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From the Editor...

As I write this, you are deciding how to cast your vote in the November elections. I'm sure your choices will be the right ones and that the newly elected will, in all cases, work for a strong economy and an environment free from the effects of terrorism. My students (majoring in logistics and intermodal transportation) are often concerned, given events of the past year, about their prospects for jobs as they graduate. The very good news for them to this point is that demand for our graduates has shown no signs of softening. Our industry has shown remarkable resilience under adverse conditions.

Reaction to the decision to skip a publication year in order to "catch up" with the issue date has been extremely positive. I have not received a single complaint, and the number of manuscripts submitted has increased significantly. As the number and quality of manuscripts increase, maintaining the publication schedule becomes easier.

You will be pleased, I think, with the content of this issue. The lead article, by Jim Keebler, begins with an excellent summary of the development of the U.S. transportation industry by mode. This sets the stage for his analysis of important trends affecting the transportation of goods in the United States. The second article, by Charles Pettijohn, Stephen Parker, and John Kent, provides an in-depth look at the relationship between transportation salespeople and their customers. In their research, the authors identify a number of salesperson traits that are attractive to buyers of transportation services. Both sides can benefit from the results! Jim Johnson, Diane McClure, Kenneth Schneider, and Donald Wood query owners and managers of short-line railroads about their relationships with their Class-I counterparts in the third article of this issue. While the relationships between the two are not always "harmonious," the markets they serve assure a long-term need to work well together. They also identify what the short-line industry considers to be some of the more important trends affecting the Class-I railroads. Dawna Rhoades traces the development of the global air transportation industry in the beginning of the fourth article. She also describes the nature of the world air transport market both before September 11, 2001, and after. She concludes by offering several possible scenarios for the future of the industry. In the final article of this issue, Hokey Min reexamines the issue of driver turnover and its impact upon profitability of the U.S. trucking industry. His research both supports previously published research in this important area and offers new managerial insights as well. There you have it. Something for everyone. I hope you take the time to read each of the articles in this issue.

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Journal of Transportation Management

OBJECTIVES

Editorial Policy. The primary purpose of the *JTM* is to serve as a channel for the dissemination of information relevant to the management of transportation and logistics activities in any and all types of organizations. Articles accepted for publication will be of interest to both academicians and practitioners and will specifically address the managerial implications of the subject matter. Articles that are strictly theoretical in nature, with no direct application to the management of transportation and logistics activities, would be inappropriate for the *JTM*.

Acceptable topics for submission include, but are not limited to carrier management, modal and Intermodal transportation, international transportation issues, transportation safety, marketing of transportation services, domestic and international transportation policy, transportation economics, customer service, and the changing technology of transportation. Articles from related areas, such as third party logistics and purchasing and materials management are acceptable as long as they are specifically related to the management of transportation and logistics activities.

Submissions from industry practitioners and from practitioners co-authoring with academicians are particularly encouraged in order to increase the interaction between the two groups. Authors considering the submission of an article to the *JTM* are encouraged to contact the editor for help in determining relevance of the topic and material.

The opinions expressed in published articles are those of the authors and do not necessarily reflect the opinions of the Editor, the Editorial Review Board, Delta Nu Alpha Transportation Fraternity, or Georgia Southern University.

PUBLISHING DATA

Manuscripts. Four (4) copies of each manuscript are to be sent to Dr. Jerry W. Wilson, Department of Information Systems & Logistics, Georgia Southern University, P. O. Box 8152, Statesboro, GA 30460-8152. Manuscripts should be no longer than 25 double-spaced pages. Authors will be required to provide electronic versions of manuscripts accepted for publication. Guidelines for manuscript submission and publication can be found in the back of this issue.

Subscriptions. The *Journal of Transportation Management* is published twice yearly. The current annual subscription rate is $50 domestic and $65 international in U.S. currency. Payments are to be sent to the editor at the above address.

TRENDS IN THE TRANSPORTATION OF GOODS IN THE U.S.

James S. Keebler
St. Cloud State University

ABSTRACT

This article describes the development and growth of various modes of transportation in the United States and recent trends in the length, size and value of domestic shipments. Changes in the transportation of goods in the United States are being driven largely by four factors—the shift toward a digital economy, the growth of third-party logistics providers, globalism, and the application of new technologies. Finally, this paper looks at emerging forms of supply chain integration and operation.

INTRODUCTION

Many factors affect the performance of the transportation system: accessibility, safety, environmental restraints, input costs, energy efficiency, capacity-to-demand ratios, reliability, travel time and delay, goods damage, and a host of other variables. The choice of mode used in transporting goods is largely based on desired trade-off between speed and cost. Discernable shifts in modal choices have been occurring. For some time, domestic truck transportation has been the dominant mode in value of shipments and tons shipped. Recently, motor carriage has eclipsed rail as the leader in the category of ton-miles shipped.

Goods and raw materials shipped to factories and wholesale and retail outlets throughout the nation generated almost 2.7 trillion ton-miles in 1997 compared with 2.4 trillion ton-miles in 1993 (USDOC 1999). Most modes showed an increase in ton-miles. Shipments by air (including those involving truck and air) grew the most in ton-miles (55.5 percent), followed by parcel, postal, or courier services (36.8 percent), and truck (17.7 percent). Ton-miles by rail (including truck and rail) increased by 8.5 percent and ton-miles by water decreased by 3.8 percent.

BRIEF HISTORY OF MODAL DEVELOPMENT

To better appreciate the roles currently played by the various modes of domestic transportation, it would be helpful to briefly review their origins and growth patterns.

Development of Waterways

Before the American Revolution, much of the trade and commerce of the thirteen colonies was carried on small ships that sailed up and down the Atlantic Coast. Early in the nineteenth century, improvements were made along some of the rivers leading to the Atlantic so that they could carry waterborne commerce. By the 1850s, much of the United States east of the Mississippi

River was served by an elaborate network of barge canals. Many were constructed before the railroads. Others were built later to compete directly with the railroads. Many of the railroads' business practices were aimed directly at driving the competing waterway carriers out of business. By the end of the nineteenth century, domestic water transportation had virtually disappeared, except on the Great Lakes.

Starting in the 1930s, massive federal improvements to the Tennessee and Mississippi Rivers, which included dams for flood control and power generation as well as locks for passage of barges, combined with enforcement of laws aimed at railroad predatory pricing practices, inland waterway transportation began to revive. Established in 1925 by Congress, the Army Corp of Engineers continues to be the agency that provides most of the federal expenditures for river and harbor improvements. In 1997, 563 million tons of cargo was moved by water (USDOC Census FTD 1997). In 1997, 57 percent of domestic tons moved on the inland waterways, 24 percent moved coastwise, and 11 percent moved on lakes (the rest was local and intraterritorial traffic). Lake and inland waterway movement increased by 13 percent and 7 percent, respectively, over this period, while coastwise movement declined by 19 percent (USACE 1998).

Port performance is typically measured by annual cargo throughput. In 1997, 150 ports handled more than 1 million tons of cargo, and 31 ports handled over 10 million tons. While waterborne trade accounted for more than three-quarters of the tonnage of U.S. international trade in 1997, its share of the value of U.S. trade declined from 62 percent in 1980 to 40 percent in 1997 (USDOC Census 1994, Table 1062; USDOC Census FTD 1997). Among the factors that explain this decline are greater land trade with Canada and Mexico and the demand for faster delivery of high-value commodities, which has increased air trade. In 1997, maritime ports on the west coast of the United States accounted for 42 percent of the value of U.S. waterborne trade with other countries compared with only 24 percent in 1980. East coast ports' share by value, however, declined from 41 percent to 38 percent over this period (remaining relatively stable in the last 5 years), and the share of value for Gulf ports also dropped from 33 percent to 18 percent (USDOC Census 1997, Table 1069; USDOT MARAD 1998).

Increased trade with Asian Pacific countries between 1980 and 1997 helps explain this east to west coast shift. The financial crisis impacting several Asian economies, beginning in the second half of 1997, caused a slight decrease in overall merchandise trade by west coast ports. Between 1996 and 1997, the value of total international trade by west coast ports decreased 1.5 percent compared with a 0.4 percent decrease for east coast ports. Because of the appreciation of the U.S. dollar in relation to several Asian currencies, imports through west coast ports increased 3 percent between 1996 and 1997, while exports declined 12 percent.

The majority of west coast waterborne trade transits the ports of Long Beach and Los Angeles. Long Beach is also the leading U.S. port both by value and for containerized trade, as measured by the number of 20-foot equivalent units (TEUs) handled. In 1997, $85 billion worth of international trade passed through the port of Long Beach, and the port handled 2.7 million TEUs (USDOC Census FTD 1997). Other west coast ports such as Los Angeles, Seattle, and Tacoma are also important gateways for U.S. trade with Asia. The port of New York/New Jersey is the east coast leader in both the value of trade ($68 billion) and in the number of containers (1.7 million TEUs) handled in 1997. Charleston and Norfolk are also major east coast container ports. The importance of Gulf ports (e.g., Houston and South Louisiana) in the trade of bulk commodities and crude petroleum can be seen from their listing as the top two U.S. ports by tonnage.

Development of Railroads

The first railroad in the United States was the Baltimore and Ohio (B&O), incorporated in 1827. The next year construction was started, using the standard English track gauge—which is still used today—of 56.5 inches between rails. In 1830, the first steam engine operated over a thirteen-mile stretch of B&O track.

The strength, speed, durability, and year-round availability of the railroad (waterways often freeze during winter) made it the dominant form of transportation. Its growth was spectacular. From 40 miles of track in 1840, railroads expanded over 31,000 miles by the start of the Civil War (Kirkland 1951). Trackage peaked a hundred years later at 152,000 miles, dropping to about 115,000 by 1990. Improved technologies, such as automatic couplers, air brakes, and diesel-powered locomotives facilitated the growth of railroads. In the decade between 1862 and 1872, Congress enacted several land-grant programs, giving railroads free land, usually alternating sections, each section a square mile or 640 acres, in a checkerboard pattern for six miles on each side of the track (Wood and Johnson 1996). Land was granted to accelerate westward development of railroads. However, the railroads accepting the grants had to agree to charge lower rates to the federal government for carrying freight and passengers—military traffic and personnel.

With the advent of the Interstate Highway System in the 1950s, truckers gained a distinct cost advantage over railroads, under the existing system of regulated rates, on hauls up to 500-600 miles in length. However, we have seen a resurgence of railroads since deregulation in 1980. Revenue ton-miles reached 1,349 billion in 1997, an increase of 47 percent since 1980, although revenue-ton miles increased only 16 percent in the eastern United States, but climbed to 68 percent in the western United States (AAR 1998, p. 61).

Intermodal (trailer or container on flatcar) and coal are the largest categories of rail traffic, each accounting for approximately one-quarter of the carloadings of the railroad industry. Intermodal traffic increased from 3.1 million loadings in 1980 to 8.7 million in 1997 (AAR 1998). The introduction of double stack container trains in the early 1980s played a major role in this growth. Since the late 1970s, when the Powder River Basin opened in Wyoming, coal shipments grew from 4.4 million carloads in 1978 to 6.7 million carloads in 1997, reflecting the increased demand for low sulfur western coal by electric utilities to comply with clean air standards (AAR 1998). A combination of chemicals, motor vehicles and equipment, and farm products account for roughly 20 percent of rail traffic.

Development of Pipelines

In August 1859, close to Oil Creek, near Titusville, Pennsylvania, Colonel Edwin Drake drilled the first commercially successful oil well. Both waterway and wagon transportation of oil had limitations overcome by a dedicated pipeline. Samuel Van Syckel built the first successful pipeline in 1865 (Johnson 1956). It reached five miles from Oil Creek to the Oil Creek Railroad. The pipe came in 15-foot sections that had to be screwed together. It was laid on the ground, although in some areas it was buried below the level reached by plowing. With three steam-powered pumps, it was able to transport 80 barrels, or 3,360 gallons, per hour. It could move as much as 300 teamsters could transport in a day.

At first, railroads did not object to pipelines, because they were relatively short—less than ten miles—and were primarily used to bring oil to the railroad collection points. The first trunk line, from Bear Creek, Pennsylvania to Pittsburgh was six inches in diameter and transported 10,000 barrels per day over its 108-mile length (Johnson 1956).

The emergence of John D. Rockefeller's Standard Oil Company in the 1870s triggered a war for control of both oil and natural gas pipelines. By 1890, Standard had a virtual monopoly on pipeline transportation. Today there are over

half-a-million miles of pipeline in the United States, working with minimum labor and risk 24 hours a day, seven days a week, transporting crude and refined oil, natural gas, slurry, and other commodities. The Trans-Alaska Pipeline is the largest diameter pipeline in the United States at 48 inches.

Development of Trucking

In 1896 the first self-propelled trucks began appearing in the United States. By 1898 a limited amount of competition was present among the several manufacturers of "motor delivery wagons." By 1902 the horse versus truck controversy was in full bloom.

General Motors Truck Company advertised, "During the next three months it will be no unusual sight to see horses dropping dead on the streets, having succumbed to the heat... The beauty of the motor truck is that it is not affected by the heat" (Karolevitz 1966). G.M.C. issued full-page advertisements to illustrate this point, showing ten different pictures of horses dying in the streets, attended by their anguished owners. A later advertisement for trucks stressed their economy over "Old Dobbin." The lead sentence read, "1 GMC, 1 Driver, Displaces 16 Horses, 4 Drivers, 4 Wagons" (Karolevitz 1966). By 1911 there were about 25,000 trucks in operation.

Both the pursuit of Pancho Villa into Mexico in 1916 and World War I provided great stimuli to the motor truck industry. As an indication of the general acceptance of trucks after World War I, 335,000 trucks were produced in 1920. The replacement of the wooden wheels and solid rubber tires with steel wheels and pneumatic tires enormously increased truck carrying capacity, speed and smoothness of ride. In the 1920s trucks performed mainly drayage operations to and from railroads. By 1925 about 2.5 million trucks were in operation. In the 1930s the industry developed intercity markets and began to compete with the railroads.

Trucking (for-hire and private) moves more of the nation's freight, whether measured by value, tons, and ton-miles, than any other mode (USDOC Census 1999). In 1997, trucks transported $5.0 trillion of freight, a 13 percent increase over 1993 (in constant 1997 dollars). Truck shipments accounted for 72 percent of the total value of shipments in 1997. Measured by value of shipment, trucking was followed by parcel, postal, and courier services; rail; pipeline, if crude oil is included; air; and water in 1997.

While the shipment value per ton increased overall between 1993 and 1997, it decreased for trucking from $755 to $690 per ton (in constant 1997 dollars). The average reflects the wide range of commodities moved by truck—from sand and gravel, coal, and grain to electronic equipment and pharmaceuticals. Interestingly, the average value per ton of rail shipments (as a single mode) increased from $175 in 1993 to $210 in 1997 (USDOC Census 1997).

Development of Aviation

There was great interest in the development of powered aircraft at the beginning of the twentieth century. The first successful flight was in late 1903 at Kitty Hawk, North Carolina. Wilbur and Orville Wright, two brothers who had a bicycle business in Dayton, Ohio, accomplished this feat. Their first flight lasted only a minute, but by 1905 the Wright brothers were making flights lasting as long as thirty minutes. In the early days of World War I, aircraft were used primarily for observation. Before the end of the war, aircraft were being used as fighters and bombers. With government subsidies to carry the mail, the domestic airline industry began in the mid-1920s. The first U.S. aircraft designed primarily to carry passengers was the Ford Trimotor, introduced in 1926 (Woods and Johnson 1996). Because of the high cost of air transportation, the airlines have not been a major factor in commercial cargo transport, except for selective high value, perishable, or extremely time sensitive

TABLE 1
VALUE OF SHIPMENTS

Domestic and Export-Bound Freight Shipments Within the U.S.

	1997 Value	1997 % of Total Value	1997 vs. 1993 Growth in Value (%)
Truck	4,982	71.7	13.1
PPC	856	12.3	51.9
Other/Unk	368	5.3	7.9
Rail	320	4.6	29.2
Air	229	3.3	64.7
Pipeline	113	1.6	26.3
Water	76	1.1	23.1
Total	6,944	100.0	18.8

Value of Shipments in $Billions, inflation-adjusted
PPC = Parcel, postal, and courier
Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *1997 Commodity Flow Survey*: United States, EC97TCF-US (Washington DC: 1999)

TABLE 2
TONS SHIPPED

Domestic and Export-Bound Freight Shipments Within the U.S.

	1997 Tons	1997 % of Total Tons	1997 vs. 1993 Growth in Tons (%)
Truck	7,700	69.4	20.6
Rail	1,550	14.0	0.4
Other/Unk	630	5.7	-15.7
Pipeline	618	5.6	27.8
Water	563	5.1	11.5
PPC	24	0.2	25.4
Air	4	0.0	42.6
Total	11,089	69.4	14.5

Tons of Shipments in Millions
PPC = Parcel, postal, and courier
Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *1997 Commodity Flow Survey*: United States, EC97TCF-US (Washington DC: 1999)

TABLE 3
TON-MILES SHIPPED

Domestic and Export-Bound Freight Shipments Within the U.S.

	1997 Tons-Miles	1997 % of Total	1997 vs. 1993 Growth (%)
Truck	1,024	38.5	17.7
Rail	1,022	38.4	8.5
Water	262	9.8	-3.8
Pipeline	(*1)	(*1)	(*1), (*2)
Other/Unk	329	12.4	(*2)
PPC	18	0.7	36.8
Air	6	0.2	55.5
Total	2,661	100.0	9.9

(*1) CFS data restated in December 1999 to exclude crude oil shipments by pipeline
(*2) Category component changed in 1997 survey not comparable to 1993 survey

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *1997 Commodity Flow Survey*: United States, EC97TCF-US (Washington DC: 1999)

commodities. There are a few all-cargo airlines, like FedEx, UPS, and DHL. They principally handle overnight delivery of small packages. Otherwise air cargoes move on scheduled passenger aircraft operated by Northwest, United, Delta, American, and others. Usually shipments need to originate and terminate in trucks, making airlines a speedier alternative to truck transportation only over long distances.

Airfreight moves both by all-cargo carriers and carriers that transport passengers. Between 1980 and 1997, airfreight's share of the value of U.S. international merchandise trade increased from 16 percent to nearly 28 percent (USDOT BTS 1998). Commodities that move by air tend to be high in value—air's share of U.S. trade by weight was less than 1 percent in 1997. Western European and Asian Pacific countries dominate airfreight to and from the United States. The top three countries by value of airfreight with the United States are Japan, the United Kingdom, and Singapore. New York's John F. Kennedy (JFK) International Airport was the leading gateway for shipments into and out of the United States by all modes, accounting for over $89 billion in 1997 (USDOC Census 1997). Following JFK in shipment volume were the airports of Chicago, Los Angeles, and San Francisco.

CHANGING SHIPMENT CATEGORIES

Parcels, Postal and Courier Shipments

Business establishments in the United States shipped much more commercial freight on the nation's transportation system in 1997 than in 1993, the two most recent years for which comprehensive freight data are available (USDOC Census 1997). While parcel, postal and courier shipments comprised a very small amount of the 11 billion tons moved in 1997, only two-tenths of a percent or 24 million tons, these shipments represented over 12% of the nearly $8 trillion in total value of shipments. This equates to $2.4 billion per day in value of shipments in this category. This category of shipment grew

significantly between 1993 and 1997: 52% in value of shipments, 25% in tons, and over 36% in ton-miles (USDOC Census 1997). The phenomenal growth in this category is likely due to Internet-based sales that are delivered by U.S. mail, and companies like Federal Express and UPS.

