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OBJECTIVES

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Articles relating to carrier management, modal and intermodal transportation of goods and people in both the domestic and international areas are accepted. Topics from allied areas such as public policy, logistics, purchasing and distribution are also acceptable if they are specifically related to the objective stated above. Because articles are to have a real-world orientation, those which are theoretical in content with no application for practitioners are inappropriate for the *Journal of Transportation Management*.

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U.S. AND EUROPEAN APPROACHES TO IMPROVING AIRSPACE CONGESTION

by

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and

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South Carolina*

April 25, 1991

Revised October 15, 1991

It is evident to anyone who has recently travelled by a commercial airline in the United States or Europe that something needs to be done and done fast to relieve the ground and air congestion that exists at major air hubs. The February 1st, 1991 runway collision at Los Angeles International Airport in which 34 people were killed is the most recent, tragic example of what can happen when the infrastructure of a national aviation system becomes inadequate to meet the demands placed upon it.

As the number of saturated airports in Europe and the United States increases, federal aviation authorities on both continents are studying a number of ways to relieve airspace and airport congestion. The purpose of this paper is to identify and analyze the major options being considered. While all options will be examined, most attention will be focused on the airspace around airports and the air traffic control (ATC) system that regulates this airspace. Of all the components of an air transport system, airspace around an airport is the one that is absolutely constrained. It can be expanded by definition, but it cannot be expanded as a practical matter once defined.¹ The

four major approaches to airspace congestion reviewed in this paper are (1) new/larger airports, (2) greater use of surface transport alternatives, (3) rationing airspace and runways and (4) improved air and ground traffic control systems.

New/Larger Airports

This option to improve the air travel system is the most easily understood, yet is the most expensive in terms of construction costs, land acquisition, and environmental costs imposed on the surrounding area e.g., more traffic congestion and noise. Of the three costs, the environmental one generally receives the most publicity.

There are some major advantages and disadvantages of a new airport versus expansion of an existing one. One major advantage of building a new airport is that the airport design can be state of the art and built to allow expansion. A new airport can be located to maximize the air (control) space around the metropolitan area it serves and it can be located to maximize ground access to the airport. New airport negatives are (1) greater construction costs, (2) more contentious with respect to environmental impact, and (3) difficulty in making inter carrier connections. From an operational point of view, the third disadvantage evokes the most concern. It is the main reason all-cargo carriers are against all-cargo airports. In this respect it is argued:

- Such airports would be theoretically built away from the major cities where land is available for expansion. They could also be established at former military airports that are available for purchase from the federal government.

- The advantages of regular airports, such as proximity to population centers, and availability of connecting flights, far out weigh the benefits of more space and less congestion at an all-cargo airport.
- Most important, the vast majority of general cargo is carried in the bellies of passenger aircraft, not in freighters. No air carrier would be willing to divert a plane with passengers to an all-cargo airport to unload cargo.²

For the same reason, regional carriers, i.e., commuter airlines, resist the idea of being moved to so-called reliever airports. The concern of the commuter airlines has lessened, however, as the hub and spoke system has continued to develop, a system which depends upon small commuter planes feeding traffic into large hub airports.

Of the 40 largest metropolitan areas in Europe and the United States, 16 have two or more airports. None have an all freight airport although such was being considered for Frankfurt (Germany). Examples of two airport cities are Washington, DC, New York, (three including Newark), Chicago, San Francisco/Oakland, London, and Paris.

Airport expansion also has its problems. First, expansions create essentially the same problems with respect to inter-airline connections as do two airports serving the same metropolitan that are geographically separated. When a light rail system must be used to connect terminals within an airport (Dallas-Ft. Worth, Houston, Texas), an airport is probably very close to its optimum size. Nonetheless, even an expanded airport causes fewer connection problems than two geographically separate airports. Airports in the United States and Europe that have undergone major expansions include JFK International (NYC), Chicago's O'Hare, Los Angeles International, Baltimore-Washington International, Logan International (Bos-

ton), Zurich (Switzerland) and Heathrow (London). Examples of new, state-of-the-art airports in the United States are Atlanta, Georgia's Hartsfield International Airport and Denver, Colorado's Stapleton International Airport.

