operating Agreements	13 Fuel Prices	14 Publicly-Provided Infrastructure	15 User Charges and Other Taxes	16 Government Subsidization of Carriers	17 Environmental Policies and Restrictions	18 Safety Policies and Restrictions	19 Changes in Truck Size and Weight Limits	20 Congestion	21 Technological Advances
Commodity																					
Commodity Type (e.g. SIC Code)	X	X	X	X					X	X	X			X			X	X	X		X
Weight	X		X	X		X			X		X			X	X				X		X
Volume	X		X	X		X		X	X		X		X		X				X		X
Value	X		X	X						X	X				X						X
Perishability (shelf-life)		X	X	X		X														X	X
Storage space requirements	X		X	X		X		X	X			X									X
Degree of Hazard				X							X			X	X		X	X			X
Shipment																					
Line haul miles	X	X	X	X	X			X		X	X	X	X	X	X						X
Miles per number of stops	X	X	X	X	X			X		X	X	X		X							X
Mode																					
Cube limit			X	X	X				X		X	X		X	X				X		X
Weight limit			X	X	X				X		X	X		X	X				X		X
Suitability for hazardous materials			X	X	X						X			X	X		X	X			X
Line-haul costs (per shipment or per mile)		X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
Pickup costs (per shipment or per mile)		X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
Delivery costs (per shipment or per mile)		X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
Wait time		X	X	X	X	X	X	X			X	X		X						X	X
Travel time		X	X	X	X	X	X	X			X	X		X			X	X		X	X
Reliability		X	X	X	X	X	X	X			X	X		X						X	X
Probability of loss and damage claim			X	X	X	X	X	X	X		X	X		X			X	X			X
Load ratio			X	X	X	X			X		X	X		X					X		X
Logistics Costs																					
Order costs			X	X	X		X	X			X	X			X	X	X		X	X	X
Loading and unloading costs		X	X	X	X		X	X			X	X			X	X	X	X	X	X	X
In-transit capital carrying cost		X	X	X	X		X				X	X			X	X	X	X	X	X	X
In-storage capital carrying costs			X	X	X	X	X	X			X	X			X	X		X			X
Storage cost			X	X	X	X	X	X			X	X		X	X	X					X
Shelf loss in transit		X	X	X	X		X				X	X			X	X					X
Cost of filing loss and damage claims			X	X	X		X	X			X	X			X	X	X	X			X
Capital carrying cost on loss and damage			X	X	X		X				X	X			X	X	X	X		X	X
Carrying cost for safety stock			X	X	X		X				X	X			X	X	X	X		X	X
Emergency shipment cost		X	X	X	X		X				X	X	X	X	X	X		X		X	X

Source: Quick Response Freight Manual Final Report, Federal Highway Administration, 1996.

Appendix V: Rail and Trucking History Timeline

1865 The "golden age" of railroads begins. During these years, the rail network grows from 35,000 miles to a peak of 254,000 miles in 1916.

1900–1940 By the eve of World War II, automobiles, large buses, trucks, planes, and pipelines — supported by government subsidies and less burdened by regulation than railroads — have become full-fledged competitors to railroads.

1935 The trucking industry becomes regulated due to unrelenting lobbying by the railroads, state regulators, and the ICC itself.

1945–1970 Railroads enter the post-war era with a new sense of optimism that leads them to invest billions of dollars in new locomotives, freight equipment, and passenger trains. That investment would see retirement of the last steam locomotive by the late 1950s in favor of diesel engines. In spite of this modernization, the decline in rail market share that began before the war resumes.

After World War II, the trucking industry experiences an unprecedented growth rate. This is spurred by the booming post-war economy, the sizeable excess industrial capacity of American automobile and truck manufacturers, and the construction of the Interstate superhighway network.

1970–1975 Burdened by regulation and faced with subsidized competition, nine Class I railroads, representing almost one-quarter of the industry's trackage, file for bankruptcy protection.

1980 The Staggers Rail Act reduces the Interstate Commerce Commission's regulatory jurisdiction over railroads and sparks competition that stimulates advances in technology and a restructuring of the industry, including the creation of hundreds of new shortline and regional railroads.

Congress ratifies the Motor Carrier Act of 1980. This act is not as wide ranging as the Staggers Act as it only limits the ICC's authority over motor carriage.

1996 Full deregulation finally occurrs when Congress terminates the ICC and eliminates various regulatory functions. The Act creates a much smaller independent entity called the U.S. Surface Transportation Board or STB as part of the Department of Transportation (DOT) which oversees only railroad pricing and merger issues. The Act, sun setting the ICC, also transfers licensing and certain non-licensing motor carrier functions to the Federal Highway Administration within DOT.

1999 The Federal Railroad Administration announces that "the years 1993 through 1999 were the safest years in rail history, for every safety category we measure." The rail industry's accident rate fall 66 percent from 1980 to 1999, while employee injury rates fall by 70 percent.

2002 U.S. freight railroads transport 1.56 trillion ton-miles of freight — more than ever before.

2003 The Federal Railroad Administration (FRA) notes, "As judged by most indicators, long-term safety trends on the nation's railroads are very positive… and progress is being made to continue these positive trends." The rail industry reduces its overall train accident rate 67 percent from 1980 to 2002. The rate of railroad employee casualties falls 74 percent since 1980; 2003 is the lowest rate on record.

2003 U.S. and Canadian railroads move 12.1 million intermodal trailers and containers — an all-time high. For the first time ever, intermodal overtake coal as the primary source of revenue for U.S. Class I railroads. According to railroad financial reports, rail intermodal revenue in 2003 is $7.7 billion (22.0 percent of total revenue), compared with coal revenue of $7.6 billion (21.8 percent of total revenue).

Source: Association of American Railroads, "A Trip through Railroad History," 2003.