Multimodal Shipments

Multimodal transportation (shipments reported as moving by more than one mode) increased substantially in value between 1993 and 1997 from $932 billion to $1.2 trillion (in constant 1997 dollars), or 31% (USDOC 1999). Multimodal shipments declined in both tons and ton-miles by 14% and 2%, respectively. These shipments are typically international shipments. Air, land, and water modes are all-important in transporting goods in U.S. international trade. The leading gateway overall in 1997 was JFK International Airport in New York with $89 billion of activity (USDOT BTS 1998). This was followed by the water port of Long Beach, California, which handled $85 billion worth of shipments, and Detroit, Michigan, a land gateway with $83 billion worth of shipments in 1997 (USDOT BTS 1998). Changes in the mix of commodities traded internationally, geographic shifts in centers of production, global trade patterns, and many other factors will continue to affect these gateways as well as the movement of international trade shipments to, from, and within the United States.

Local Versus Long-Haul Freight

Freight shipments can be categorized as local (less than 100 miles), intra-regional (between 100 and 1,000 miles), and interregional (over 1,000 miles). In 1997, local shipments constituted nearly 67 percent of the weight (7.7 billion tons), 40 percent of the value ($3 trillion), but only 9 percent of the ton-miles (254 billion) of all U.S. shipments, about the same proportion of the value, tons, and ton-miles identified in 1993 (USDOT BTS 1998).

Intra-regional shipments in 1997 accounted for 45 percent of the value of goods shipments ($3.4 trillion), 29 percent of the tons (3.3 billion tons), and 62 percent of the ton-miles (1.7 trillion). Interregional shipments accounted for a relatively small proportion of the total tonnage (4.4 percent in 1997), but they have had a large impact on the U.S. transportation system and the tonnage of such shipments has grown rapidly. In 1997, longer haul shipments accounted for 29 percent of the ton-miles, about the same proportion as in 1993. Nevertheless, the tonnage moving such long distances grew about 40 percent, with value increasing nearly 30 percent in real terms (USDOT BTS 1998).

Shipments of Major Commodities

Merchandise in the category "electronic, other electrical equipment and components, and office equipment" accounted for the highest dollar value ($925 billion) of U.S. shipments in 1997, followed by motorized and other vehicles (including parts); textiles, leather, and articles of textiles and leather; and miscellaneous manufactured products (USDOT BTS 1998). It should be noted that the Department of Transportation discontinued reporting crude oil shipments and does not include values or volumes of crude oil shipments made by pipeline or water in its reports.

As for total tonnage shipped, the top commodity groups were gravel and crushed stone (1.8 billion tons), coal and coal products, gasoline and aviation fuel, and nonmetallic mineral products. Although gravel and crushed stone accounted for 16 percent of total tons, shipments in this category accounted for less than 1 percent of the value and about 4 percent of the ton-miles of all shipments, impacting mostly local transportation.

The transportation of coal generated the most ton-miles (520 billion), followed by cereal grains, gasoline and aviation fuel, and prepared foodstuffs. Coal produced the most ton-miles

because, unlike gravel and stone, which move mostly in local areas, coal is often shipped long distances. Coal mined in Wyoming and Montana is transported nationwide. In 1997, a ton of coal was shipped 416 miles on average, compared with 55 miles for a ton of gravel and crushed stone (USDOT BTS 1998).

Shipment Size

Freight shipments are divided into several weight categories: less than 100 pounds, 100 to 999 pounds, 1,000 to 49,999 pounds, and over 50,000 pounds. In 1997, the value of U.S. shipments under 100 pounds exceeded $1.1 trillion, 37 percent greater than in 1993 (USDOC Census 1997). Growth in parcel, postal, and courier services and an increase in just-in-time production and distribution systems are partly responsible for this rise in smaller size shipments. Shipments of less than 100 pounds are often high-value, time-sensitive commodities transported by truck and air intermodal combinations, or by truck alone. In 1997, such small-size shipments accounted for 15 percent of the value of shipments, little different from the 13 percent in 1993 (USDOT BTS 1998).

Large-size shipments (over 50,000 pounds) accounted for nearly 66 percent of the ton-miles, 56 percent of tons shipped, but only 12 percent of the value of shipments in 1997. The relative share of large-size shipments fell slightly between 1993 and 1997 in value, tons, and ton-miles (USDOC Census 1997).

MAJOR INFLUENCING FACTORS

The Role of the Digital Economy

The real purpose of a supply chain is not to help companies get rid of products in their inventories but to help customers find and acquire them efficiently. Electronic commerce (e-commerce) has significantly changed the way companies "go to market." The Internet provides an opportunity for supply chains to work 24 hours a day, seven days a week, in all countries using the language of the customer to effect an exchange of values. The power of the Internet lies in its capability to connect companies, their trading partners and consumers easily, quickly and inexpensively. The impact of the Internet on the supply chain is nothing less than profound in its contribution to improved planning, improved asset management, shorter cycle times, tailored product positioning, and customer service. Adoption of the new technologies that enable this capability has been at a remarkably fast rate.

The concepts of aggregation of purchases, inventories, orders and shipments and slower cycle times to achieve logistics economies are being challenged by the e-commerce enabled supply chain concepts of make-to-customized order, transact in units of one or a few, and complete the fulfillment within hours, not weeks. This results in customer expectations of "overnight deliveries," and will shift truckload to less-than-truckload deliveries and dramatically increase the freight moved by parcel delivery companies.

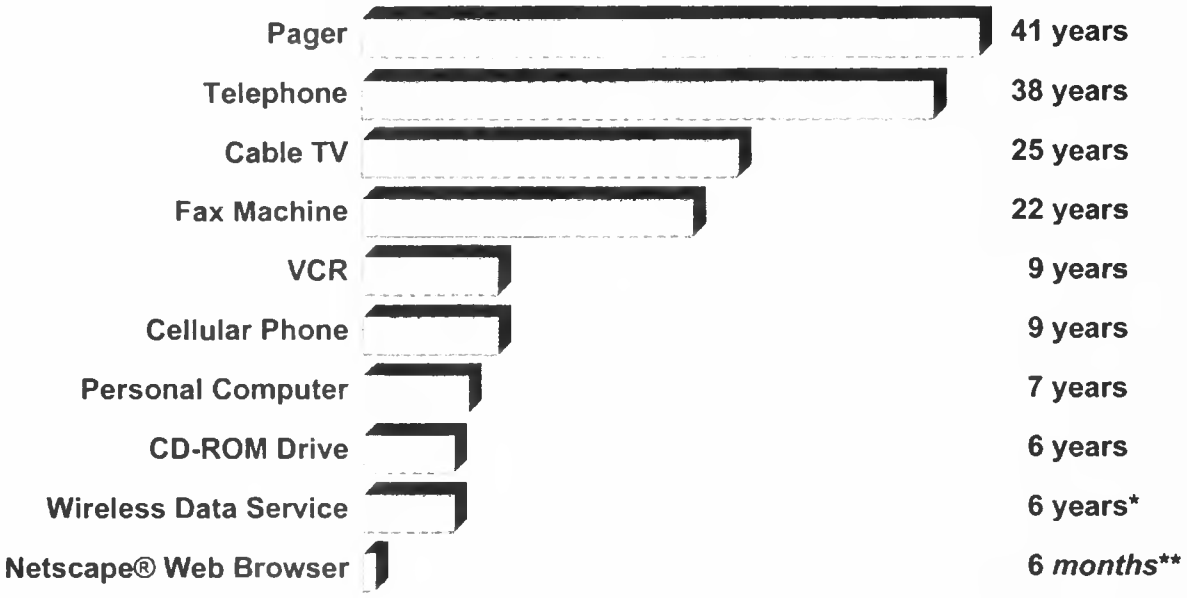
Shifts in the U.S. economy toward more services and high-value, low-weight products are influencing the mix of commodities, even as overall shipments increase. Such shifts affect the average value by unit of weight of commodities shipped (e.g., personal computers have a much higher value per ton than lumber). On average, a ton of goods shipped in 1997 was valued at $580, a slight increase from $563 in 1993 (both in constant 1997 dollars) (USDOT BTS 1998).

The Role of Third Party Logistics Providers

Companies have long recognized that it is to their advantage to outsource functions and activities that do not matter much from a business perspective, such as the operation of the company cafeteria and provision of janitorial services. Companies have expanded this thinking to include logistics functions, believing it is appropriate to outsource activities that some other firm can do better than they can. The providers of services for transportation

FIGURE 1
ABSORPTION RATES OF NEW
INFORMATION TECHNOLOGIES ARE ACCELERATING

The following is the time it took (or is taking) for these technologies to reach the 10 million customer mark after being introduced to the mass market.



*Based on a forecast through 1999
**38 million in 18 months

Sources: *USA Today*, Info Tech, Pac Tel Cellular and Netscape Communications (Keebler et al., 1999)

management, warehousing, order handling and other logistics activities are called third-party logistics providers, or 3PL's.

Third-party logistics providers enable firms to achieve reduced operating costs and increased revenues in new and existing markets (Keebler and Durtsche 2001). 3PL's provide firms an opportunity to enhance their market value by reducing a company's ownership of assets, which translates to a higher return on remaining assets and greater return on stockholder investment. 3PL's also bring to the relationship their specialized expertise in managing logistics with contemporary technology and systems. The COO's decision to outsource company logistics operations to the 3PL is often justified solely on the favorable difference between the more efficient 3PL's price for the services and the firm's higher costs of existing operations. The chief marketing officer views the enhanced services and distribution reach of 3PL's in existing and new markets as translating into increased sales and better long-term relationships with customers. CFO's are delighted to see assets—property, plant, equipment, and even inventory—disappear from the firm's balance sheet, freeing up cash for more

productive uses, instantaneously and "permanently" improving the company's returns on assets. CIO's are often very pleased to have access to the 3PL's systems and technology resources, avoiding the cost and trauma of upgrading their own. Reliance on the 3PL alliance frees up company employees to focus on their core competencies, doing more of what they are good at and less of what can be done better by the 3PL. Chief logistics officers begin to realize that ownership of resources is not necessary to achieve control over the results.

Third-party logistics providers with sophisticated data base management systems and competency in activity-based costing can secure long-term alliances with their customers and their trading partners. Firms value timely, accurate, comprehensive, and actionable data about the activities that constitute their sourcing and fulfillment processes, whether it is used for planning, scheduling, measurement, costing, or pricing purposes. Successful third-party providers supply this knowledge. Under gain sharing arrangements, the firm and its 3PL partner can implement improvements that result in lower costs and share the benefits on an equitable basis. There remains a great opportunity for this alliance to involve the firm's trading partners in the gain sharing program. Changes by suppliers and customers in how and where the work gets done can produce additional logistics savings that can be shared by all. Third-party logistics providers are seen as key facilitators of supply chain management.

The selection and integration of a capable 3PL requires managerial skill in establishing and maintaining trusting, long-term relationships. It also requires a continued investment in the success of each party, based on a strategic and systemic perspective of the interdependencies and potential of the alliance.

In today's competitive market place what distinguishes winners from losers is the ability to differentiate themselves through their service and product offerings. For many firms, the service differentiation is accomplished by how well the logistics process is managed. To achieve excellence in logistics, successful firms ensure that the key logistics processes are aligned with the firm's business strategy and measured against predetermined performance objectives. Additionally, the top firms are jointly defining the specifics of each measure with their trading partners (customers / suppliers / 3PL's) to create a common understating of expectations. While some firms are developing their measurement capability internally, a number are turning to 3PL's to support their needs. As focused service providers, 3PL's are ideally positioned to bring the systems, process design, and managerial expertise to aid in establishing and implementing a comprehensive logistics management effort. The 3PL is also often in the position to act as a catalyst for meaningful dialog between trading partners to establish a level of service performance that truly adds value.

The Role of Global Supply Chains

Changes in how and where goods are produced, and increase in international trade, have contributed to the rise in freight tonnage and ton-miles over the past few years. For example, the manufacture, assembly, and sale of a single product may involve several different facilities located hundreds or even thousands of miles apart.

The importance of international trade to the U.S. economy can be seen in the increased value of U.S. merchandise trade in recent decades. Between 1980 and 1997, the real-dollar value of U.S. merchandise trade more than tripled, from $496 billion to $1.7 trillion (in 1997 dollars). In addition, the ratio of the value of U.S. merchandise trade relative to U.S. GDP doubled from about 11 percent in 1980 to 23 percent in 1997 (USDOC ITA 1999).

During the past two decades, changes can be seen in the geography of trade. Trade with Asian Pacific countries grew greatly. In 1997, five Asian countries were among the top-10 U.S. trading partners, despite a slight downturn in trade in the second half of 1997 related to

economic problems in the region. These five countries accounted for 26 percent of overall U.S. trade in 1997, up from 17 percent in 1980 (USDOC Census FTD 1997). Canada and Mexico were the first and third largest U.S. trading partners in 1980 and in 1997. While the rankings remained the same, the U.S. trade relationship with these two countries deepened. In 1980, Canada and Mexico together accounted for 22 percent of all U.S. trade by value. By 1997, this had increased to over 30 percent (USDOC Census FTD 1997). Canada accounts for approximately 20 percent and Mexico 10 percent of U.S. merchandise trade. U.S. trade with Mexico has grown more quickly than with Canada, and in 1997 Mexico surpassed Japan as the second largest market for U.S. merchandise exports (although Mexico remained the third largest trading partner overall). Between 1993 and 1997, trade with North American Free Trade Agreement (NAFTA) partners increased 62 percent in current dollars, from $293 billion to $475 billion. During this same period, U.S. trade with Mexico grew most rapidly, almost doubling from $81 billion in 1993 to $157 billion in 1997 (USDOC 1998, table 1323; USDOC Census FTD 1997).

Changes over the past two decades also occurred in the commodities traded. Higher value manufactured goods now dominate U.S. trade, accounting for $1.3 trillion or 85 percent of the value of all merchandise trade in 1997 (USDOC ITA 1999). Of these goods, motor vehicles, computers, telecommunications equipment, and aircraft are among the top U.S. import and export commodities by value. While the value of manufactured goods increased as a share of U.S. trade, the share of agricultural commodities declined from 13 percent in 1980 to 6 percent in 1997. Mineral fuels accounted for approximately 6 percent of the value of U.S. trade in 1997, primarily imports of crude petroleum and petroleum products (USDOC ITA 1999).

In terms of commodities, motor vehicles and motor vehicle parts and accessories dominate trade between all of the North American countries. Other leading North American trade commodities include consumer electronics, telecommunications equipment, and aircraft equipment and parts. In addition, crude petroleum, natural gas, and petroleum products are important U.S. imports from both Canada and Mexico. Mexico is also a chief source of U.S. imports of clothing and textiles, while paper products, furniture, and wood products are among leading U.S. imports from Canada.

In their search for new markets and customers as well as more favorable sources of supply and production sites, U.S. companies have been pursuing globalization strategies as a means of insuring access to resources and growth in revenues. Joint ventures and strategic alliances with trading partners around the world are characteristic today of major American companies. Elimination of country tariffs and quotas and simplification of trade documentation have been pursued by the U.S. government and trade organizations. Market defensive strategies are being replaced by market prospecting strategies where the goal is to establish supportive, interdependent business relationships and influence emerging industries, technologies and supply chains.

Application of Technologies

Technologies exist today that can be used to create more effective and efficient supply chains. Examples include bar coding, scanning, data warehousing and data mining architectures and software systems, and use of the Internet to connect trading partners and customers. Applications of radio frequency and computer directed storage and handling systems, of satellite supported ground positioning systems (GPS) for tracking and expediting shipments, and of point of sale and point of use capture of demand data are examples of 'new' technologies being used. Progress toward improved supply chain management does not appear to be limited or propelled by available technology as much as the capability and desire of management to establish strategic, and mutually beneficial multi-firm relationships.

CONCLUSION

As the U. S. economy continues to grow, so does the demand for transportation services. Truck transportation is the dominant mode, accounting for 69% of 1997 tonnage. The nearly 15% increase in domestics tons shipped between 1993 and 1997 can be attributed to trucking, which grew by 20% over the same period.

The way companies go to market, increasingly moving smaller shipments faster to meet shorter fulfillment cycle times, is having a visible impact on the domestic transportation trends. Today, Internet based catalogues offer everything from consumer electronics, luxury goods, sporting gear, freshly produced foods, prescription medicines, and replacement parts. Demanding customers are expecting overnight delivery of this Internet based e-commerce. This can occur out of a network of market-based distribution centers filled with inventory, or more cheaply out of fewer fulfillment hubs, requiring much less inventory, where overnight delivery is still possible. Parcel express companies, like Federal Express and UPS are developing sophisticated new software for customer order fulfillment and electronic warehousing at strategic "pick and pack" hubs. Orders placed today over the Internet can be delivered anywhere in the US from locations in Seattle, Memphis or Lexington. International shipments can be cleared by customs electronically before they land, overnight or the next day, in the destination country. Pick up and delivery carriers can be coordinated electronically on both ends to schedule the quickest and least expensive movements.

The supply chains of tomorrow will be supported by virtual logistics networks where manufacturers and their suppliers and customers, repair vendors, delivery companies, and logistics service providers will be connected electronically via virtual data centers and web interfaces on the Internet. Internet based collaborative relationships will provide enterprise-wide and supply chain visibility for improved planning and execution.

As we head into this new millennium, the movement toward globalization, with emerging markets, cheaper supply sources, and new trading partners, is compelling enterprises of all sizes to build alliances and on-line commerce systems that efficiently deliver products to customers while providing a worldwide view of operations. Virtual along with traditional organizations are developing new strategies to track orders and react to changes in real time in handling and transporting materials as they move across the supply chain from originating suppliers to end customers.

The goal is to electronically link the entire forecasting, planning, sales, procurement, production, delivery, freight payment and revenue collection processes into one seamless flow of information across national borders, time zones, and differing languages, creating a global view of the supply chain flows. Transportation and fulfillment providers, including Federal Express, UPS, Sea Land, DHL and SkyWay, are opening up their systems allowing e-commerce vendors to access, track, and communicate logistics information in a variety of innovative ways. Web casting and publish/subscribe techniques allow all interested parties to be alerted to situations requiring their attention. This includes changes in customer demand, order revisions and cancellations, adjustments in quantity and/or locations for deliveries in progress, customs clearance problems, and on-time delivery or installation issues. An integrated, virtual solution can diagnose when a critical piece of equipment is about to fail, can tell when a hub is short of replacement or repair parts, and also can locate the source of the problem, whether it is due to an enroute delivery, warehouse situation, or change in the scope of an order.

These new Internet-based solutions have the potential to all but eliminate the strategic role of distribution centers for replacement parts, putting the emphasis on moving information, not parts. This new capability provides for dynamic decision opportunities, or fixing problems before they arise.

Automated online personalities that emulate human customer service representatives will become widespread in the Internet at a much lower cost than traditional support functions. These web-

based "virtual reps" will be able to react to customer inquiries and handle frequently asked questions twenty-four hours a day, seven days a week, in any language.

Internet-based, extra enterprise-wide e-commerce applications are part of a fundamental shift in how computing is being applied to the business of managing logistics across the trading landscape. New strategies and software to support those strategies are being developed, tested and implemented in order to help companies find the best balance between demand opportunities and supply constraints while enabling effective, controlled logistics execution. As trading partners work together to improve the overall performance of their supply chain, they are beginning to discover the solution might just be a virtual reality.