Alternate Surface Transport Systems

Surface transport systems are here defined to include highway (automobile, bus, truck), rail, passenger and freight, and to a lesser extent, rivers and oceans (barges, ocean carriers, ferries, and passenger ships). Over the past 20 years the option most discussed to improve overall transport efficiency has been to substitute high speed rail passenger transportation for the privately-operated automobile. The arguments for this substitution that are most cited include relieving highway congestion, lessening pollution caused by automobiles, and fuel conservation. As a practical matter the option has found more favor in Europe than in North American. France's Train a Grande Vitesse (TGV) began service between Paris and Lyon in 1983. It is the best known of the European high speed rail services. The TGV train travels at an average speed of 132 mph and covers the 244-rails miles from Paris to Lyon in two hours flat.³ It might also be noted that the train has paid all of its operating and construction costs from fares.

French plans to expand its TGV system can be summarized thus:

- Europe's railroads have cooperated for years in running international services, but the TGV prompted officials to take another step. They began to look at numerous routes between major cities where trains averaging in excess of 100 mph could be truly competitive with airlines.

- In France, plans are under way to expand the TGV network beyond Brittany and southeast France to include Brussels, Belgium, Amsterdam, the Netherlands; the French cities of Bordeaux and Strasbourg; and cities in West Germany and Switzerland.
- "In 1992, the railroads will find themselves in a different environment," said Dagobert M. Scher, vice president for French Rail, Inc. the North American marketing arm of the French National Railroad.
- "The goal is to tie together cities 200 to 500 miles apart at rail speeds fast enough to make the service truly competitive with airlines."⁴

Other planned high speed European rail systems include Milan, Italy to Rome; London via the Channel Tunnel to Paris, Brussels, Amsterdam, and Cologne; London to Folkestone, Glasgow and Bristol; and all major German cities to Europe. Projects to improve rail service are also in the planning stage in Portugal, Spain, Switzerland, and Austria.

In the United States and Canada it was the improved highway system that ended scheduled air service between cities less than 100 miles apart. And as planes became larger and faster direct air service between cities up to 150 miles apart decreased. The major exception to this trend was flights from cities 100-200 miles from major hub airports.

However, the possibility of United States high speed rail systems that would be competitive with airlines is an idea that will not go away. At different times proposals have been made for high speed rail service between San Diego and Los Angeles, Chicago and Milwaukee, Chicago and Minneapolis/St. Paul and upgrading the present 85-90 mph Amtrak routes in the so-called Northeast Corridor, that is, Boston to New York, and

New York to Washington, DC. The latest proposal is for a high speed magnetic train (magnetic levitation or maglev) to service the 265 mile route from Los Angeles to Las Vegas. The train would operate at speeds up to 300 miles per hour and cover the distance in 75 minutes.⁵

Although the United States has lagged Europe in upgrading its rail passenger service, its rail freight service has improved to a point where dedicated container trains, trailer on flat car (TOFC), and roadtrailers, successfully compete with trucks on many high density traffic corridors.

As the case of short distance airline service, an improved highway system which incorporated bridges and tunnels, all but ended ferry services in the United States. In Europe, however, ferries are still competitive in linking English Channel and North Sea ports. Hovercraft operate profitably between England and France. And in the United States, surface effect ship technology has attracted some renewed interest and investment. In New York City, for example, ferries have made a comeback as one means of avoiding highway congestion.

- While boats once were the only way into and out of Manhattan, ferry travel largely fell into disfavor after 1930 with the construction of New York's network of bridges, tunnels and highways.
- But in the past four years, seven private ferry operators have established 13 routes into Manhattan. The routes range from short hauls from new housing developments on the New Jersey side of the Hudson River to 45 minute runs from Monmouth County New Jersey, across Raritan Bay.
- The private ferries carry about 10,000 riders a day into and out of Manhattan.