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DEVELOPING THE BUYER-FRIENDLY TRANSPORTATION SALESPERSON: AN EMPIRICAL ANALYSIS OF THE MOST IMPORTANT SELLER TRAITS AND BEHAVIORS FROM THE TRANSPORTATION BUYER'S PERSPECTIVE

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ABSTRACT

The research reported in this manuscript provides several insights regarding the specific behaviors and traits of transportation salespersons as sought by a sample of shippers. Shippers in both manufacturing and non-manufacturing industries were asked to evaluate the importance of 30 potential salesperson characteristics. Overall, dependability, ethical conduct, honesty, provision of regular service, and solution selling were ranked as the most important ("must have") characteristics. In addition to the overall rankings, t-tests were used to compare the manufacturing and non-manufacturing groups and ANOVA tests were used to compare the responses of shippers which were grouped by number of contacts from salespersons.

INTRODUCTION

What are the critical traits and behaviors that a salesperson should exhibit in his/her interrelationships with various customer groups? According to an interview reported in *Sales and Marketing Management* magazine, buyers seek salespeople who "exude integrity" (honest and trustworthy), who know their product, applications and industry (something of an expert), who listen and custom design a solution, conduct follow-up activities in a timely fashion, work for the benefit of both the buying and selling organizations, and who are excellent communicators (Kaydo 2000). Kaydo further contends that the common mistakes salespeople make include: not being knowledgeable of their product, failing to evaluate and understand the company with which they are dealing, focusing only on price, not following through on commitments, not making appointments, not having an agenda, and not working to fit into the consuming firm's priorities. Based on the anecdotal evidence reported, it would seem that the key qualitites of a "good" salesperson are: honesty, knowledge, ability to adapt to the customer's situation, being dependable, allowing and encouraging customer input, and providing true solutions.

As Garver and Mentzer (2000) point out, in the area of business logistics, the sales "interface is becoming increasingly important." Thus, it would seem that a listing of the traits and behaviors that are desired by buyers could be important for numerous reasons. First, one could reasonably assume that salespeople who possess the traits/behaviors most desired by their buyers would also be the ones with whom buyers prefer to work and interact. It could then be argued that this preference should result in more sales, higher profits, greater customer satisfaction, etc. Based on this premise, an identification of traits/behaviors of salespeople could also be valuable to firms as they engage in the selection process. For example, if product knowledge is identified as one of the buyer's most critical factors, then selection decisions may be predicated upon the applicant's ability and/or skills in understanding the product. Third, the listing of critical skills may also be useful in the development of sales training and development programs. If, as stated previously (Kaydo 2000), the ability to custom design a solution is a critical behavior, then firms should train their sales forces in developing custom designed solutions. Finally, the development of a list of key skills/traits of salespeople may also be useful in the development of performance appraisal programs. It would seem logical that salespeople be evaluated on criteria that are critical to their buyers. Using this logic, one might argue that salespeople should be assessed on their ability to communicate solutions to their buyers.

However, while the information provided from interviews such as the one from *Sales and Marketing Management* (Kaydo 2000) is insightful, valuable, and may be useful in the selection, training, and evaluating of salespeople, it should be recognized that the definition and identification of "good" selling behavior/traits is probably largely dependent upon the perceptions and positions of the person listing the traits. One might find that different individuals identify different behaviors/traits as being critical to a sales position. Correspondingly, individuals in various industries may identify unique behaviors/traits as being important in their industries. Further, designing selection, training, and evaluation programs on the basis of a half a dozen interviews would seem tenuous. Based on these limitations, the purpose of this research is to evaluate the importance of alternative salesperson traits and behaviors from the perspectives of professional buyers in one selected industry, the transportation industry. The findings of this research may be valuable to firms that target this industry for their personal selling efforts. These organizations may use these findings to guide their sales force selection, training, and evaluation processes. Thus, businesses that are emphasizing personal selling as a significant portion of their promotional mixes may be better able to identify the critical factors that influence the effectiveness of their selling efforts and

consequently improve their sales results by implementing the findings of this study.

RELATED LITERATURE

An assessment of the skills and traits required for successful selling can be made from numerous vantage points. From one perspective, it would seem that performance appraisal criteria would emphasize an evaluation of the skills/behaviors that would be required for success in the sales profession. This viewpoint might argue that salespeople should be "graded" on criteria that relate to successful performance. Jackson, Schlacter and Wolfe (1995) identified numerous criteria that they found were used to assess salesperson performance. Among these criteria were qualitative criteria (sometimes referred to as input criteria) which relate to the skills that may help a salesperson succeed. The results of their research provided the percentage with which specific skills were used by managers in their evaluations of salesperson performance. These sales managers stated that the following skills were used in their evaluations of salesperson performance: communication (88%), product knowledge (85%), attitude (82%), sales skills (79%), initiative (76%), appearance (image) (75%), competitive knowledge (71%), enthusiasm (66%), time management (63%), motivation (61%), and ethical behavior (59%). In a similar study, the importance of various criteria were evaluated (Taylor, Pettijohn and Pettijohn 1999). In terms of the traits/behaviors of salespeople, the results of this study indicated that sales managers believed that the most important factors (7 = most important, 1 = least important) were product knowledge (4.8), attitude (4.4), communication skills, (4.3), selling skills (4.2), initiative (3.6), and appearance (3.5). However, it may be noted that the Taylor, Pettijohn and Pettijohn (1999) study also found some differences in the perceptions of salespeople and their managers in terms of the qualitative criteria that should be emphasized in performance appraisals. The results indicated that salespeople rated the importance of the salesperson behaviors/traits in the following manner: product knowledge (5.2), attitude (5.3), communication skills, (5.1), selling skills (4.7), initiative (4.8), and appearance (4.9).

A second method that may be used to identify the critical salesperson traits/behaviors that relate to successful selling would entail an assessment of sales training topics. Firms that are interested in facilitating successful performance by their sales forces would logically provide training in those areas most closely aligned with sales success. Most research pertaining to training topics contends that the following topics are important: selling techniques, product knowledge, negotiation skills, interviewing, and competitive knowledge (Chonko, Tanner and Weeks 1993; Del Gaizo 1987; Kerr and Burzynski 1988). Others argue that the training focus should be more exclusively on selling skills and topics such as self-management and motivation, and sales planning (Johnson 1990; Smith 1991). In one study, salespeople were asked to identify the critical topics that should be included in a sales training program. The percentage with which certain topics were rated as being important by salespeople, which could also be perceived as being critical determinants of an effective sales presentation, included the presentation (88.3%), sales follow-up (80%), ethics (71.7%), relationship selling (63.3%), professionalism (60.6%), product knowledge (58.3%), and adaptability (48.3%) (Parker, Pettijohn, and Luke 1996).

A third method that may be used in identifying critical salesperson behaviors might entail asking salespeople to rate the importance of alternative behaviors. One study which evaluated the importance of alternative behaviors did so by examining alternative tactics in selling, from the prospecting stage to closing (Hite and Bellizzi 1985). The two topical areas that seem to hold the most relevance for the present study include the "presentation" and the "follow-up" sections. In the presentation section, industrial salespeople provided the following importance ratings (5 = most important) for various sales behaviors/traits: develop a "tailored" sales presentation (4.33), ask questions (4.26), help the prospect visualize the product offering (4.11),

speak the prospect's language (4.09), and demonstrate (4.09). With regard to the follow-up section of the sales encounter, industrial salespeople provided the following importance ratings: periodic follow-up of customer satisfaction (4.54), customer training (4.37), serving as a consultant (4.22), and reassuring the customer (4.18). Chonko, Caballero, and Lumpkin (1990), used a scale to assess the salesperson's behavior in nineteen critical dimensions of retail sales behavior. Salespeople in this study were graded on aspects such as courtesy, customer focus, listening, product knowledge, availability, willingness to assist, use of questions, attempts to learn about he customer's needs, use of visualization techniques in the presentation, demonstration skills, willingness to customize solutions, and his/her general attitude.

Moncrief (1986) conducted an analysis of critical sales behaviors by asking industrial salespeople what they did on their jobs. Of interest to the present research, the findings identified the following behaviors: select products for sales calls, prepare sales presentations, introduce new products, help clients plan, correct orders, handle shipment problems, learn about product by working with technicians, make deliveries, train customers, provide feedback to employer, receive feedback from clients, read trade publications, provide technical information, and conduct social activities with buyers. A more recent analysis identified "critical success factors" in sales by identifying behaviors that separated "top" sales performers from the "bottom" performers (Dwyer, Hill and Martin 2000). Findings relevant to the present analysis showed that "helping the prospect visualize the benefits" was a behavior engaged in by top performing salespeople. Using "partially standardized sales presentations" was a behavior engaged in by the low performing salespeople. The research concluded that top performing salespeople tended to use a more personal and customer-oriented approach to selling. These top performers also engaged in more "customized" presentations that focused on the buyer's needs. Conversely, the low performing salespeople tended to less personal methods for identifying and satisfying needs. The research argues that "low performers" focus on product benefits and do little to alter their presentations to the specific customer needs in a given situation (Dwyer, Hill and Martin 2000). In a similar vein, qualitative research indicates that logistics buyers are seeking salespeople who have expertise in several areas, including in their product, their firms' logistics systems and in their buyers' businesses and operations. Further, buyers in this study indicated that their salespeople should be able to handle logistical procedures and understand their buyers' needs. Buyers were also described as desiring more of a "partnership relationship" with their sales representatives (Garver and Mentzer 2000).

It may be noticed that while some degree of overlap exists between the traits/behaviors described by buyers and sellers as being critical, the training topics included in the programs discussed, and the ways in which sales representatives are evaluated, some differences exist. One could argue that some differences should always exist, as many aspects of a salesperson's job may not be a portion of the buyer-seller dyad. However, it would also seem reasonable to assume that the behaviors that are deemed critical by the buyer would be topics that should also be emphasized in a sales training program and correspondingly in the performance review process. Reconciling these positions requires more than the anecdotal evidence garnered from an interview with six buyers (Kaydo 2000). In fact, it could be argued that an identification of salesperson traits that seem most significant to buyers should be completed through some form of empirical analysis. The purpose of this research is to engage in this process by surveying professional buyers of shipping services and identifying the relative levels of importance of the skills/traits that are possessed by the salespeople that contact them and their employers. As stated by Garver and Mentzer (2000), limited research has evaluated the relationship between logistics salespeople

and their customers. This type of research may be valuable not only in the development and implementation of sales training programs, but also in the salesperson recruitment and selection processes. Indeed, an analysis of the buyers' perspectives of the traits and behaviors of salespeople may provide the catalyst for evaluating the effectiveness of both sales training programs and individual salespeople.

METHODOLOGY

Literature was reviewed to identify characteristics of successful salespeople in a wide variety of industries. The results of the literature review were used to construct questions relating to salesperson characteristics which might be required of salespeople in the transportation and logistics industry. The reviewed research suggested that three categories of characteristics exist. First, intrinsic characteristics, which include concepts such as self-motivation, knowledge of one's goals, perseverance, a desire for continual training, and a willingness to take risks. Second, customer oriented skills, including characteristics such as the ability to listen, the ability to sell solutions, anticipation of the customer's needs, and building and improving customer relations. Third, personal selling characteristics, which include approach and involvement techniques, qualifying customers, presentation techniques, overcoming objections, and closing techniques.

The final questionnaire used in this study consisted of thirty questions covering the three previously mentioned categories, as well as several questions used for developing a demographic profile of the respondents. Respondents were asked to rate the importance of each characteristic on a five point Likert type scale with 1 representing "not important" and 5 representing "must possess." The questionnaire was then sent to a sample of shipping firms for evaluation and feedback purposes. Based on this feedback, the questionnaire was revised and then mailed to a list of 518 companies that used truckload shipping services. This list was provided by a major transportation company located in the Midwest. The shipping companies used in this study included firms involved in retail, manufacturing, services, and specialty providers. Of the 518 questionnaires sent, seven were returned as being undeliverable, thereby reducing the sample size to 511 shippers. A total of 114 usable questionnaires were returned representing an overall response rate of 22.3 percent.

RESULTS

The results of this study are presented by evaluating mean responses to a set of 30 salesperson characteristics. While other studies have examined salesperson characteristics in a variety of industries, this study examines these traits from the perception of shippers presently using transportation services. The respondents consisted of 33 non-manufacturing firms, 79 manufacturing firms, and two respondents opting not to respond to this question. Respondents from the two types of companies were first asked to provide information on the number of transportation sales forces that contact their company on a regular basis. The response to this inquiry is shown in Table 1.

TABLE 1
SALES FORCE CONTACT

Type of Company	Number of Contacts		
	0-20	21-50	51+
Non-Manufacturing Firms	14	6	12
Manufacturing Firms	35	25	18
Total Contacts	49	31	30

Table 1 shows that 49 of the responding firms (42% of non-manufacturing respondents and 44% of manufacturing respondents) have regular contact with up to 20 firms. Higher numbers of contacts are reported by 31 firms (18% of non-manufacturing respondents and 32% of

manufacturing respondents) who report regular contact with 21-50 firms and 30 firms (36% of non-manufacturing respondents and 23% of manufacturing respondents) reporting over 50 regular contacts with various sales forces. Based upon these responses, it seems reasonable to conclude that the companies involved in this study have regular contact with a variety of different types of salespeople in their daily operations.

The respondents were asked to examine the list of thirty salesperson behaviors/traits, derived from the process described in the methodology, and to rate the relative importance of each behavior/trait using a Likert-type scale anchored with 1 representing "not important" and 5 representing "must possess." Overall mean scores for each of the characteristics were then ranked in descending order from the highest level of importance ("must have") to the lowest level of importance ("not important") and are shown in Table 2. Additionally, Table 2 reports the mean scores for each characteristic as reported by both non-manufacturing and manufacturing respondents. These responses were then examined for significant differences between the manufacturing and non-manufacturing groupings.

The data reported in Table 2 indicate that the respondents regarded 13 of the characteristics (based on mean scores of at least 4.0) as being of "importance" for a salesperson to possess, while the remaining 17 characteristics, with reported mean scores of below 4.0, were found to fall into the category of being "beneficial" characteristics for a salesperson to possess. When these characteristics are examined based upon the type of responding firm, the levels of importance varied slightly with non-manufacturing firms reporting 14 characteristics to be "important" and manufacturing firms reporting 11 characteristics as being "important" to the success of the salesperson. Four of the characteristics, Dependability of Salesperson (4.62), Ethical Conduct (4.54), Honest (4.53), and Provides Regular Service (4.44), were rated higher than the remaining characteristics. A sales manager may well draw the conclusion that these four characteristics would be critical characteristics for their salespeople to exhibit when dealing with either non-manufacturing or manufacturing firms.

Each characteristic was then examined through the use of t-tests to determine whether significant differences existed between non-manufacturing and manufacturing firms in terms of the importance placed on each characteristic. Table 2 reveals that six of the 30 characteristics (Dependability, Knowledge of Operations, Sincere, Expert on Offerings, Contact with customer, and Opens Discussions) were found to differ significantly, at the .05 level, while four characteristics (Sells Solutions, Flexibility, Risk Taker, and Persistent) were found to be significantly different at the .10 level. These findings indicate that a sales manager might be well-advised to consider the type of clientele with which the sales force will be interacting when designing sales training programs.

While the mean score ratings for each characteristic are useful in determining the overall perceived importance of each characteristic, they may not tell the entire story. For example, when each characteristic is examined in terms of the number of companies contacting the respondents, the perceived importance of several of the characteristics change. The mean scores for each characteristic as it relates to the number of contacts is shown in Table 3.

For those companies having 20 or fewer organizations whose sales forces contact them, 18 of the 30 characteristics examined were rated as being "important" characteristics, while those companies reporting 21 to 50 contacts found only 6 of the characteristics to be considered "important." Of those companies reporting over 51 contacts, 15 of the characteristics were found to be "important" for the sales person to possess.

The top four characteristics (Dependability, Ethical Conduct, Honest, and Provides Regular Service), which were rated high in the overall ratings, were also rated high by each of the

TABLE 2
SALESPERSON CHARACTERISTICS

Characteristic	Overall Mean Score	Mean Score		t-test Significance
		Non-Mfg	Mfg	
Dependability of Salesperson	4.62	4.61	4.65	.019*
Ethical Conduct	4.54	4.52	4.54	.408
Honest	4.53	4.55	4.52	.409
Provides Regular Service	4.44	4.38	4.48	.231
Develops Solutions to Problems	4.09	4.03	4.12	.292
Communication Skills	4.09	4.00	4.13	.216
Sells Solutions	4.08	4.27	4.01	.056**
Listens to Customer Input	4.08	4.24	4.02	.079
Knowledgeable of Operations	4.06	4.27	3.96	.019*
Sincere	4.06	4.30	3.96	.008*
Expert on Product Offerings	4.05	4.33	3.92	.004*
Tailored Presentation	4.05	3.94	4.10	.395
Flexibility in Customizing Services	4.04	4.18	3.97	.076**
Resolves Concerns	3.98	3.94	4.00	.348
Maintains Contact with Customer	3.98	3.79	4.06	.005*
Self-Confident	3.98	4.00	3.95	.366
Positive Outlook	3.88	3.94	3.85	.263
Motivation or Drive	3.87	3.97	3.82	.185
Identify Needs	3.86	3.85	3.86	.471
Prepared	3.81	3.85	3.80	.388
Forecast Problems	3.80	3.94	3.73	.110
Looks for Participation from Customers	3.78	3.70	3.82	.228
Stays Informed of New Developments	3.77	4.03	3.96	.322
Enthusiastic	3.73	3.82	3.68	.190
Assertive	3.72	3.70	3.72	.426
Develops Supply Chain Relations	3.55	3.59	3.52	.357
Opens Discussions with Firm	3.53	3.79	3.42	.016*
Persistent	3.29	3.48	3.20	.068**
Risk Taker	3.16	3.36	3.05	.059**
Social Skills	3.11	3.13	3.09	.435

*Significant at the .05 level **Significant at the .10 level

TABLE 3
IMPORTANCE OF CHARACTERISTIC BASED UPON NUMBER OF CONTACTS

Characteristic	Overall Mean	Number of Contacts			Sig.	Groups
		0-20	21-50	51+		
Dependability of Salesperson	4.62	4.73	4.42	4.70	.041	1-2
Ethical Conduct	4.54	4.59	4.26	4.73	.005	1-2, 2-3
Honest	4.53	4.51	4.48	4.63	.524	
Provides Regular Service	4.44	4.65	4.26	4.30	.019	1-2
Develops Solutions to Problems	4.09	4.04	3.97	4.30	.188	
Communication Skills	4.09	4.15	4.03	4.07	.808	
Sells Solutions	4.08	4.12	3.87	4.23	.181	
Listens to Customer Input	4.08	4.08	3.90	4.27	.162	
Knowledgeable of Operations	4.06	4.08	4.00	4.03	.884	
Sincere	4.06	4.16	3.77	4.20	.021	1-2, 2-3
Expert on Product Offerings	4.05	4.18	3.84	4.03	.131	
Tailored Presentation	4.05	4.63	3.43	3.73	.166	
Flexibility in Customizing Services	4.04	4.16	3.77	4.10	.045	1-2
Resolves Concerns	3.98	4.04	3.87	4.00	.615	
Maintains Contact with Customer	3.98	4.10	3.97	3.77	.192	
Self-Confident	3.98	4.02	3.81	4.03	.355	
Positive Outlook	3.88	4.10	3.61	3.72	.004	1-2
Motivation or Drive	3.87	3.96	3.61	3.93	.130	
Identify Needs	3.86	4.00	3.65	3.83	.161	
Prepared	3.81	3.98	3.48	3.87	.038	1-2
Forecast Problems	3.80	3.94	3.58	3.77	.148	
Looks for Participation from Customers	3.78	3.90	3.74	3.63	.361	
Stays Informed of New Developments	3.77	3.92	3.81	4.23	.048	2-3
Enthusiastic	3.73	3.90	3.65	3.50	.055	
Assertive	3.72	3.69	3.52	3.97	.019	2-3
Develops Supply Chain Relations	3.55	3.56	3.45	3.60	.825	
Opens Discussions with Firm	3.53	3.53	3.55	3.47	.923	
Persistent	3.29	3.45	3.13	3.17	.231	
Risk Taker	3.16	3.06	3.00	3.41	.193	
Social Skills	3.11	3.06	3.19	3.03	.818	

Group 1 = 0-20 contacts Group 2 = 21-50 contacts Group 3 = over 50 contacts

responding contact categories. However, after the top four characteristics, numerous differences in terms of the importance ratings were found based upon the number of contacts experienced. For example, several characteristic ratings from those companies experiencing 51+ contacts were found. Specifically, the characteristics of Ethical Conduct, Honest, Develops Solutions, Sells Solutions, Listens to Customers, and Stays Informed of New Developments, were rated higher than in the overall ratings. An ANOVA technique was employed to examine each characteristic and determine if significant differences existed between contact groupings. If significant differences were found, the Bonferroni post hoc test was employed to determine which groups were significantly different. The results of this analysis are also shown in Table 3. As can be seen from this table, eight characteristics were found to differ significantly between the contact categories, with all differences being between either categories one and two or categories two and three.

While no single variable had an overall reported mean score of 5 ("must possess"), individual respondents did report that they believed that certain criteria fell into this area. Therefore, the perceived importance of each characteristic was examined based upon the specific type of industry reporting with the results being shown in Table 4.

The data reported in this table reveal that each characteristic was reported as being a "must possess" characteristic by several respondents. These "must possess" scores ranged from a high of 76 respondents or 66.7% for Dependability of Salesperson to a low of 8 respondents or 7% saying that a salesperson "must possess" the characteristic of being a risk taker.

It is interesting to note that respondents from each of the two types of shippers (non-manufacturing and manufacturing) represented in this study are very similar in their perception of most of the characteristics, they do tend to differ on several of the characteristics. For example, while 43.8% of the non-manufacturing respondents reported that "Provides Regular Service" was a must possess characteristic, 59.5% of the manufacturing respondents reported it as being a must have characteristic. Conversely, while 42.4% of non-manufacturing respondents reported "Knowledge of Operations" to be a must possess characteristic, only 20.5% of manufacturing respondents found it to be a must have characteristic. Again, it is clear that differences between non-manufacturing firms and manufacturing firms must be considered when designing sales training programs.

CONCLUSIONS

Previous research which has examined the types of characteristics or traits which salespeople should possess has often been very general in nature. The results of these studies have revealed salesperson characteristics such as possessing communication skills, product knowledge, positive attitude, integrity, and sales follow up as being desirable. The present study broadens the body of knowledge in at least two areas. First, salesperson characteristics were evaluated in terms of their overall importance to the transportation industry. This examination revealed four characteristics which stand out as being considered to be more important than all of the other salesperson characteristics which were examined. These characteristics were Dependability of Salesperson (4.62), Ethical Conduct (4.54), Honest (4.53), and Provides Regular Service (4.44). This information should lead sales managers to evaluate their training procedures to assure that the company's sales force truly understands the perceived importance of each of these characteristics. While being ethical and honest are harder characteristics for a training program to address, other characteristics such as the concept of providing the customer regular service, along with the other characteristics which also were rated as being "important" would fit nicely into most training programs. It is also important to note that these levels of perceived importance change slightly when the number of sales force contacts are considered. Again, it would seem that it is of importance to know and understand

TABLE 4
REQUIRED SALESPERSON CHARACTERISTICS

Characteristic	Must Have		Company Type			
			Non-Mfg		Manufacturing	
	No.	%	No.	%	No.	%
Dependability of Salesperson	76	66.7	21	63.6	55	69.6
Ethical Conduct	68	59.6	19	57.6	47	59.5
Honest	63	55.3	18	54.5	44	55.7
Provides Regular Service	61	53.5	14	43.8	47	59.5
Communication Skills	39	34.2	11	33.3	28	35.9
Sells Solutions	36	31.6	12	36.4	24	30.4
Listens to Customer Input	34	29.8	12	36.4	22	27.8
Develops Solutions to Problems	33	28.9	8	24.2	25	32.1
Expert on Product Offerings	33	28.9	16	48.5	16	20.3
Maintains Contact with Customer	31	27.7	6	18.2	25	31.6
Knowledgeable of Operations	30	27.0	14	42.4	16	20.5
Sincere	29	25.4	11	33.3	18	22.8
Resolves Concerns	29	25.4	8	24.2	21	26.6
Customizes Services	26	22.8	10	30.3	16	20.3
Self-Confident	26	22.8	8	24.2	16	20.3
Informed of New Developments	25	21.9	7	21.2	18	22.8
Prepared	23	20.2	7	21.2	16	20.3
Forecast Problems	22	19.3	8	24.2	14	17.7
Motivation or Drive	21	18.4	8	24.2	13	16.5
Tailored Presentation	21	18.4	6	18.8	15	19.0
Identify Needs	20	17.5	6	18.2	14	17.7
Looks for Participation	20	17.5	5	15.2	15	19.0
Positive Outlook	18	15.8	7	21.2	11	14.1
Enthusiastic	13	11.4	6	18.2	7	8.9
Develops Supply Chain Relations from Customers	13	11.4	4	12.5	9	11.4
Opens Discussions with Firm	13	11.4	7	21.2	6	7.6
Social Skills	11	9.6	5	15.6	6	7.6
Assertive	10	8.8	3	9.1	7	8.9
Persistent	8	7.0	5	15.2	3	3.8
Risk Taker	8	7.0	4	12.1	3	3.8

how many other contacts each firm might be experiencing.

The second area of contribution is in the area of providing information as to which characteristics are thought to be "must possess" characteristics. The perception of which characteristics a salesperson must possess is dependent upon the particular type of company the salesperson has targeted for his/her sales efforts. By understanding which of these characteristics each company type values, the sales manager is in a better position to either attempt to identify salespersons who possess these specific characteristics or to attempt to fine tune the sales force training programs to consider the type of company the sales force will be contacting. As a result of this tailored training, the salesperson should be in a better position to become more effective by tailoring his/her sales presentation for the specific company type in question.

Finally, future research should focus on at least two specific areas. First, to address a limitation of this research, future research should attempt to survey a larger sample of shippers. While the study consisted of a survey mailed out to over 500 shippers only 114 were returned and usable. Second, future research should build upon the attributes and characteristics identified in this study and attempt to identify specific factors or constructs that could be utilized in a theory of buyer-friendly behavior.

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SHORT-LINE RAILROAD MANAGERS DISCUSS CLASS I RAILROADS

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ABSTRACT

Managers/owners of short-line railroads were queried about three issues: (1) How would you describe your company's business relationship with the Class I railroad(s) with which you interchange traffic; (2) Do you believe that mergers between Class I railroads have been good or bad for short-line railroads; and (3) Besides merger activity, what do you believe will be the most important trend for Class I railroads in the next 10 years?

INTRODUCTION

Short-line railroads (defined herein as railroads with less than 250 miles of trackage) have been part of the transportation industry for many decades. Before 1970 their numbers had been in a long term decline. For example, in 1916 there were approximately 1,000 of these carriers, but by 1970 the number had shrunk to about 240 companies (Levine et al., 1982). The federal regulatory environment became more friendly toward the formation of new short-line railroads starting in the early 1970s. This was precipitated by the bankruptcy of the Milwaukee Road and the Rock Island railroads. Because portions of these railroads could be operated profitably, the federal government enacted laws to facilitate the operation of the viable segments of the failed carriers. Specific legislation included: (a.) The 3-R Act of 1973, (b.) The 4-R Act of 1976, and (c.) The Local Rail Service Assistance Act of 1978 (Babcock et al., 1995).

Further encouragement of the short-line rail sector took place in 1980 by the enactment of the Staggers Rail Act. This law facilitated the formation of new short-lines by procedures that liberalized the abandonment of light traffic density trackage by the larger Class I railroads. (Class I railroads are defined by the Surface Transportation Board in terms of their annual revenues, adjusted yearly for inflation. Currently, Class I railroads have approximately $260 million or more in revenues.) Much of the abandoned trackage became the new short-line railroads (Due 1984). Between 1980 and 1989, approximately 230 new short-lines began operation (Babcock et al., 1995).

The purpose of this study is to learn more about what managers of short-line railroads think about Class I railroads. To accomplish this objective, we surveyed about 450 owners/managers of short-line railroads. Specifically, this article will address the following topics: (a.) A brief literature review, (b.) A description of the research methodology utilized, (c.) An examination of the respondents' answers to this question, "Overall, how would you describe your company's business relationship with the Class I railroads with which you interchange traffic?" (d.) A look at how the short-line owner/managers answered this query, "Do you think the recent history of mergers between Class I railroads has been good or bad for short-line rail companies?" and (e.) An analysis of how the respondents replied to this question, "Besides merger activity, what do you believe will be the most important trend for Class I railroads in the next ten years?"

BRIEF LITERATURE REVIEW

Short-line railroads are typically established when a Class I railroad spins-off their low traffic density trackage. For example, when the Burlington Northern and the Santa Fe railroads merged in 1995, the combined carrier sold about 2,000 miles of trackage to short-line railroads (Fairbank 1999). In 2000 the BNSF indicated that additional lighter density trackage will be spun-off to short-lines (Blanchard 2001c). Other rail industry observers believe that additional Class I carriers will also continue to rationalize their route system (Kruglinski 2001). Class I railroads prefer to sell this trackage, because short-lines generate additional business that would have been lost if the trackage was abandoned (Due 1984; Landry and Ozment 2001a). Finally, short-line railroads are also involved in mergers. RailAmerica operates approximately 40 short-lines in North American and continues to add properties to its corporate structure. In late 2001 it purchased StatesRail, a privately owned company that operates eight short-line railroads (Gallagher 2001a; Rock 2002).

Operating Characteristics

There are approximately 450 short-line railroads in the United States today (Pocket 2000). They operate in an analogous manner to commuter airlines that feed passengers between smaller cities and major city airports. Short-line railroads collect freight from shippers on light density trackage and transport it to the Class I main-line intercity trackage for delivery to the consignee, and vice versa. Rail industry management consultant, Roy Blanchard, noted,

> The short-line thus is the bridge between the batch process of the Class I and the custom-made process of the small railroad (Blanchard 2001b).

Most, but not all (Turner 2001), short-line employees are non-union. While this typically results in lower wage rates, a more important advantage to management is the less restrictive work-rules compared to a unionized labor force. Thus, the locomotive engineer may operate the train in the morning, do track maintenance work in the early afternoon, and make sales calls in the late afternoon (Babcock 1995; Due 1984; Due and Leever 1997; Probing 1995).

Problems

A recent survey of short-line railroad managers by Professors Landry and Ozment found that the most serious threat, as perceived by these

managers, involved their relationships with Class I railroads (Landry and Ozment 2001b). Here is a summary of the main problems involving Class I railroads: (a.) Short-lines receive an inadequate percentage of the total revenues when interlining with Class I carriers (Due and Leever 1997), (b.) After initially purchasing the trackage from the selling Class I carrier, it is so run-down from years of deferred maintenance, that the short-line cannot afford to bring it back to acceptable operating standards (Carroll 2001), (c.) A "paper barrier" is often imposed by the selling Class I carrier that mandates that the short-line must interline exclusively with them, even if other short-lines or Class I's have trackage that connects to the short-line railroad (Wilner 2000c; Wilner 2001a; Wilner 2000a), (d.) The Class I's will not adequately supply the short-line with rail cars during times of seasonal shortages (Due and Leever 1997; Gallagher 1999; Landry and Ozment 2001b; Kaufman 2000a), (e.) Class I railroads try to convince shippers to locate new facilities directly on the Class I's trackage, so the Class I does not have to share the rail revenue with the short-line (Burke 1997), (f.) Class I carriers desire to exclusively transport rail cars that accommodate 286,000 gross weight tons, and many short-lines do not have trackage or bridges that can safely handle this weight (Burke 1997; Gallagher 2000; Saylor 1999; Wilner 1999; Zarembski and Turner 2001), and (g.) Class I service standards are often so bad that shippers become frustrated and switch their business to the trucking industry (Duff 2000a; Gallagher 2000; Judge 2000; Kaufman 2000b; Vantuono 2001a).

Three additional problems that do not involve Class I railroads are: (a.) Short-lines are devastated when floods or storms wash-out bridges, tunnels and trackage, because they typically do not have the ability to re-route their trains around the problem (Due 1984), (b.) There may not be enough business located on their trackage to generate adequate revenues to stay in business, especially if many of the shippers are in the same business which then experiences an economic downturn in their industry (Due and Leever 1997; Glischinski 2000; Prater and Babcock 1998; Wilner 2001b), and (c.) Federal Railroad Administration safety regulations often place unreasonable burdens on small railroads (Landry and Ozment 2001a; Landry and Ozment 2001b).

Service Successes

The recent survey of short-line managers by Professors Landry and Ozment also asked respondents what was their greatest competitive advantage over the Class I railroads. By far the most common answer was their ability to provide shippers with customized service (Landry and Ozment 2001b). Service excellence increases sales. Burlington Northern Santa Fe CEO Matt Rose noted that in recent years, short-line railroad revenues have been growing at an annual rate of 7%, while Class I's sales are advancing only 2.5% annually (Blanchard 2001c; Gallagher 2001c). BNSF Vice-President Peter Rickershauser commented that,

> Short-lines bring us business that we couldn't otherwise get, with a creativity that, quite frankly, is hard to match (Vantuono 2001a).

The BNSF obviously appreciates the service excellence of short-lines. Dave Garin, a BNSF manager, speaking at a rail industry conference about short-line railroad strengths, observed, "It's all about service, service, service, and you can do it best," (Blanchard 2001a).

An example of this customer friendly service is provided by the Indiana Rail Road. Its employees stress improved service reliability. They daily transport GE refrigerators with a dedicated 25 car train that runs from the GE factory at Bloomington, Indiana, to CSXT, a Class I railroad, at Indianapolis. Tom Hoback, CEO and President of Indiana Rail Road, said

> I've always believed that if you could run a railroad like a business and not like a railroad, you could do well. We took a railroad that was going to be abandoned

in the 1970s and increased traffic more than five-fold (Blanchard 2001c).

Class I Mergers

The railroad industry's "Golden Era" came to an end in 1916. Prior to this, railroads had a near monopoly on domestic intercity transportation. The only serious competitor was barge transportation on a few waterways and coastal, or intercoastal, shipping. Total railroad track mileage in 1916 was 254,000 miles, and it declined every year thereafter. The primary reason was the growth of the trucking industry (Stover 1961). Concomitant with the declining trackage came a decrease in the number of intercity railroads. In 1898 there were 836 Class I railroads (Thirteenth 1900), and by 1936 this number had decreased to 139 (Locklin 1938). What follows are the number of Class I railroads for selected years: 1970—71; 1980—42; 1990—16; 1994—13; and early 2002—7 (Annual; Association 2002). Prior to the 1980s, many rail mergers were "side-by-side," meaning that the two railroads in many cases served the same geographic area. After the merger, the duplicate trackage was often sold to short-line railroads. More recently the predominant form of rail merger has been the "end-to-end" type, indicating that each railroad prior to the merger served a different geographic area. These types of mergers involved less reduction of trackage (Burns 1998; Johnson and Whiteside 1975; Saunders 2001; Wilner 1997).

With only four major rail systems in the U.S.—Burlington Northern Santa Fe, CSX, Norfolk Southern, and Union Pacific—some shippers believe that rail management has become arrogant. Edward M. Emmett, president of the National Industrial Transportation League, (a large shippers' organization) noted,

> Major rail customers continue to be frustrated not only by inconsistent service, but also. by a[n] "imperial" attitude on the part of some railroads (Gottlieb 2001).

This situation, along with the service breakdowns that have occurred with recent rail mergers (some shippers refer to this as "track trauma" (North 2000; O'Reilly 1998)), led the Surface Transportation Board to declare a fifteen month moratorium on all Class I rail mergers that ended in June 2001. This action was taken after the Burlington Northern Santa Fe and Canadian National applied to the STB for permission to merge. These carriers have since withdrawn their merger application (Why 2000; Shoot-out 2000; Wilner 2000b).

The newly revised STB rail merger guidelines became effective in June 2001 (Rail 2001). They were designed to not just preserve rail competition, but to enhance it. Future rail merger applications must contain a "Service Assurance Plan," which details exactly how and why the combined carrier will be able to render improved service to their shippers. In addition, applications that contain "competitive enhancements" will be more favorably considered. These include trackage rights, reciprocal switching agreements, and improved efforts to work with short-line railroads (New 2001).

RESEARCH METHODOLOGY

To address the aforementioned objectives, a survey of owners and managers of short-line rail companies was designed. The mailing list was compiled from Primedia Directories' *The Pocket List of Railroad Officials*. For purposes of this study, a short-line railroad was operationally defined as any railroad identified in the *Pocket List* that operates a system that includes a maximum of 250 miles of trackage. This definition is consistent with but not identical to the Surface Transportation Board (STB) "Class III railroad" designation (any railroad with an annual operating revenue of less than $20.5 million) and/or to the Association of American Railroads (AAR) "local railroad" designation (any railroad with an annual operating revenue below $40 million and less than 350 miles of track operated).

The actual mailing list was compiled as follows. There are a total of 725 railroad companies identified in the *Pocket List*. Of these, 125 were deleted for one or another of the following reasons:

- Company was identified as STB Class I or Class II railroad
- Company was identified as an AAR regional as opposed to local railroad
- Company was headquartered outside the United States
- No mailing address was included with the directory listing

Of the remaining 600 railroad companies, another 149 were deleted because of duplicated management or cross-over ownership so that any given individual would be asked to participate no more than once. The final mailing list consisted of 451 unique owners/managers. Each of these persons was mailed a copy of the questionnaire approximately one week following receipt of a postcard announcing the survey and requesting participation. In addition, each was sent a "thank-you" letter and follow-up copy of the questionnaire approximately ten days later, for a total of three separate mailed contacts. During this period, nine questionnaires were returned for bad addresses, reflecting a very high overall rate of accuracy in the *Pocket Directory*.

Of the 442 delivered questionnaires, responses were eventually received from a total of 114, representing a response rate of 26%. This level of participation is considered very adequate, especially given the professional nature and harried work lives of the sampled population of railroad owners and managers. Of these 114 usable responses, an additional seventeen were deleted because they represented companies that exceeded the 250 mile trackage limit set in the operational definition of a short-line railroad guiding this study. The remaining 97 companies comprise the data base of short-line rail companies on which the results reported herein are based.

PROFILE OF RESPONDENTS AND RESPONDING COMPANIES

As measured by number of employees, the responding companies were quite small. The sample was divided almost evenly between companies with fewer than ten employees (49.5%) and those with ten or more employees (50.5%). One-fourth of the responding companies had fewer than five employees, and three-fourths of them had fewer than twenty-five employees. Company size was also measure by annual revenue, but those results are not presented here for two reasons. First, sixteen of the 97 qualified respondents (16.5%) chose not to disclose their annual revenue. Second, there is a significant and fairly strong correlation (+.504, $p < .001$) between revenue and number of employees.