- To city officials, the Metro Manhattan represents a technological advancement in ferry service that could make longer-distance commutes more feasible.
- The 110 foot vessel is what is known as a surface effect ship, a hybrid between a catamaran and a hovercraft. It rides on a cushion of air that lifts 85% of the boats weight out of the water. The limited contact with the water allows a vessel to achieve speeds as high as 48.6 knots-about 56 mph.⁶

Whether rail, highway, or short haul ferries, surface transportation options have received increased attention as an alternative to short and medium distance air service. To the extent that surface transportation can be competitive in terms of price and time with air, then to that extent congestion in European and North American air transport systems will be lessened.⁷

Table I contrasts airline distances, highway distances, and driving times between major United States cities, of which many are major air hubs. Table II shows airline distances and estimated high speed rail times between major European cities. An inspection of Table I indicates the extent to which highways are competitors to corresponding air services in the United States. Table II indicates the potential for European high speed rail service as a competitor to air transportation. And it takes no great amount of introspection to see the real possibility of United States high speed rail service, in time, becoming a significant competitor of airlines, especially over relatively short (200-500 mile) distances.

Table I
Airline/Highway Distances and Driving Times
between Major U.S. Cities

City Pairs	Air Distance	Road Distance	Driving Time	Est. TGV Time
New York-Buffalo	292	436	9 hrs.	
Cleveland	405	514	10 hrs. 15 min.	
Detroit	482	671	13 hrs. 55 min.	
Pittsburgh	317	386	8 hrs. 45 min.	
Boston	188	213	4 hrs. 35 min.	1 hr. 30 min.
Washington DC	205	229	5 hrs. 30 min.	1 hr. 50 min.
Philadelphia	83	93	2 hrs. 25 min.	
Chicago-Cleveland	308	344	7 hrs. 10 min.	
Omaha	432	493	9 hrs. 30 min.	
Minneapolis	355	411	9 hrs.	
Detroit	238	279	6 hrs. 05 min.	2 hrs.
Indianapolis	165	189	3 hrs. 50 min.	1 hr. 30 min.
Kansas City	414	503	11 hrs. 50 min.	
Louisville	296	305	6 hrs. 15 min.	
Pittsburgh	410	457	10 hrs. 15 min.	
Milwaukee	75	87	1 hr. 55 min.	
Kansas City-Omaha	166	198	4 hrs. 15 min.	
St. Louis	238	257	5 hrs. 25 min.	
Dallas-Houston	225	242	5 hrs. 10 min.	1 hr. 55 min.
Memphis	420	470	9 hrs. 45 min.	
New Orleans	443	504	10 hrs. 55 min.	
Los Angeles-				
San Francisco	347	403	9 hrs. 35 min.	
San Diego	102	127	2 hrs. 50 min.	45 min.
Phoenix	357	398	9 hrs. 05 min.	
Los Vegas	229	272	5 hrs. 50 min.	

Table I continued

**Airline/Highway Distances and Driving Times
between Major U.S. Cities**

City Pairs	Air Distance	Road Distance	Driving Time	Est. TGV Time
Atlanta-New Orleans	412	480	11 hrs. 15 min.	
Jacksonville	280	313	7 hrs. 25 min.	
Charlotte	220	240	5 hrs. 20 min.	2 hrs.
Memphis	320	382	8 hrs. 55 min.	
Birmingham	135	150	3 hrs. 20 min.	
Chattanooga	90	113	2 hrs. 35 min.	

Sources: National Geodetic Survey as published in Reader's Digest These United States. (Reader's Digest Association, Pleasantville, New York, 1968) p. 170 and Rand McNally 1986 Road Atlas (Rand McNally & Co., Chicago, IL, 1986) p.2.

Range of highway speeds, 45-52 mph.

TGV estimated times based on Paris-Lyon TGV of 2 hours over similar terrain.

Table II
Airline Distances and Estimated TGV Rail Times
between Major European Cities^a

City Pairs	Airline Miles	Est. TGV Time (Hours) ^b
Paris-Lyon	240	2.0
Berlin	545	4.5
Rome	697	5.8
London	213	1.8
Brussels	163	1.4
Bonn	252	2.1
London-Brussels	200	1.7
Rome	887	7.4
Berlin	579	4.8
Brussels-Bonn	120	1
Madrid-Lisbon	320	2.7
Rome-Zurich	425	3.5
Milan	300	2.5
Milan-Vienna	385	3.2
Frankfurt-Brussels	188	.4
Zurich	193	1.6
Vienna	367	3.1

^aSources: Colliers World Atlas Gazette, (P.F. Collier & Son, New York, 1957), p. 144 and Encyclopedia Britannica as published in the 1990 Information Please Almanac (Houghton Mifflin, Boston MA, 1990). pp. 330-31.