A different dimension of a short-line railroad's size is captured by the total miles of trackage it operates, that being an indication of the line's geographical coverage. About two-fifths (39.2%) of the short-line companies in the study operate with more than 50 miles of track (up to the qualifying limit of 250 miles), and three-fifths (60.8%) operate with fewer than 50 miles of track. Again, forty percent of the companies have fewer than 25 miles of track and fifteen percent have fewer than ten miles of track.

Just over one-third (36.1%) of the companies included in the study were formed before the 1980 Stagger's Act that substantially deregulated the U.S. rail industry. Another one-fourth (26.8%) were formed during the industry's tumultuous decade of the 1980s, and the remainder were started between 1990 and 2000.

Respondents were also queried about their own age and education. They are very highly educated. Nearly forty percent (39.2%) have earned a 4-year degree, and another one-fourth (24.7%) have received a graduate degree. Thus, only about one-third of all respondents (36.0%) do not have a college degree (but sixty percent of that group have some college education). Finally, almost six out of every ten (57.3%) are at least fifty years old.

RELATIONSHIP WITH CLASS I INTERCHANGE RAILROADS

It is absolutely essential to the financial health of a short-line that it maintain a good working relationship with the Class I railroads to whom it bridges traffic. Without their Class I "partners," short-lines would have no way of connecting, literally or figuratively, with most of the rest of the world. Correspondingly, short-line owners and managers in the study were asked:

Overall, how would you describe your company's business relationship with the Class I railroads with which you interchange traffic?

____ *Very Good* ____ *Good*

____ *Neither Good nor Bad* ____ *Bad*

____ *Very Bad*

Figure 1 contains the basic results pertaining to this question. Only a very few respondents characterized their relationship with Class I railroads as being negative. Just three of the ninety-seven participants said that the relationship was bad, and no one said that it was very bad. Conversely, half of the respondents (50.0%) said that their relationship with interchanging Class I rail lines was good, and another fifteen percent (14.7%) said that it was very good. In total, 64.7% of all respondents said that they have a good or very good relationship with their Class I "partners." The remaining one-third of respondents (31.6%) characterized the relationship as neither good nor bad.

Figure 2 can be used to compare the percent of respondents who said they have a good or very good relationship with their Class I interchange companies across various subgroups of the sample based on characteristics of the respondent or his/her company.

The difference involving number of employees was statistically significant at the ten percent level (chi-square = 3.01; $p < .10$). Specifically, managers of companies with ten or more employees were significantly more likely to say they have a good or very good relationship with their Class I interchange lines (73.5%) when compared to those from companies with fewer than ten employees (56.5%). Also, while not statistically significant, there was also a tendency for managers of older companies—formed prior to 1980—to more often say they have a good or very good relationship with their interchange railroads (76.5%) and for managers with a four year degree to say so (76.3%). Collectively, these were the only three subgroups in which more than seventy percent of managers felt their relationship to the relevant Class I roads was good or very good.

CLASS I RAILROAD MERGERS' IMPACT ON SHORT-LINES

Since passage of the Staggers Act in 1980, there has been considerable merger activity involving the nation's Class I railroads. How has this frenetic situation been received by the owner/managers of short-line railroads? To investigate this issue, each respondent was asked:

Do you think the recent history of mergers between Class I railroads has been good or bad for short-line rail companies?

____ Very Good ____ Good

____ Neither Good nor Bad ____ Bad

____ Very Bad

Please tell us why you responded as you did:

_____

_____

_____

_____

Figure 3 presents the percentage responses to this question. Clearly, more respondents think the merger activity has been bad for short-lines than think the reverse. In particular, 37.6% of respondents think that the merger activity has been bad for their sector, and another 18.3%

FIGURE 1
SHORT LINE'S BUSINESS RELATIONSHIP WITH CLASS I INTERCHANGE RAILROADS

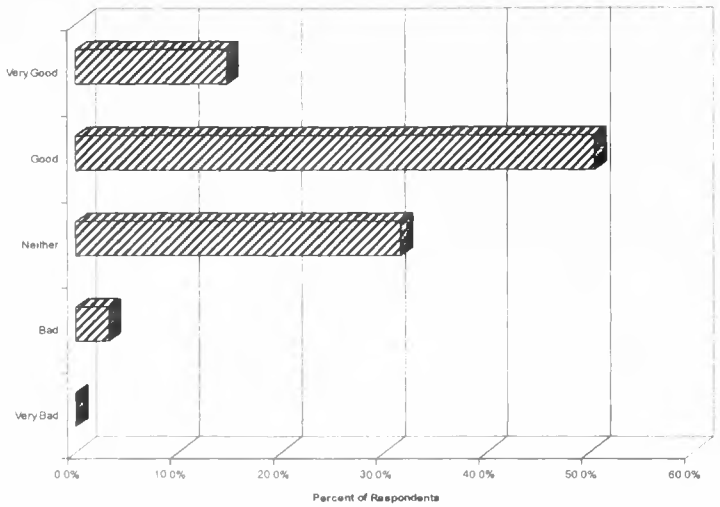

FIGURE 2
PERCENT INDICATING BUSINESS RELATIONS WITH CLASS I INTERCHANGE RAILROADS IS GOOD/VERY GOOD BY CLASSIFICATION DATA

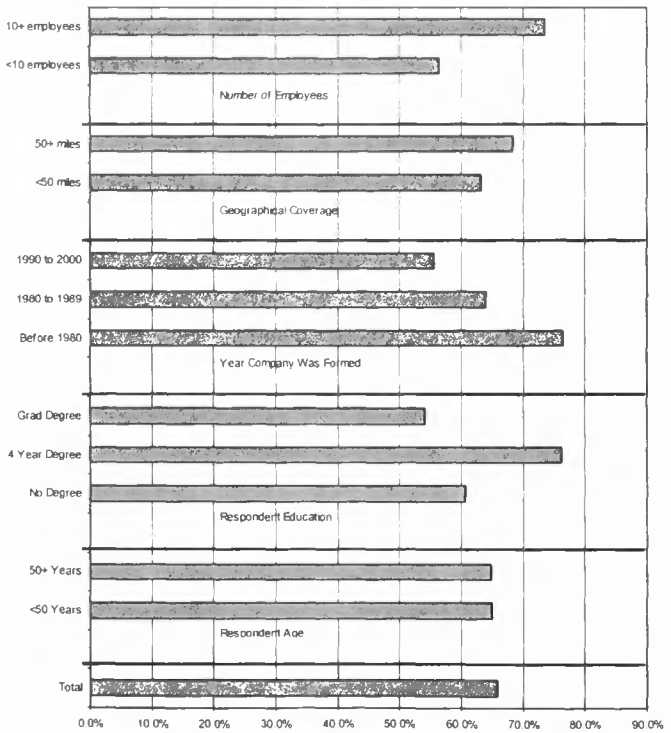

FIGURE 3
CLASS I RAILROAD MERGERS' IMPACT ON SHORT LINES

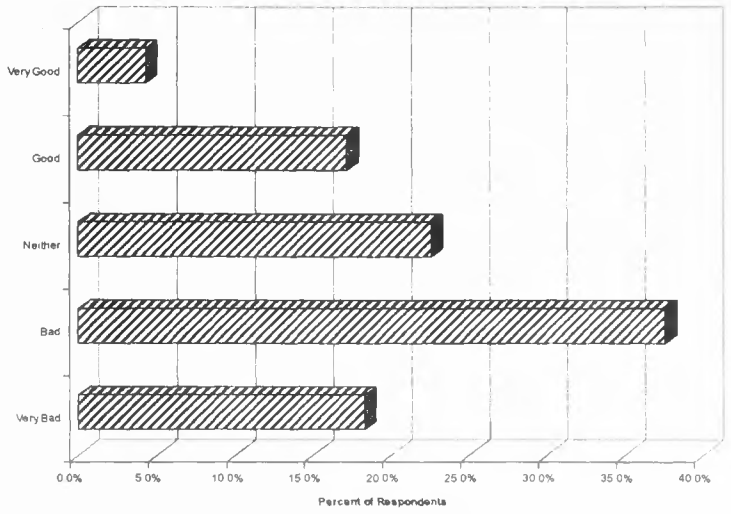

TABLE 1
CLASS I MERGERS: CROSS-TABULATION ANALYSIS

Class I Railroad Mergers' Impact on Short Lines:	Respondent Age		Respondent Education			Year Company Formed			Total Trackage		Number of Employees		Total
	< 50 Years (%)	50 + Years (%)	No degree (%)	4 Year Degree (%)	Grad. Degree (%)	Before 1980 (%)	1980 to 1989 (%)	1990 to 2000 (%)	< 50 miles (%)	50 + miles (%)	< 10 (%)	10 + (%)	
Good/Very Good	20.5	20.8	28.1	26.3	4.3	27.3	19.2	17.6	17.9	27.0	17.8	25.0	21.5
Neither	20.5	24.5	21.9	23.7	21.7	21.2	19.2	26.5	28.6	13.5	22.2	22.9	22.6
Bad/Very Bad	59.0	54.7	50.0	50.0	73.9	51.5	61.5	55.9	53.6	59.5	60.0	52.1	55.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00
Base	(39)	(53)	(32)	(38)	(23)	(33)	(26)	(34)	(56)	(37)	(45)	(48)	(93)

think it has been very bad. Altogether, more than half of the respondents (55.9%) think that the Class I mergers have affected short-lines negatively, as compared to just one in five (21.5%) who think this activity has been good or very good for short-lines. (Note: The remaining 22.6% of respondents said the mergers have been neither good nor bad for their industry.) Overall, the short-line railroad industry has not reacted well to the recent mergers involving their larger cousins.

Table 1 presents a set of descriptive comparisons of responses to this question across various subgroups of the sample. Generally, the contention that the recent merger history involving Class I roads has been bad or very bad for short line rail companies (representing 55.9%

of all respondents) was stronger than average among respondents who:

- Possess a graduate degree (73.9%) and/or are less than fifty years old (59.0%).
- Represent a company formed in the decade following deregulation (61.5%).
- Work for a short-line with fewer than ten employees (60.0%) or at least fifty miles of track (59.5%).

Please keep in mind, however, that the overall differences between subgroups in a given classification variable were modest; indeed, none was statistically significant at the ten percent level or less based on appropriate chi-square contingency table tests.

IMPACT OF CLASS I MERGERS ON SHORT-LINES: DETRIMENTAL ASPECTS

Respondents were also asked to explain why they felt as they did about the impact of Class I mergers. Of the 54 owner/managers who thought that Class I merger activity was either "bad" or "very bad," we were able to categorize their responses into four general themes. Because some respondents mentioned more than one reason for their position, there were 84 rationales enumerated. Each of these general themes will be examined in the descending order of frequency that they were stated. In addition, six reasons (7.1% of the total number of explanations) were mentioned only once or twice, and they are not included in the discussion.

Less Competition for Short-lines' Business

The most common explanation why short-line owner/managers believe Class I merger activity has not been beneficial to them is that it has decreased competition for their business. Specifically, prior to the merger, the short-line was served by two competing Class I railroads, both of which desired to obtain more traffic from the short-line railroad. After the merger, with competition often eliminated, there was no longer any reason to be concerned about the short-line's business, because as a monopolist, it was obtained by default. This explanation was stated by 25 respondents, representing 29.8% of the total number of reasons enumerated. Below are five typical respondent comments. Each of these statements is either a direct quotation or an amalgamation of the comments of two or more respondents.

- Without competition service gets worse, prices rise, and nobody cares any more.
- Concentrated power produces less competition from the connecting Class I railroads.
- Class I mergers have created giants that are extremely difficult to communicate with because of their arrogance. Actually you do not work with them, they "dictate" rates, and are generally unwilling to negotiate any aspect of service that you would like to provide to your customers.
- We used to have two Class I's that, at least at times, competed for our business. Now they have merged and we have been forgotten about in terms of meeting our needs, and those of our customers. Class I monopoly power is harmful to our long-term existence.
- When you have a monopoly, your attitude is different than when you have competition. This is exactly what is happening to Class I's today. They have a monopoly, and they know we know it, and they let us know in no uncertain terms that "it's our way or else—literally take it or leave it."

Class I Merger-Related Service Breakdowns

Twenty-three respondents (representing 27.4% of the total reasons) stated that as a result of recent Class I unifications, and the resulting service catastrophes, it has affected their business in both the short and long-terms. Here are four of their observations:

- Recent mergers, and the service disruptions that then took place, have focused rail management on merger integration and cost cutting, not on developing new business or improving service. In any case, the result is that frustrated shippers took their business to the trucking industry, and some of this traffic will never return to the rail system.

- First the Class1's merged. Then service levels suffered. The result—we lost business immediately and some of it has not come back and I don't think it will.

- As the Class I's try to digest their mega-mergers, service declines. This decline in service particularly impacts short-lines, because all we have to sell is service.

- Service has never been as bad as it is now and nobody at the super-roads seems to pay more than lip service to these problems. They just don't get it.

Class I's Have Minimal Interest in Single Car Shipments

Seventeen respondents (20.2% of the total reasons) stated that mergers have hurt their business because the newly enlarged Class I railroads seem to have little interest in single, or a few car, shipments. Below are three of their observations.

- Today Class I's do not want to focus on the small moves—only on unit-trains, etc. These small moves are the "lifeblood" of short-line railroads. Their attitude is killing us and they don't seem to care.

- Class I's apparently do not desire to pick-up a small number of cars from short-lines. They just want high volume shipments between major cities. Their marketing people do not understand our shippers' needs and furthermore, they don't want to.

- As the Class I's become larger, the more their personalized service to short-lines gets lost in the shuffle. They do not realize, or if they do they don't care, that all we have to sell is SERVICE!

Class I Bureaucracy Becomes Invidious

The final problem with Class I mergers, as noted by 13 of our respondents (15.5% of the total complaints), was that the resulting bureaucracy of the enlarged railroad made it more difficult to work with the Class I railroad. Below are three of their statements:

- The merged railroad becomes even more distant from us. We become more and more isolated from them, and they have a harder and harder time identifying with our situation. Their bureaucracies are so mammoth that it becomes very difficult for them to make decisions in a timely manner. We can make decisions almost immediately, but what good does it do us, since we have to interline almost all of our traffic with them.

- The larger the Class I's become, the longer it takes them to respond to our needs and requests. Then when they finally do respond, they are less sensitive to our customers needs, both in terms of customized rates and services.

- Bigger is not better. It sure is slower when it comes to making decisions!

Table 2 summarizes the reasons why respondents believed that Class I rail mergers are detrimental to short-line railroads.

TABLE 2
DETRIMENTAL ASPECTS OF CLASS I MERGERS ON SHORT-LINE RAILROADS

Reasons	Percentage
Less Competition for Short-Lines' Business	29.8
Class I Merger-Related Service Breakdowns	27.4
Class I's Have Minimal Interest in Single Car Shipments	20.2
Class I Bureaucracy Becomes Invidious	15.5
Miscellaneous	7.1
Total	100.0

IMPACT OF CLASS I MERGERS ON SHORT-LINES: POSITIVE BENEFITS

When respondents were asked their opinion about the Class I merger movement, 21 short-line owner/managers thought it was either "very good" or "good." When queried about why they took this position, we found that they cumulatively noted 28 reasons. Three statements were only mentioned once (10.7% of the total number of explanations) and are not included in the discussion below. Each of the two major explanations will be examined below in the descending order of frequency that they appeared.

Class I's Will Only Offer Main-Line Service

Nineteen respondents (representing 67.9% of the total number of positive explanations) thought Class I mergers were beneficial for their industry because of the future direction of Class I operations. These respondents thought Class I's will continue to heavily stress main-line intercity transportation service. Therefore, in many situations, the pick-up and delivery service will have to be provided by the short-lines. The result is the increasing importance of short-lines to the rail industry. Below are five of their statements.

- Class I's do not want to be involved directly with customers. They desire to exclusively dispatch high volume, high speed intercity trains. We will become more and more important as the customer contact personnel with shippers/consignees. With our knowledge of each customer's transportation requirements, we will provide the "real people" customer service that all shippers/consignees desire.

- Larger railroads do not want to be bothered by a lot of switching at both ends of a shipment, mainly because their labor costs are prohibitively expensive. Nor do they want to be involved in shipments to smaller cities. Both of these situations are our "bread and butter." This explains why we are in a growth industry.

- As each Class I gets bigger after a merger, they become less customer acquainted. These mega-railroads do not care about the great majority of medium and smaller shippers/ receivers. This is great for us, because what they want out of us is our strength and passion.

- Switching is the bane of large railroads. It is our best service. Therefore, I love to see Class I mergers!

- Before the latest wave of Class I mergers, these large railroads were still trying to do their own pick-up and delivery. Therefore, they often did not want to try to work with me. Now they approach me and ask me to partner with them. It is an excellent division of labor. We are each doing what we do best.

Accelerating Trend To Sell Branch-Line Trackage

Six short-line owner/managers (representing 21.4% of the total number of reasons enumerated) stated that Class I mergers were beneficial to their industry because it would accelerate the sale of branch-line trackage to short-

line carriers. Below are three of their observations.

- Class I's will continue to spin-off low density trackage, which they are more and more defining as any trackage that is not part of their main-line system.

- Class I mergers are expensive. After the merger, to generate additional dollars to pay of debt, the combined carrier frequently sells off low traffic trackage.

- Labor costs are killing Class I railroads. These railroads can only operate efficiently and profitably on high volume main-line trackage. Especially after mergers, when top management must now "make their numbers" to show the wisdom of the transaction, is when additional spin-offs take place.

Table 3 summarizes the reasons why short-line owner/managers believe Class mergers are beneficial to their industry.

TABLE 3
BENEFICIAL ASPECTS OF CLASS I MERGERS ON SHORT-LINE RAILROADS

Reasons	Percentage
Class I Railroads Will Only Offer Main-Line Service	67.9
Accelerating Trend to Sell Branch-Line Trackage	21.4
Miscellaneous	10.7
Total	100.0

OTHER IMPORTANT CLASS I TRENDS

Each respondent was also asked,

> Besides merger activity, what do you believe will be the most important trend for Class I railroads in the next ten years?

We were able to categorize the responses into six general themes, each of which will be examined below. When answering this query, the 97 respondents noted 117 reasons for their responses. There were 16 answers (13.7% of the total number of reasons enumerated) that were only mentioned once or twice, and they are not included in the discussion below. Each of the explanations will be examined in the descending order of frequency that they were mentioned.

Increased Utilization of Scheduled Trains

The most common response about future trends for Class I railroads involved the increased utilization of scheduled trains. This idea was noted by 36 managers, representing 30.8% of the total explanations given. This concept involves trains departing classification yards on set schedules, regardless of the number of cars that have been accumulated when the train is scheduled to leave (Vantuono 2001b; Ytuarte 2001). The effect of this type of train operation is far more delivery schedule consistency. Below are four respondent statements:

- Service, service, service—this is what will save the rail industry. The key to this is scheduled train operations, and the CN is showing the world how it can be done.

- Our industry will become almost irrelevant if service levels do not improve. If they don't, we will just get the bulk commodities that we get by default, such as coal, grain, sand, fertilizers, ores and bulk chemicals. The key to growth is consistent and reliable delivery schedules, and the key to this is scheduled train operations. It is as simple as that.

- Class I's must shift their orientation to being a service oriented business, from one that is operationally oriented. Scheduled train despatching is the obvious answer. At least I hope it is the obvious answer, because if the Class I's don't change, the industry will slowly die, and it will take my company down with them.

- Re-engineering their operations to function more like the trucking industry. That is, run more trains on set schedules. Shippers will pay for a reliable and consistent service.