^bCalculated on basis of Paris-Lyon TGV time. The 245 mile run takes a flat two hours at an average speed of 132 mph (Trains, V. 49 (April 1989) p. 53. Calculated as a ratio of $2/240 \times X/\text{airline miles}$. Example: Berlin is 545 miles from Paris. TGV time = $2/240 \times X/545 = 4.5$ hours, 30 minutes. No allowance made for differences in topography.

Rationing Air Space and Runways

Another option to improve air travel systems is to make more efficient use of existing air space and airport runways. Technically, runways are a physical part of the airport, and like terminals, can only be added to subject to the constraints of land availability, construction costs, and environmental concerns. Here, however, runways are considered together with local airspace, primarily because both are subject to air traffic control procedures that can be improved by investment in state of the art air and ground control electronic systems. This option is discussed in the next section.

There are several ways in which local airspace and runway congestion can be lessened without increased investment in air traffic and ground control equipment. One is to limit airport use to large, commercial passenger aircraft. In practice, all cargo aircraft, private and business aircraft, and commuter aircraft would use secondary (reliever) airports located in the general metropolitan area. Necessary inter-airline connections would be handled by ground transport systems linking the airports. Objections to this option have already been noted.

All-cargo carriers stress that dedicated freight airports are impractical because of the need to interline with commercial passenger plane--which carry a significant part of the air freight movement in their cargo bellies. Commuter airlines stress the fact that their "reason for being" is to feed traffic into large airports and in this they are supported by most major passenger carriers. Corporate and private aircraft make the same argument but are not as persuasive given the private, rather than public, nature of their operations. However, both represent potent political constituencies and have been quite successful in maintaining their accessibility to large airports in the United States.

A second alternative is to make better use of existing air and runway capacity. Basically, it is to "encourage" round the clock use of the airport, or at least to extend the peak use periods. One way is to recognize that a landing or takeoff time (a slot) is a valuable economic asset and as such should not be treated as a free good.

In 1969 the FAA implemented a high density rule at five major airports - Newark, La Guardia, O'Hare, Washington National, and JFK International. (Newark was later dropped from the list) The rule set a ceiling on the total number of slots available during each hour of the day...a so-called slot control system. The allocation of the slots was by a committee made up of carriers using the airport with the FAA in an oversight role. A chief criticism of the slot control system was that existing airlines at the four airports could keep competitors out through their control over an FAA fixed number of slots.

Following the air controllers strike in 1985, the committee system for allocating slots at the four airports allegedly broke down, i.e., the airlines could not agree among themselves. Allocation by committee was replaced with a lottery system administered by the FAA. In 1986 the lottery system was replaced by an open market system under which carriers were allowed to buy, sell, and lease their slots. Existing carrier slots were "grandfathered" to the then user of the slots. Essentially, the system of slot control was replaced by a slot market. David Graham of the Institute of Defense Analysis notes that some slots have sold for more than \$700,000.⁸

Another suggested approach to rationing air and runway space is for congested airports to establish market-clearing prices for take off and landing rights. In this case, higher prices would be charged during peak periods, and less during off peak periods. The argument here is that slot markets are difficult to operate and that a market-clearing price system would accomplish the same objective.

At airports, other than the four hubs cited above, takeoff and landing rights are handled by committees made up of existing carriers. In no United States airport are takeoff and landing fees used to allocate airport capacity. In most cases the fees are minimal, due, in part, to competition among airports.

The use of slot markets has not gone unchallenged. Some carriers urge that sale of slots to the highest bidder unfairly favors large carriers with deep pockets, while discouraging efforts by the federal and local governments to expand the number of airports and existing airport capacity. On the other hand, a number of carriers and some officials within the FAA are in favor of establishing slot controls at other high density airports. The counter-argument is that whether the slots are allocated by lottery or a market price, the present committee system would unduly favor existing carriers and inhibit competition, i.e. new carriers coming into the airport.