Continued Class I Sale of Light Traffic Density Trackage

Twenty-seven respondents (23.1% of all explanations) stated that Class I railroads will continue to sell their light traffic density trackage to short-lines. The reason is that Class I's will operate with a new paradigm. It will involve running trains primarily on their main-lines between major cities. Branch line trackage will be sold to the short-lines, which will then feed traffic to the Class I's. In addition, Class I's will desire to de-emphasize customer contact activities, such as pick-up and delivery services, which will be operated more efficiently by the short-lines. Here are three respondent observations.

- The new Class I business model will involve them operating high speed, frequently scheduled trains on their intercity main-lines. Short-lines will become their partners to feed traffic from shippers on lighter density trackage.

- Class I carriers will be in the "wholesale" transportation business. They will operate only on main-line corridors between major cities. The "retail" side of the rail business will be conducted by short-lines. We will be the customer contact people, who arrange pick-ups and delivery, and customize service levels for our shippers using the services of the Class I railroads.

- Customer relations and marketing in general is too labor intense for Class I's. They just desire to run their trains on the high traffic density trackage. We will more and more assume the marketing activities of the Class I's. Short-lines are starting to be appreciated by the Class I's for the essential services we provide.

Rail Industry Renaissance

The 21st Century, according to 13 respondents (11.1% of all reasons), will experience a rail industry rebirth. The reason is that the highway system cannot continue to expand to accommodate additional traffic as the economy grows. In addition, automobile passengers will continue to press for governmental policies that shift truck traffic from the highway system to the underutilized rail industry. Here are three comments.

- Rail/truck intermodal shipments will be the norm for the 21st Century. It will happen because we as a country cannot afford to even maintain the existing highway system, let alone build new highway lanes. As this takes place, and it has to take place, we as short-lines will prosper along with the Class I's.

- Traffic must come off of the highways! They are too crowded now and the situation is getting worse year by year. Either traffic will go all rail, or it will be piggyback, but in any case it will be transported between cities by rail. This additional traffic will help the rail industry, and since the Class I's look to us to be their marketing departments, our importance can only grow.

- In my judgment, this question is a no-brainer. The rail industry will become more important by default. Traffic cannot stay on the horrendously crowded highway system. The only place it can go is to the rail system which already has a substantial amount of unusedcapacity. I just hope the Class I's don't drop the ball on this issue.

Labor Cost Reduction

Ten short line-line owner/managers (8.5% of the reasons noted) said the most important Class I trend for the next decade is their reduction of labor costs. Here are two of their statements.

- The rail industry is plagued by high labor costs. This is because the industry is highly unionized. Many people do not realize that of the three major modes of domestic transportation, truck, rail, and air, the rail industry has the highest average labor costs (not counting management). The only way for the rail industry to survive is to reduce labor costs. They will do this by outsourcing as many activities as possible. Short-lines will perform the origination and delivery function, as well as most customer service functions. The Class I's will exclusively provide just train service between major cities, and all other activities will be outsourced to short-lines.

- Class I unionized labor rates must come down. Management will ask the craft and operating rail unions to allow cross-functional work-rules. Knowing rail unions, they will probably not agree to this. If this happens, and I'm sure it will, then Class I management will continue to outsource all but their main-line operations. This is why I believe the short-line rail industry will become more important in the future.

Governmental Funding of Rail Infrastructure

Although traditionally the rail industry has provided their own right-of-way with no governmental funding, this may change. Some Class I senior managers have said that this issue is too important, and the capital requirements are so great, that it needs to be studied with an open mind (Gallagher 2001b). Eight respondents (6.8% of the total reasons) said that in their judgment governmental funding of the rail infrastructure will become the norm. Here is one comment.

- Class I railroads are not maintaining their rights-of-way adequately. Just recently the BNSF stated that they are cutting back on their right-of-way maintenance, because the railroad is not earning its cost of capital. Therefore, if we as a country are going to shift traffic from the highways to the rails, we must have a rail system that can accommodate this additional traffic. That is why both the federal and state governments are going to have to get involved in funding the rail infrastructure. And Class I management had better swallow their pride and accept this financial help, just the way the truckers and airlines have for decades.

Federal Rail Re-Regulation

Seven respondents (representing 6.0% of all reasons) thought that the rail industry would be re-regulated by the federal government because of the monopoly situation existing for many shippers today (Duff 2000b; Kertes 1998; Kruglinski 2001). This situation exists because there have been so many mergers that most shippers today are served by only one Class I carrier. Here is one observation.

- Class I's continue to alienate more shippers and community elected officials. This arrogance comes from being the "only game in town." It will lead to reinvigorated efforts to re-regulate the railroads, because there is not enough competition between railroads anymore. Any time an industry is federally regulated, its vitality is diminished. Hence short-lines will be hurt, because we are so dependent on the Class I's to provide the long-distance intercity movement.

Table 4 summarizes the Class I future trends as predicted by the survey respondents.

SUMMARY

Short-line owner/managers were asked to describe their business relationship with the Class I railroads with which they interchange traffic. The responses were positive; with almost two-third's selecting the "good" or "very good" choices. They were next queried regarding their thoughts about how Class I railroad mergers have affected their industry. Here the owner/managers were less sanguine. More than half of the respondents thought these mergers had a detrimental impact on short-line railroads. When asked why they took this position, the three most

TABLE 4
MOST IMPORTANT CLASS I TRENDS BESIDES MERGERS

Trends	Percentage
Increased Utilization of Scheduled Trains	30.8
Continued Class I Sale of Light Traffic Density Trackage	23.1
Rail Industry Renaissance	11.1
Labor Cost Reduction	8.5
Governmental Funding of Rail Infrastructure	6.8
Federal Rail Re-Regulation	6.0
Miscellaneous	13.7
Total	100.0

common rationales were: (1) Less competition for short-line business, (2) Class I merger related service breakdowns, and (3) Class I's have minimal interest in single car shipments. However, about one-fifth of the respondents thought that Class I mergers were beneficial to them. The two reasons for this position were: (1) Class I's will offer only main-line service, and (2) The accelerating trend to sell branch-line trackage. The final question involved short-line owner/managers perceptions of the most important trends among Class I railroads, not counting mergers. The three most common responses were: (1) Increased utilization of scheduled trains, (2) Continued Class I sale of light traffic density trackage, and (3) A rail industry renaissance.

CONCLUDING COMMENT

The railroad industry is composed of two components—the short-lines and the Class I's. This survey, in our judgment, conclusively illustrates the symbiotic relationship that exists between the two parts. They need each other. However, as this survey strongly indicates, only one of the two parties clearly understands this. Short-line owner/managers know that their destiny is tied to the Class I's. Unfortunately, it appears that from the viewpoint of short-line owner/managers, their importance to the Class I's is often not appreciated or even comprehended. As we gaze into our "crystal ball," here is how we see the future. We believe Class I carriers will continue to spin-off low traffic density trackage to short-line railroads. The Class I's will also outsource more activities that others can do more efficiently than they can. This will be especially prevalent with labor intensive functions, such as customer service activities and the pick-up and delivery of rail cars. The Class I's will specialize in what they do best—running scheduled trains on main-line trackage between major cities. The short-lines will feed cars between the shippers/consignees and the Class I's which provide the intercity transportation. As this relationship matures, both parties will desire to work together more closely for their own mutual benefit. The result will be a true "win-win-win" situation. Shippers/consignees will receive better service at less cost, while each of the rail partners becomes more efficient and profitable. We believe the 21st Century will experience a rail renaissance.

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LIBERALIZATION OF INTERNATIONAL AIR TRANSPORTATION MARKETS: THE EFFECT OF TERRORISM ON MARKET TRENDS

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ABSTRACT

Since the United States deregulated its airline industry with the Airline Deregulation Act of 1978, the international air transport industry has been on a path toward market liberalization. Market changes have included entry, capacity, and pricing freedom as well as increased levels of foreign ownership. The recent terrorist acts of September 11, 2001 have the potential to alter, if not reverse this course. This paper examines the forces fueling the trend toward liberalization and analyzes the impact of recent events on the future prospects of open aviation markets.

INTRODUCTION

According to the *World Investment Report 2001* published by the United Nations Conference on Trade and Development, global foreign direct investment rose to a record US$1.3 trillion dollars in 2000. Contributing to this increase was the number of cross border mergers and acquisitions, which were up nearly 50 percent to US$1.1 trillion (UNCTAD, 2001). In addition to the growth in FDI, world merchandise and service exports have continued to post significant gains. World Trade Organization figures indicate that merchandise exports rose to US$5.47 trillion dollars in 1999 while service exports rose to US$1.35 trillion for the same period. Travel services accounted for $440 billion of these dollars (World Trade Organization, 2001). The latest estimates from the International Air Transport Association are that the total economic output of the air transport industry is over US$1.3 trillion. In the United States alone, the airline industry contributed nearly $273 billion dollars to the total economy, including $109.1 billion in direct expenditures (salaries, purchase of equipment, etc), $109.1 billion in indirect benefits (airports revenue, travel agency), and $54.6 billion in visitor spending and conference revenues (Air Transport Association, 2000).

While the international air transport industry has played a significant role in globalization of economic activity, the industry itself has

remained firmly rooted in the domestic market. Governments around the world have treated airlines like a public utility whose service is said to be in the public interest. The public interest argument is based on three areas: national security and use in national defense under programs like the U.S. Civil Reserve Air Fleet program, postal air delivery, and contribution to commercial activity (Kane, 1999). International airlines also "carry the flag" and represent the national achievement and pride of their home country. This latter role is not to be underestimated. When the bankruptcy and subsequent grounding of the Swissair fleet forced the Swiss football team to fly Aeroflot to a qualifying match in Moscow, one article reported this as a "further humiliation for the Swiss flag carrier" (Hall, Grant, Done, Cameron, and Dombey, 2001).

Because of the special status accorded to air transport, governments have always taken an interest in promoting and protecting their national carriers. Directly or indirectly governments played an important role in shaping their national aviation systems. A tightly regulated international aviation market whose basic precepts were laid out even before the end of World War II insured protecting the national industry and its carrier(s). In recent years that regulatory regime has come under increasing pressure to liberalize. The terrorist attacks of September 11, 2001 have called this trend into question as governments worldwide now struggle with issues of security. Many of these governments are also faced with an aviation system on the verge of collapse.

The purpose of this paper is fourfold. First, the regulatory development of the air transportation system will be reviewed, including the rationales for treating air transport as a special case in international business. Second, the forces leading to liberalization of this market will be examined. Third, the progress in air liberalization will be discussed prior to the recent terrorist attacks. Finally, the impact of these attacks on the transportation industry and liberalization will be assessed.

REGULATORY DEVELOPMENT

The development of a regulatory regime for the international air transport industry can be divided into four phases. Phase I witnessed the birth of the industry and a philosophical struggle between freedom and tight regulation. Phase II began with the reluctant acceptance of a system of relatively tight regulation. Phase III saw deregulation of the U.S. air transport industry and renewed efforts for a more liberal international air transport regime. Phase IV may mark its beginning on September 11, 2001 with the attacks on the World Trade Center and Pentagon.

Phase I, 1910-1943

Seven years after the first heavier-than-air, manned flight of the Wright Brothers at Kitty Hawk, the first international conference on air navigation was convened in Paris in 1910. The key debate was over the rights and privileges of flying. One view sought to apply the "Freedom of the Seas" model to the entire airspace and was championed by the French and German delegations. The other view argued for the sovereignty of nations over the airspace above their terrestrial borders with rights to control entry and in airspace activities. The British were the key proponents of the national sovereignty faction. While the Paris Conference did succeed in identifying the key concepts, terms, and technical provisions of international aviation, it failed to resolve the freedom/sovereignty debate. In the absence of international agreement, the British moved to pass the British Aerial Navigation Act in 1911 (amended in 1913). This act declared British rights to its sovereign airspace and gave the Home Secretary full power to regulate the entry of foreign aircraft. The other European governments followed the British example prior to the beginning of World War I.

World War I clearly demonstrated the potential of aviation in the military arena as an offensive and defensive weapon. The ability of aircraft to

support the transportation of troops and equipment would not be fully realized until World War II, but the supporting role of aviation was not ignored following World War I. An aeronautical commission formed as part of the Peace Conference ending World War I decided to prohibit the development of military aviation in Germany but to allow civil aviation to continue. The Commission also drafted the Paris Convention of 1919 whose first article proclaimed the right of each state to "complete and exclusive sovereignty over the airspace above its territory." The Paris Convention would remain in effect until superceded by the Chicago Convention (Sochor, 1991).

The period between the two world wars saw two different models of government intervention in the development of the domestic air transportation system. Direct intervention became the most frequent method of promoting domestic aviation. Governments either provided direct subsidies and/or assumed full or partial ownership of air transport companies. British Airways and Air France are two classic examples of this strategy. The British Overseas Airways Corporation (BOAC) was created in 1939 when two smaller British carriers were merged and nationalized. Air France emerged in 1933 from the merger and nationalization of Air Orient, Air Union, CIDNA and SGTA (Hengi, 2000). This direct intervention did not suit the philosophical and political tastes of U.S. lawmakers and officials. Indirectly, the U.S. government strongly influenced domestic air transportation through the U.S. Post Office Department that was authorized by the Air Mail Act of 1925, also called the Kelly Act, to enter into contracts with private persons or companies to transport mail by air. The Air Mail Act was amended in 1930 to give the postmaster the authority to consolidate routes in the public interest. Postmaster Walter F. Brown used his authority to redraw the air map of the U.S. and award air mail contracts to a small group of airlines that he considered well run and financially stable. In fact, Brown had told the carriers that the air mail routes would be consolidated and awards granted only to carriers with sufficient size to serve the route. This "forced" major consolidation in the industry in an effort to obtain these very lucrative contracts, which could provide the stable income that passenger service did not offer.

Many routes started offering passenger service to provide "additional income" to their air mail business (Davies, 1984). A scandal fueled by smaller carriers who were excluded from these contracts temporarily halted all airmail awards. The Air Mail Act of 1934 changed the system of awarding contract and barred all prior contract holders from bidding on new awards. However, the new post-master general, Farley, privately advised these airlines to reorganize and reapply. Thus, the airlines known as American Airlines, Eastern Airlines, and United Airlines were formed. In fact, almost all of the major U.S. carriers except Southwest, America West, and Alaska Airlines can trace their origin to early air mail carriers. The increasing importance of air mail added a further argument to the "public interest" status of air transportation (Wells, 1994). By 1998, the ten major U.S. airlines were responsible for carrying over 251,279 tons of mail (Aviation Week, 2000).

Phase II, 1944-1978

While World War I hinted at the importance of air transportation to the security of nations, World War II with the Battle of Britain and massive bombing campaigns clearly demonstrated it's potential. The technological advances made during and just prior to the war also showed that the industry could contribute economically as an engine for innovation. Even as U.S. President Franklin D. Roosevelt and British Prime Minister Winston Churchill were meeting in Quebec to plan the cross-channel invasion, the topic of a general meeting to discuss the future of air transportation came up as an issue. The conference was convened in Chicago on November 1, 1944. Representatives of all but one of the allied World War II nations attended it. The delegates were presented with four proposals for an international aviation system. The joint proposal of Australia and New Zealand called for international ownership and manage-

ment of all international air service. The United States proposal sought a system with unrestricted air service rights and market-based control of frequency and fare issues. The British wanted an international regulatory body to distribute air routes and determine frequency and fares. The Canadians offered a compromise proposal that would have allowed limited competition in a system controlled by a multilateral oversight body. No agreement could be reached on the main issues. Neither the U.S. nor Great Britain was willing to compromise their positions or jeopardize efforts to conclude the war. Great Britain also had one final card to play—landing rights. They suggested the possibility of developing an all-Commonwealth airline with exclusive landing rights in Commonwealth and British territories. Since the parties had no reason to assume that the British Empire would change following the war, this appeared to be a credible threat (Sochor, 1991).

Without agreement on anything but the basic freedoms at the conclusion of the Chicago Convention, national governments were forced to fall back on the traditional means of resolving territorial disputes—treaty. In 1946, two key wartime allies and aviation leaders, the United States and the United Kingdom, met to negotiate and sign the first bilateral air service agreement. The Bermuda Agreement as it is now known became the model for all future bilateral air service agreements. The Agreement granted each party the five freedoms of the air (Table 1 lists these five and the four additional freedoms added later.) on named routes for multiple carriers without specifying capacity or frequency limitations. The U.S. also agreed in principle to the establishment of an international body, the International Air Transport Association (IATA), to set fares. Subsequent bilaterals not including the U.S. also included frequency and capacity limitations that attempted to split air traffic between designated carriers of the two countries

TABLE 1
THE FREEDOMS OF THE AIR

Freedom	Description
First	The right to fly over the territory of a contracting state without landing
Second	The right to land on the territory of the contracting state for non-commercial purposes
Third	The right to transport passengers, cargo, and mail for the state of registration to the aircraft to another state and set them down there
Fourth	The right to take on board passengers, cargo, and mail between two other states in another contracting state and to transport them to the state of registration of the aircraft
Fifth	The right to transport passengers, cargo, and mail between two other states as a continuation of, or as a preliminary to, the operation of the third or fourth freedoms
Sixth	The right to take on board passengers, cargo, and mail in one state and to transport them to a third state after a stopover in the aircraft's state of registration and vice versa
Seventh	The right to transport passengers, cargo, and mail between two other states on a service that does not touch the aircraft's country of registration
Eighth	The right to transport passengers, cargo, and mail within the territory of a state that is not the aircraft's country of registration (full cabotage)
Ninth	The right to interrupt a service

involved. A pooling agreement was often included to insure that revenue was evenly divided between country carriers (Toh, 1998).

Bermuda I was a compromise that clearly favored the U.S., as did most of the other agreements signed shortly after the war. Unlike the nations of Europe, the U.S. had both a number of air carriers and an intact aviation system. It also had money that many countries sought to help them rebuild following the war. As a result, the U.S. carriers were granted greater capacity and frequency freedom as well as more extensive beyond or fifth freedom rights. By 1976, the British felt confident enough to give notice of their decision to terminate Bermuda I. The Bermuda II agreement, signed in 1977 eliminated multiple carrier designations, limited capacity, and restricted American fifth freedom rights. The U.S. viewed this as a major setback in the liberalization of international air transport (Toh, 1998).

Phase III, 1979-2000

To demonstrate it's commitment to air transport liberalization, the United States initiated three actions in 1978. In early 1978, the U.S. issued a statement entitled "Policy for the Conduct of International Air Transportation." This statement reaffirmed the U.S. commitment to liberalization. Shortly afterwards, the Civil Aeronautics Board (CAB) issued an order to IATA to "show cause" why they should not be considered an illegal cartel as prohibited by U.S. anti-trust law. Since IATA membership was restricted to international airlines whose major tasks included setting fares and capacity, there was little argument of violation. Finally, in late 1978, the United States became the first government in the world to deregulate its air transport industry with the passage of the Airline Deregulation Act. This Act would phase out the CAB with it's market control over entry/exit, pricing, and service levels and house the remaining safety functions of the federal government with the Federal Aviation Administration (FAA).

The International Air Transportation Competition Act (IATCA) of 1979 laid out the competitive goals of future U.S. policy as encouraging 1) multiple carrier designation without operational restrictions, 2) market-based determination of air fares, and 3) elimination of unfair and discriminatory competitive practices such as excessive user fees, exclusive airport services, and limited access to facilities. These features are incorporated in the U.S. policy of open skies (see Toh, 1998 for further discussion). The U.S. pursued two paths toward fostering open skies. The Director of the Bureau of Pricing and Domestic Aviation at the CAB laid out the first path. The so-called Encirclement Strategy called for the U.S. to bring pressure on smaller market countries to sign open skies agreement as a means of diverting traffic from larger aviation markets. This strategy was based on the assumption that open skies would lower fares between those countries involved and cause passengers to change their traveling patterns in pursuit of lower fares. The pressure of falling traffic would then encourage larger market countries such as the United Kingdom and Japan to accept the more liberalized open skies agreement (Levine, 1979). The U.S. first sought open skies with smaller market countries. These countries generated very little third and fourth freedom traffic (to and from the U.S.), but stood to gain by getting greater access to U.S. destinations. There could also be no question of exchanging domestic opportunities since these small nations had little domestic traffic to exchange (Antoniou, 2001). There is evidence to support the economic benefits of open skies. In the case of the U.S.-Canadian agreement, results in the year immediately following the implementation of the agreement saw an increase in traffic of over one million passengers as well as growth in the number of cities served (Office of International Aviation, 1996; Pustay, 1997).

The second path to open skies came through the application of the U.S. Department of Transportation's (DOT) policy on approving airlines alliances. This policy based approval on

either the coverage of the rights under existing bilateral or proven benefits to the U.S. (Gellman Research Associates, 1994). In addition, the U.S. DOT has granted immunity from antitrust to alliances between carriers from open skies countries. Antitrust immunity allows competitors to coordinate on issues of pricing, capacity, and scheduling. This has allowed those alliances with immunity to achieve greater levels of operational integration, thus cutting costs and improving quality through coordination (Oum and Park, 1997). The "carrot and stick" approach toward achieving open skies has results in some 50 open skies agreements (Table 2).

Other countries were also pursuing a more liberal approach to aviation. Unlike the U.S. domestic deregulation, the Europeans opted for a more gradual approach to aviation deregulation. The first and second packages (1987 and 1990 respectively) liberalized air transport among members of the European Community by creating additional route and carriers designation as well as lifting capacity limitations. The third package, which became effective in 1993, phased in further liberalization ending in April 1997 with the creation of a single aviation market in the European Union (Morrell, 1998). Under this single market, carriers established in any of the EU countries are granted all of the so-called freedoms of the air. With this step, the Europeans have taken the lead in air transport liberalization. In fact, the position of the European Commission, Directorate General for Transport on open skies is that "[o]pen skies is an American term which, as we see it, is synonymous with a free for all system depending on the good behavior of air carriers and only a partial opening of the market" (Sorenson, 1998, p. 125). The current European view is that ownership and domestic markets should be opened. These concepts are embodied in a proposal put forth by the Association of European Airlines (AEA) called the Transatlantic Common Aviation Area (TCAA). While the AEA suggests that TCAA should include liberalization of airline ownership and right of establishment as well as harmonization of competition and leasing policies, the basic objective "must be to ensure that all airlines of the parties to the TCAA will have unrestricted commercial opportunities to conduct the business of air transport anywhere within the TCAA." (Association of European Airlines, 2001). Acceptance of this agreement would essentially create a single aviation market across the North Atlantic.

Other areas associated with air transport have also been undergoing liberalization including the privatization of airports, air traffic control systems, and airport related services such as security and the removal of restrictive policies that favored domestic over foreign carriers. The privatization of airports began in 1987 when Great Britain sold seven of its airports to the British Airport Authority (BAA). Since this time, airports in Australia, Germany, Italy, Argentina and a dozen other countries have shifted from public to private hands (Pope, 1996; Utt, 1999). Air traffic control systems have been or are being privatized in such countries as Canada, Switzerland, South Africa, and Germany in the belief that private firms would not only be able to raise capital more quickly but would have a greater incentive to modernize ATC systems, decreasing delays and improving safety (McCartney, 2001).

In short, the aviation industry in general underwent a major reorientation during the third phase of its existence. Liberalization increasingly won out over efforts to maintain the tightly restricted markets of the past. These efforts have made air travel more affordable for passengers and airfreight more viable for international shippers. Liberalization has placed a burden on those few remaining government-owned and run international airlines. It has also threatened the small, nation market airlines such as the Belgian airline Sabena. In fact, liberalization has been a particular burden on small, developing nations that have neither the resources to compete effectively with the larger international carriers nor the markets to attract foreign interest and investment (Abeyratne, 1998). Nevertheless, as economies grew the level

TABLE 2
OPEN SKIES AGREEMENTS

Year	Date	Country	Year	Date	Country
2000	11/28	Benin	1995	6/14	Austria
	7/27	Burkino Faso		9/5	Belgium
	5/2	Gambia		6/16	Denmark
	3/16	Ghana		6/9	Finland
	10/12	Malta		6/14	Iceland
	10/11	Morocco		6/6	Luxembourg
	3/16	Namibia		6/16	Norway
	8/26	Nigeria		6/16	Sweden
	6/30	Portugal		6/15	Switzerland
	10/11	Rwanda			
	12/15	Senegal			
	1/8	Slovak Rep.			
	8/28	Tanzania			
	5/2	Turkey			
1999	12/6	Argentina	1992	10/14	The Netherlands
	5/24	Bahrain			
	10/21	Chile			
	12/16	Dominican Republic			
	12/6	Italy			
	11/10	Jordan			
	4/12-29	Pakistan			
	10/21	Qatar			
	4/13	United Arab Emirates			
1998	6/9	Korea			
	7/14	Antilles (Netherlands)			
	6/10	Peru			
	7/15	Romania			
	6/9	South Korea			
	3/18	Taiwan			
	2/27	Uzbekistan			
1997	9/18	Aruba			
	6/20	Brunei			
	5/8	Costa Rica			
	5/8	El Salvador			
	5/8	Guatemala			
	5/8	Honduras			
	6/21	Malaysia			
	6/18	New Zealand			
	5/8	Nicaragua			
	5/8	Panama			
	4/8	Singapore			
1996	9/10	Czech Republic			
	5/42	Germany			

of air travel increased. Faster growing regions such as Asia saw double-digit growth rates during the 1980s and early 1990s.

Phase IV: 2001 and Beyond

Even before September 11th, the U.S. airline industry was on a path to lose US $2 billion (Arndt, Byrnes, and Woellert, 2001). Part of the blame can be attributed to the same two historical forces that have plagued the industry for decades, a softening economy and over-capacity. As one famous disgruntled investor, Warren Buffet, has noted,

> The airline business, from the time of Wilber and Orville Wright through 1991, made zero money net (Miller and Barnhart, 2001).

In fact, the industry suffered its worst previous loss between 1990-1993 when it posted losses in excess of US$10 billion (Rosen, 1995). The airline industry is an old-line, cyclical industry with high fixed costs and a very unionized, powerful labor force. The industry that witnessed significant consolidation following de-regulation has become increasingly concentrated with the top ten major carriers responsible for the carriage of the bulk of U.S. scheduled traffic.

While the remainder of the 1990s saw improved profitability, there were a number of troubling trends including sharp declines in overall service quality (rising customer complaints, delays), disgruntled high yield business passengers, and labor unrest at such airlines as United, American, and Comair (Rhoades and Waguespack, 2001). Even the US$15 billion bailout of the Air Transportation Stabilization Act is not likely to prevent a number of U.S. carriers from filing for bankruptcy (Arndt et al, 2001). Meanwhile European carriers are already protesting this government aid and requesting assistance from their own governments (Flottau, 2001). Some of the hardest hit EU airlines are already requesting assistance (Sparaco and Wall, 2001).

If there were ever any questions of the economic importance of the air transport industry before, there are few who doubt it now. U.S. airlines have already announced layoffs of approximately 100,000 employees and some estimates claim that there will be an additional six jobs lost in the U.S. economy for each airline loss. The airline industry appears unlikely to turn a profit until at least 2003. Initially, the hardest hit area will be the travel and tourism industry, which generates over US$578.8 billion a year and supports one out of every 17 jobs. Aircraft manufacturers such as Boeing will also be hard hit and are preparing for layoffs. Other aviation system manufacturers such as Rockwell Collins, Textron, Honeywell, and Goodrich are likely to follow suit raising manufacturing layoffs up to 100,000 (Arndt and Woellert, 2001; Isidore, 2001; Mecham, 2001).

FUTURE DIRECTIONS

Given the impact of recent events, the trend toward further liberalization in international transport is likely to stall and may well reverse itself as nations struggle to stabilize their aviation industries. The U.S. bailout smacks of the kind of government subsidy that the U.S. has historically derided other governments for providing and includes provisions that would see the U.S. government taking a non-voting stake in airline ownership through either stock options, warrants or other equity devices (Bond, 2001; Toh, 1998). Government authorities, particularly in the U.S., may well rethink their position on industry consolidation in the face of widespread industry bankruptcy. If the bankrupt carriers are allowed to continue operation as Continental and America West did during previous bankruptcies, the industry would likely face the same devastating price wars that have plagued it in the past as cash-strapped carriers drive prices down and keep capacity up (Wolf, 1995). The inability of air transportation to generate long-term profitability has driven stock prices down over 41 percent and downgraded some carrier's credit rating to junk bond status (Isidore, 2001). Insurance premiums

have risen by a factor of 15 for war risk and eight-fold for passenger liability (Sparaco, 2001). Increased security costs will either be passed onto consumers or borne by the U.S. government if security is federalized (Arndt and Woellert, 2001; Ott, 2001).

It is clear that liberalization will be at least temporarily stalled as governments struggle with the immediate security and economic issues raised by the terrorist attacks. The length of the stall is partly contingent on the global efforts to "root out terrorism." The long-term fate of international aviation is a matter of conjecture, but the following three scenarios seem most likely.

Scenario One

The trend toward liberalization reverses itself as nations revert to a very protectionist approach to aviation. The longer the war on terror, the more likely international aviation is to slip back into the old protectionist pattern. If the events of September 11th threaten to devastate national airlines and economies, governments are even more likely to take actions to protect jobs and markets. Even before 9/11, there were forces at work that sought to pull back from liberalization. Examples of this trend include the European debate over the fate of Sabena and Swissair. The Belgian and Swiss governments are intent on "saving" their national airlines for reasons that opponents believe violate the concepts of free, open markets. The Canadian decision to allow Air Canada to merge with Canadian Airlines was also seen as a resurgence of aviation nationalism. Most recently, Europeans have complained that the U.S. package of loan guarantees to post-9/11 carriers exceeded the level warranted by shutdown losses and should constitute illegal subsidies.

Scenario Two

Consolidation accelerates to the point that national governments feel forced to consider allowing at least limited foreign involvement in domestic markets as a means of generating competition. This has already occurred in Canada where government officials have not only indicated that they might consider allowing foreign carriers into the domestic market but have floated a proposal for a North American single aviation area. Under this scenario, a TCAA might also come about for several reasons. First, the security levels of most EU carriers are at least equal if not higher than current U.S. levels. Secondly, allowing EU allies in the war on terror into the U.S. market would be more palatable than throwing the market open to all foreign nationals. Finally, it might be seen as a reasonable concession to allies who have pushed for such an opening. In an effort to aid their airlines, the EU members might push even harder. They could be aided in their efforts by a decision due out in early 2002 from the European Court of Justice on whether the EC has the right to negotiate aviation agreements with countries outside the EU. If the EC were to declare the EU a single aviation unit, then the extensive "beyond rights" of US carriers would be considered cabotage and voided (Bond, 2001).

A number of issues would have to be resolved before this scenario could come about including changes in ownership rules, right of establishment, and harmonization of a number of the laws and policies affecting aviation including anti-trust policies, operation of aircraft, leasing, etc (European Cockpit Association, 2000). There could be a disconnect between the domestic and international markets. In an effort to reduce costs, many major carriers have announced plans to withdraw from less profitable domestic routes, many of whom will see regional carrier entry (Ott, 2001). In addition, the growth of general and business aviation could continue as aviation fears, disgruntled business passengers, and flexjet leasing programs make it an attractive option to commercial travel. Major carriers would then focus more on international aviation. In effect, there would be a system of smaller, regional carriers linking to major, international hubs. With a further relaxation of ownership rules, it is possible that the Australian/New Zealand proposal at the Chicago Convention for internationally owned and managed carriers

would finally become a reality. The current mega-alliance (Star, Oneworld, SkyTeam) structure might form the nucleus of such carriers.

Scenario Three

In a further twist, it is possible that the industry would decouple even further into distinct businesses such as fleet management, transportation, and marketing (Sparaco, 2001). This decoupling might allow the industry to get around some of the ownership restrictions that currently prevent international consolidation. Arguments for this type of decoupling draw their rationale from two distinct but related fields of strategic thinking. The first area is concerned with defining a firm's core or distinctive competency. This resource-based view of the firm suggests that firms are collections of tangible and intangible assets that when combined develop competency in certain areas. This competency is defined as a skill, knowledge or ability that a firm possesses that allows it to achieve a competitive advantage over its rivals (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). Under this theory, airlines would determine what activity they could perform better than rivals, then focus on this activity and outsource other activities to firms that have an advantage in that area.

The second, related area concerns the value chain. In essence, a firm is a collection of linked activities that may produce value for customers (Porter, 1985). In a decoupled system, higher profits would accrue to firms performing higher value-added activities. Industries can be said to have value chains, sequences of activities that lead to a final product or service. In manufacturing settings such as automobiles, aircraft, etc., it appears that the integrator (firm responsible for some parts manufacturing, supply network management, and final product assembly) earns the superior industry returns (Galbraith, 1995). For the airline industry or more broadly speaking the travel industry, the question becomes who in the value chain is best able to assume this role. To a limited extent, the travel agent once performed the role of integrator, but this role has been undermined by cuts in commission fees, internet access, and other direct marketing efforts. Conceivably, a firm or group of firms could assume this role, adding value to customers by packaging multi-modal transportation with accommodations, vacation packages, etc.

Theoretically, the idea of a "virtual airline" that outsources aircraft, cockpit/cabin crew, engineering and maintenance, ground handling, accounting, and reservations is appealing (International Civil Aviation Organization, 1997). This would allow the virtual airline to escape two factors that tend to plague the industry during economic downturns—over-capacity and high labor costs. The virtual airline would possess the flexibility to reduce both labor and fleet quickly. The practical details of the virtual airline are more perplexing. On a small scale, the concept appears workable, but envisioning a virtual airline the size of American Airlines is difficult. It is also difficult to envision how a traditional airline like American could make the shift to virtual. For example, a shift to outsourced fleet and crew would likely have to be gradual and would incur the opposition of existing labor unions who might well be prepared to take labor action to prevent the shift.

MANAGERIAL IMPLICATIONS

The international aviation industry is clearly at a crossroads. While the industry and the governments who regulate it might be tempted to fall back into the familiar highly regulated days of the past, it is doubtful that we will see a complete reversal if for no other reason than customer dissatisfaction. Airline managers, government officials, and the industries that support aviation need to begin planning for this "brave new world." The key unknown in these calculations is the timeframe. Change is not something that individuals or firms tend to embrace gladly, so it is likely that the industry will seek to draw out the transition to something like a TCAA on the argument that firms need

time to make the structural adjustments necessary. A similar argument was made for NAFTA phase-in. For the near term, scenario two seems most likely to succeed in some form. The rationale again stems from the fact that this change is more of an extension of what went before than the decoupling of the industry that would represent a dramatic shift in mindset, core competency, and basic industry givens.

A number of questions remain unresolved in the decoupled scenario that makes it difficult to determine its viability or establish any time-frame for implementation. First, it is unclear how and/or why firms might choose a given decoupled segment from a value and profitability perspective. As stated earlier, the two areas that have generally been cited as preventing the industry from achieving long-term profitability are overcapacity and labor problems. Individual airlines in good times tend to add aircraft to their fleet. Then, the inevitable bad times occur and the overall industry is faced with overcapacity. Individual carriers with new, expensive fleets tend to attempt to lower prices to fill seats cutting into margins and triggering price wars. It is unclear how a decoupled fleet management firm would derive long-term profits. There are likely to be some "economies" to exploit and it is possible to compensate for regional downturns by shifting fleets, but a global downturn like the post-9/11 environment would seem to put such firms at high risk. The issue becomes—What type of firm would seek to fill this decoupled niche? Some firm must do so to make the overall system work. In regard to the second factor affecting long-term profitability, there are examples of firms outsourcing maintenance. There are clearly "economies" to be gained by consolidating maintenance. It also would be possible to outsource flight attendants. However, the key labor group has always been pilots. In bad times, they have given up wage/working conditions to aid firms, but these concessions have been the target of immediate concern when profits return. Any scenario that threatens this group is a likely to stir rapid reaction. When the idea of using flight crews from lower wage alliance partners was floated, unions were quick to form inter-alliance union groups to block these efforts (Gill, 1998). Even the reservation/yield management systems a la Sabre that have often been viewed as a key source of advantage in the industry have come under criticism for creating complex pricing schemes that drive away customers, particularly the high margin business travelers that support the much larger low fare passengers. This is not to say that it is not possible to develop a business model for decoupled segments that would be capable of attracting investment, but it is an elusive possibility.

Under Scenario Two, the international carriers would restructure their routes and fleets toward the international long haul market leaving the domestic markets to short-haul, lower cost carriers that would feed international hubs either because of market forces or marketing agreements with the international carriers. This would be more of an adjustment of U.S. carriers than those in Europe where the flag carriers have primarily focused on international routes. Competition between individual carriers in a TCAA would focus on several key areas: cost and fare structure, service quality, and route structure/access. In a study of cost competitiveness among international carriers, Oum and Yu (1997) found that U.S. carriers are more cost competitive than all but a small number of Asian carriers that benefit from lower labor costs. This allows U.S. carriers to offer lower fares and still make a profit. On the other hand, U.S. carriers are rarely rated highly in surveys of international service quality (Zagat, 1992). It is less clear how consumers in an open aviation market would make the tradeoff between price and service quality.

CONCLUSION

Air transportation is a critical link in the global system. It has been an enabling factor in a process of globalization that has witnessed the fall of most tariff barriers, the establishment of the World Trade Organization, and the integration of many national economies into

broader trading associations. Yet, air transportation itself has only reluctantly been dragged along the path to liberalization. The events of September 11th can either jumpstart a new era of liberal air transportation or stall recent efforts to achieve liberalization. The United States can lead air transport liberalization as it has led other efforts to open markets and economies but only by taking certain risks with its own air transportation system.

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EXAMINING SOURCES OF DRIVER TURNOVER FROM A MANAGERIAL PERSPECTIVE

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ABSTRACT

There is growing concern about the declining profitability of the U. S. trucking industry. Such concerns often stem from the increased difficulty of recruiting and retaining qualified drivers. In fact, the trucking industry has been hit hard by shortages of qualified truck drivers over the last two decades. To cope with this chronic problem, trucking firms have attempted to formulate various driver recruitment and retention strategies that include pay raises, bonuses, equipment improvement, and adjustments in working hours. This article provides trucking firms with the means to implement a more effective driver recruitment and retention strategy by examining sources of the driver shortage problem.

INTRODUCTION

Despite the recent downturn of the U.S. economy, many trucking firms are still experiencing difficulty in recruiting and retaining qualified drivers. Over the past two decades, the trucking industry has been hit hard by a shortage of truck drivers. For instance, between 1992 and 1999, employment within the trucking industry grew much faster (31.10%) than the total employment growth (18.75%) of the United States (Bureau of Labor Statistics 1999). However, despite faster job growth, the trucking industry experienced unusually high turnover rates. In 1992, for-hire truckload carriers often had 100 to 200% annual driver turnover rates, whereas the median employee turnover in the U.S. was 8.4% (Overdrive 1997).

Driver turnover has already undermined the profitability of the trucking industry by causing increases in training cost, equipment idle time, and service disruptions. Pressured with chronic driver turnover and mounting fuel costs, some trucking firms such as *J. B. Hunt*, *Schneider National, Yellow Freight Systems*, *Consolidated Freightways*, *Roadway Express*, and *Swift Transportation* have raised their freight rates by 5 to 10% or more (Machalaba 1999). Indeed, freight rates are rising as evidenced by a 10% increase in intercity trucking costs and an 8% increase in local trucking costs (Minahan 1998).

While the industry increases its efforts to control trucking costs, there is little sign of improvement. The key to substantial productivity gains in the trucking industry is maintaining a steady

workforce. According to the *Trucking Economic Review* (Costello 1999), truckload (TL) carriers reported an average of 103% driver turnover rate in late 1999, while smaller carriers reported an average driver turnover rate of 92%. Such a high turnover may be due to an unprecedented demand for trucking services, slow growth in the qualified labor force, tougher federal safety regulations, and poor human resource management. Considering the significance of trucking to logistics productivity, a high driver turnover rate and driver shortage could cripple the U.S. economy. In 1998, trucking accounted for 86% of the total freight bill in the U.S. and the trucking industry grew by more than $24 billion (Schulz 1998). By 1999, the trucking industry employed more than 3.1 million truck drivers, an increase of 66% over the 1980 driver employment figure (Wilson 2001). By 2006, the trucking industry is projected to generate $446.2 billion in revenues (ATA Logistics Council 1998). Therefore, there is a growing need to formulate viable driver recruitment and retention strategies to alleviate the ongoing driver shortage problem.

Various attempts have been made to address the driver shortage problem. Many trucking firms such as *J. B. Hunt*, *Boyd Brothers*, *Contract Freighters Inc. (CFI)*, and *O & S Trucking* boosted driver pay to reduce driver turnover. Between 1997 and 1998, 80% of the top 100 carriers increased driver wages by an average of 10% (Moore 1999). On the other hand, *Celadon Trucking* and *Cargo Transporters* began to reward drivers for their longevity. *U.S. Xpress Enterprises*, *Interstate Worldwide Relocation*, and *Consolidated Freightways* introduced bonus programs for drivers with safe driving records. Reflecting a driver's desire for new and more comfortable equipment, *Boyd Brothers* reduced its equipment replacement cycles from 42-48 months to 36-40 months (Moore 1997). *C. R. England & Sons* beefed up its driver training program by investing $6 million in a state-of-the-art driver training center (Kahaner 1998). Other driver recruitment and retention strategies include a sign-on bonus, profit sharing, flexible driving schedules, driver recognition, career advancement opportunities, and a reduction in non-driving activities. Although all of these have potential merits, the effectiveness of these strategies is not necessarily verified by the existing literature. This article moves beyond the scope of the existing literature by identifying the primary causes of driver turnover and suggests viable driver recruitment and retention strategies.

RESEARCH METHODOLOGY

To examine the causes of high driver turnover, a four-page questionnaire was mailed in November of 1999 to approximately 3,000 randomly selected trucking firms listed in the *National Motor Carrier Directory* (1999) and located in the Midwest (Ohio, Indiana, Illinois, Missouri) and South (Kentucky, Tennessee, Georgia). To increase variability in the data and generality of the survey results, various sectors of the trucking industry were represented in the sample. These industries include regional truckload (TL) carriers (33.5% of the responding firms), national TL carriers (21.8%), both national less-than-truckload (LTL) and TL carriers (11.4%), both regional LTL and TL carriers (8.7%), regional LTL carriers (6.1%), national LTL carriers (1.9%), and others (16.5%).

Of the 3,000 questionnaires, 422 valid responses were received and 16 were returned as undeliverable. This produced a response rate of 14.14%. A response rate below 20% for a mail survey is not uncommon in the logistics literature (e.g., Mentzer et al. 1992; Murphy and Daley 1994; Pedersen and Gray 1998; Sum et al. 2001). To avoid potential non-response errors, a series of tests for non-response bias were conducted by comparing early responses with late responses in terms of item response. Results of the comparison of early and late responses indicated that there were no statistically significant differences in group mean scores for the two waves of samples at $\alpha = 0.05$ on any of the item responses. Therefore, non-response bias was not a concern.

The questionnaire contained various questions related to the size and sales volume of the responding firms, annual driver turnover rate, driver profiles, the relative importance of driver incentives to driver recruitment and retention, and the potential causes of driver shortages. The *Statistical Package for the Social Sciences (SPSS) for Windows* (2000) was used to analyze the data collected from the sample.

The annual sales volume of the majority of responding firms (95.8%) does not exceed $50 million. Most of the responding firms (76.7%) had less than 50 full-time drivers; 97.6 percent had less than 500. Ninety-one percent said that their part-time drivers comprise less than 10% of total drivers. A vast majority of these drivers are non-unionized (93.1%), more than 30 years old (92%), and have more than five years of driving experience (86.7%). However, almost two-thirds of the responding firms (65.2%) said that their drivers have been with their firms for fewer than five years. In other words, many firms are lacking tenured drivers. This pattern also implies the common occurrence of driver "churning" (moving from one firm to another). A majority of respondents (61.6%) reported an annual voluntary driver turnover rate greater than 10% in 1998. Four percent of the responding firms experienced severe driver turnover exceeding 100%.

HYPOTHESES DEVELOPMENT

The Effects of Organizational Characteristics on Driver Turnover

Gooley (1997) indicated that TL carriers, which offer long-haul, irregular route services, would experience a greater difficulty in recruiting and retaining drivers than LTL carriers. The rationale was that TL carrier drivers were more likely to be on the road longer and have less predictable job assignments than drivers of the LTL carriers. In fact, driver turnover rates in the TL segment have been reported as high as 300%, far exceeding the industry average of about 100% (Bearth 1999). Therefore, it was assumed that drivers of TL carriers are less likely to stay with their jobs than drivers of LTL carriers.

H_1: A significant correlation exists between driver turnover and the type of carrier for which a driver works.

In general, organizational size is positively correlated with group stability (Caplow1957). The rationale is that a large firm tends to have greater financial resources and stronger market position, providing a greater degree of stability than a small firm. Indeed, Chapin (1935) discovered that employee turnover decreased sharply with increasing firm size. On the other hand, LeMay et al. (1993) found in their survey of TL irregular route carriers, that larger firms had a higher percentage of driver turnover than smaller firms, because the latter might pay more personal attention to drivers and create a more open dialogue than the former. These facts lead to the following hypothesis.

H_2: A significant positive relationship exists between driver turnover and the size of the trucking firm for which a driver works.

The Effects of Driver Profiles on Driver Turnover

Beilock and Capelle (1990) discovered that drivers of certain age groups (in their 50's or 20's) were more likely to quit driving than those in their 30's and 40's. Younger drivers tend to have smaller opportunity costs for changing their jobs or careers due to having a greater number of career alternatives than their older counterparts. On the other hand, older drivers may leave their professions to retire.

H_3: A significant negative relationship exists between driver turnover and driver age.

More experienced drivers are expected to earn more than less experienced drivers due to their increased skill level. Thus, those with longer years of driving experience are less likely to leave their current jobs than those with fewer

years of driving experience. Considering the risk aversion nature of human behavior, a driver's years of experience are presumed to influence driver turnover.

H_4: A significant negative relationship exists between driver turnover and a driver's experience.

The "Driver Survey" conducted by Gallup (1997) demonstrated that the steadiness of the driver's work is the most important indicator of driver satisfaction. The greater the driver satisfaction, the less likely a driver is to leave his/her current position. Keller (2002) also observed that the longer a driver was with the firm, the more familiar he/she may be with the dispatcher, operation, service requirement, and customers. Thus, the longer a driver is with a firm, the more likely he/she will stay with the firm.

H_5: A significant negative relationship exists between driver turnover and a driver's tenure with the trucking firm.

Beilock and Capelle (1990) found a strong relationship between a driver's income and his/her occupational change intention. Similarly, Keller (2002) discovered that increased driver pay is significantly associated with reduced driver turnover. Drivers with lower monetary compensation are more likely to leave their jobs than those with higher monetary compensation. Higher driver salary should provide a significant incentive for job stability and reduce driver turnover.

H_6: A significant negative relationship exists between driver turnover and a driver's starting salary.

The Effect of the Trucking Firm's Incentives on Driver Turnover

In general, an increase in driver satisfaction leads to less driver turnover. Brandt (1997) indicated that the steadiness of the work was one of the most important predictors of driver job satisfaction and turnover. Steadiness of the work, in turn, often correlates with job security. In fact, Ashford et al. (1989) suggested that the lack of job security will diminish the employee's sense of attachment and responsibility to the organization and increase turnover. Thus, the trucking firm which emphasizes the importance of job security to its driver retention program is likely to experience low driver turnover.

H_7: The firm that tends to stress job security sustains low driver turnover.

Drivers will be more satisfied with their jobs when there are greater advancement opportunities (Wiggins 1990). Similarly, Barnes (1999) reported that a diverse career path with advancement opportunities would improve driver retention. Therefore, the trucking firm that provides advancement opportunities should have lower driver turnover.

H_8: The firm that tends to stress advancement opportunity sustains low driver turnover.

Fringe benefits, such as healthcare benefits, are tangible inducements that are found to positively influence an employee's decision to stay with his/her current job (Buchko 1992; Shaw et al. 1998). In other words, fringe benefits increase a driver's financial reward and make his/her current job more attractive. The projection that healthcare costs, such as hospital and doctor fees, will go up by 35% to 40% in 2002 could make fringe benefits a determining factor in retaining a driver (Bearth 2001). Thus, the trucking firm that recognizes the importance of fringe benefits to driver retention is likely to experience low driver turnover.

H_9: The firm that tends to stress fringe benefits sustains low driver turnover.

One thing that drivers wanted more than anything else was to be home for important family events (Kahaner 1997). Dobie et al. (1998) also indicated that the driver's time spent

on the road represented one of the most important incentives for driver satisfaction. This leads to the following hypothesis.

H_{10}: The firm that attempts to minimize the driver's time spent on the road sustains low driver turnover.

Many firms believe that by improving working conditions of drivers, satisfaction and loyalty can be increased. According to a driver survey conducted by the Upper Great Lakes Transportation Institute, one of four reasons why the surveyed drivers chose a particular trucking firm was better fleet equipment (Fleet Equipment 1999). Since poor equipment can translate into less comfort, operational difficulty, frequent breakdown, and reduced safety, the condition of the equipment influences the level of driver satisfaction and subsequent turnover. Indeed, some earlier studies (Deierlein 1996; Taylor and Cosenza 1998) discovered that driver satisfaction is affected by the newness and comfort of the truck. Reflecting drivers' concerns over the condition of the equipment, some firms such *as U.S. Xpress*, *Trucks for You*, and *Mary B. Turner Trucking* have begun to select new trucks based upon drivers' input (Fleet Equipment 1999). Such an effort may have contributed to the reduced life cycle of trucks and the growing popularity of aerodynamic long-nose trucks equipped with built-in satellite communication systems. Thus, we posit that the trucking firm, which recognizes the importance of the condition of trucking equipment to driver retention, is likely to sustain low driver turnover.

H_{11}: The firm that provides better equipment sustains low driver turnover.

HYPOTHESIS TESTING AND RESULTS

To examine whether there is a significant relationship between the type of carrier (LTL regional carrier; TL regional carrier; LTL national carrier; TL national carrier; both regional LTL and TL carrier; both national LTL and TL carrier) and four different categories of driver turnover (1-10%; 11-50%; 51-100%; 100% or higher), the Chi-square test was used. The Pearson chi-square value of 24.938 (p-value = .127) does not support H_1 at $\alpha = .05$. Thus, it is concluded that driver turnover does not vary significantly by type of carrier.

Two separate tests were performed to examine the correlation between the size of the trucking firm (both in terms of annual sales volume and number of drivers) and its driver turnover. Test results strongly support H_2. A significant relationship was found between the size of the trucking firm with respect to its sales volume and driver turnover at $\alpha = .05$ (Pearson Chi-square value = 33.017, p-value = .001). A significant relationship was also found between the size of the trucking firm with respect to its number of drivers and driver turnover (Pearson Chi-square value = 52.629, p-value = .000). In particular, a cross-tabulation between the firm size and the turnover rate indicates that small trucking firms, with less than a $25 million annual sales volume, are likely to maintain relatively low driver turnover rates (less than 50%). Similarly, small trucking firms, with less than 50 drivers, tend to maintain relatively low driver turnover rates of less than 10%.

The result of a Chi-square test does not support H_3 (Pearson Chi-square value = 19.525, p-value = .191), indicating that there is no correlation between driver age and turnover. On the other hand, the test result (Chi-square value = 38.648, p-value = .000) reveals that a driver's experience significantly influences driver turnover. In particular, a cross-tabulation between the driver's experience and driver turnover shows that drivers who have less than five years of driving experience will be more likely to experience turnover, while drivers with more than ten years of driving experience will be more likely to remain with the same trucking firm.

By the same token, the test result (Chi-square value = 59.764, p-value = .000) supports H_5 at $\alpha = .05$. A significant relationship was found between a driver's length of tenure and driver

turnover. More specifically, drivers who stayed with the same firm more than five years are less likely to change jobs.

Surprisingly, the test result (Chi-square value = 6.884, p-value = .649) does not support H_6 at α = .05. No correlation appears to exist between a driver's starting salary and driver turnover. This test implied that a monetary incentive was not an effective inducement for driver recruitment and retention. Although this finding defies the common belief that high monetary compensation increases driver satisfaction and thereby reduces turnover, it is somewhat consistent with the study result of Richard et al. (1995) which evidenced that low pay was not necessarily a primary cause of driver turnover.

A simple t-test was performed to determine if the low turnover firm (less than 50% annual turnover rate) stressed the importance of job security to driver retention more than the high turnover firm (greater than 50% annual turnover rate). The test result (p-value = .000) supports H_7 at α = .05. This suggests that a trucking firm's ability to sustain a low turnover rate can be increased by placing emphasis on job security. On the other hand, a similar t-test result (p-value = .761) rejects H_8 at a = .05. The data do not support the notion that the low turnover firm recognized the importance of advancement opportunity to driver retention more than the high turnover firm.

Furthermore, H_9 (p-value = .092), H_{10} (p-value = .089) and H_{11} (p-value = .066) were rejected at α = .05. There was no significant difference between low turnover and high turnover firms with respect to perceived importance of fringe benefits, amount of time on the road, and condition of equipment to driver retention. In this sample, advancement opportunity, fringe benefits, time spent on the road, and condition of the equipment did not prevent drivers from leaving their current jobs.

FINDINGS AND IMPLICATIONS

First, the surveyed firms do not regard competitive pay scales as a critical attribute for driver recruitment and retention. In other words, they tend to believe that monetary incentives are not necessarily an integral part of building a good relationship with their drivers. This finding contradicts the report of *J. B. Hunt*, which indicated that substantial pay raises reduced turnover rates significantly and attracted more experienced drivers (Schulz 1997). A study by the Gallup Organization (1997) reported that the majority (about 80%) of the driver shortage problem is the result of driver churning (moving from one company to another with the same pay). This implies that pay hikes alone cannot make drivers happy. Instead, job security has been found to influence drivers to stay with the same firm. This finding is congruent with a recent report indicating that today's drivers are putting more emphasis on job security than salary as a result of the slow economy and the subsequent increase in layoffs (Armour 2002).

Second, a driver's experience and tenure with the same trucking firm have been found to influence driver turnover, whereas driver age has no bearing on turnover. This finding makes sense, in that the more experienced a driver is and/or the longer the driver stays with the same firm, the greater sacrifice he/she is likely to take. In other words, a driver with more experience or longer tenure tends to think that the expected utility of his/her current job is greater than that of the alternatives. In particular, drivers with more than ten years of driving experience or who have worked for the same firm for more than five years have a greater tendency to stay with the same firm and profession than their counterparts. This implies that recruitment and retention strategies should be designed in accordance with its driver profiles. Perhaps the best strategy to cope with driver shortages is to

place a greater emphasis on job stability rather than providing drivers with short-term monetary rewards, fringe benefits, and better equipment.

Finally, defying common sense, the size of the trucking firm adversely affected driver turnover. Larger trucking firms tended to have higher driver turnover rates than their smaller counterparts, despite the fact that the former may be better positioned to provide drivers with greater financial stability than smaller firms. The rationale is that smaller firms may pay more personalized attention to drivers and be better positioned to maintain a solid driver-dispatcher relationship than larger firms. Thus, trucking firms should treat drivers as "internal customers" who need constant personal care.

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APPENDIX A
SUMMARY OF HYPOTHESES TESTING

Hypothesis		Result
Organizational Characteristics		
H_1:	A significant correlation exists between driver turnover and the type of carrier with which a driver works.	Not Supported
H_2:	A significant positive relationship exists between driver turnover and the size of the trucking firm for which a driver works.	Supported
Driver Profiles		
H_3:	A significant negative relationship exists between driver turnover and driver age.	Not Supported
H_4:	A significant negative relationship exists between driver turnover and a driver's experience.	Supported
H_5:	A significant negative relationship exists between driver turnover and a driver's tenure with the same trucking firm.	Supported
H_6:	A significant negative relationship exists between driver turnover and a driver's starting salary.	Not Supported
Incentives		
H_7:	The firm that tends to stress job security sustains low driver turnover.	Supported
H_8:	The firm that tends to stress advancement opportunity sustains low driver turnover.	Not Supported
H_9:	The firm that tends to stress fringe benefits sustains low driver turnover.	Not Supported
H_{10}:	The firm that attempts to minimize the driver's time spent on the road sustains low driver turnover.	Not Supported
H_{11}:	The firm that provides better equipment sustains low driver turnover.	Not Supported

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Hokey Min is a professor of supply chain management and executive director of the Logistics and Distribution Institute at the University of Louisville. As an executive director, he oversees activities of four research centers including the UPS Center for World-Wide Supply Chain Management. Dr. Min earned his Ph.D. in management sciences and logistics from the Ohio State University. His research interests include global logistics strategy, e-synchronized supply chain, benchmarking, and supply chain modeling. Dr. Min has published more than 65 articles in various refereed journals.

Journal of Transportation Management

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Johnson, James C. and Wood, Donald F. (1996), *Contemporary Logistics*, 6th ed., Upper Saddle River, NJ: Prentice-Hall, Inc.

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MANUSCRIPT SAMPLE

TEACHING LOGISTICS STUDENTS TO TAKE OWNERSHIP OF INFORMATION INFRASTRUCTURE DEVELOPMENT

Frank W. Davis, University of Tennessee
Kenneth J. Preissler, Logistics Insights Corporation

Logistics systems, developed gradually over the past decades, are undergoing necessary radical change in this era of increasing global competition. This article describes an approach taken by the authors to teach logistics students how to take ownership of designing their own information infrastructure and how to use it to make their organizations more flexible, providing more strategic options.

INTRODUCTION

Advances in information systems technology such as data base management systems, bar code scanning, telecommunications, and image processing have enabled logistics and information managers with vision to reengineer the way the firm conducts its business. The usage of mainframe computers, personal computers, and logistics information systems has been widely studied (Gustin 1989). These studies have universally concluded that there has been a rapid growth in the usage of computers and logistics information systems.

Computer Usage in the Classroom

The usage of computer applications in a logistics course has also been studied. Rao, Stenger and Wu stated that there are several approaches to integrating computers into the classroom in a business curriculum, each with its individual advantages and drawbacks (1992).

Table 1 about here

Systems Development in Practice

The study of the information systems development process of computer applications has been almost universally left up to the computer science, software engineering, and information systems educators and practitioners.

$$y = a^2 - 2ax + x^2 \quad (1)$$

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