Improved Air Traffic Control and Ground Control

Airport capacity limitations are plaguing airlines and air travelers at a growing number of the world's major airports. The cost of delays and passenger inconvenience is in the millions annually. The impact of airport congestion hit hard in the United States in the early 1980's. The United States Federal Aviation Administration (FAA) formally recognized airspace capacity problems in 1982 and in 1983 announced a \$25 billion, 20 year-plan called the National Airspace System (NAS) Plan to reduce airspace congestion by the year 2000. The plan focuses on increasing airspace capacity by (1) the safe reduction of separation standards, horizontally and vertically, (2) real-time management of aircraft flow, and (3) increased productivity of the air traffic control (ATC) system. The plan does depend on building new airports or adding new runways at existing airports. In fact, only one new major United States airport (Dallas-Ft. Worth, 1973) has been built in the past 20 years and only one is planned for the 1990s (Denver 1995).

In 1981 the FAA created an Aviation Industry Task Force to conduct in depth research on what needed to be done, what could be done, what would work and what would not work, and how much proposed solutions would cost. The result was a comprehensive NAS plan that consists of 92 separate projects, including 12 major systems acquisitions costing over \$150 million each.⁹

Major technical efforts included in the NAS Plan include the following:

1. closely-space parallel runway independent IFR operations
2. reduction of IFR minimums on converging runways
3. reduction of longitudinal separation
4. exploitation of curved segmented approaches
5. advanced terminal area automation
6. application of cockpit traffic displays for pilots
7. application of computer modeling techniques for traffic flow
8. reduction of wake-vortex impacts
9. development and implementation of microwave landing system
10. development of improved airport surface surveillance system.¹⁰

When all phases of the NAS Plan are complete, airspace capacity around a number of major U.S. hubs will be significantly increased. Expected capacity increases vary by airport, aircraft type and other factors, but the FAA estimates, in general, that changes in ATC Procedures supported by new technologies can increase the capacity of existing airports by an average of 25- 30%. Detailed capacity increases suggested by the FAA Task Force are summarized in Table III. Of the actions listed in Table III, implementation of a new landing system, the microwave landing system or MLS, appears to offer the greatest potential for increasing airspace capacity. Problems addressed by MLS include more efficient management of existing airspace and

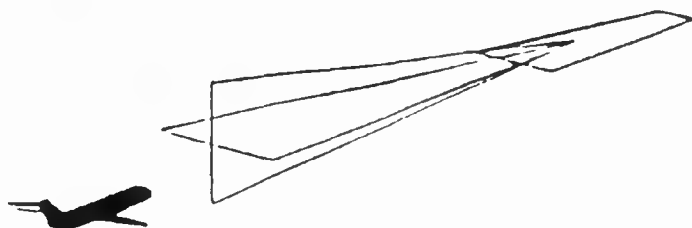
approach paths, as well as improving precision approaches in bad weather. The microwave landing system can provide increased airspace capacity because it is able to support curved and steeper angle approaches, multiple runways, and lower weather minimums.

Table III
Potential Airspace Capacity Increases

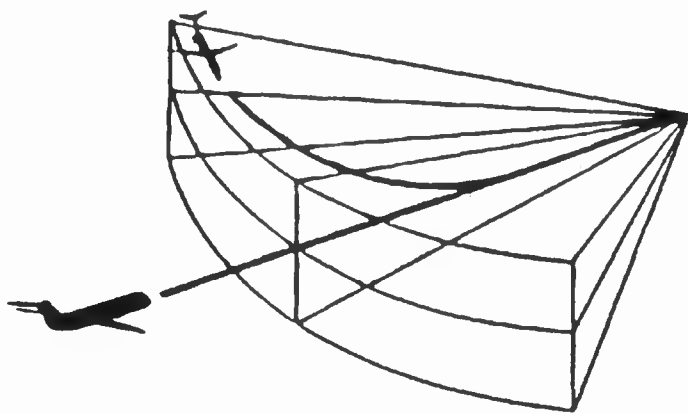
Action	Percentage Increase in Capacity
1. New runways or changed ATC procedures to allow new independent arrival streams	40-100%
2. Reduced separation standards	15-20%
3. Reduced system variabilities	10-15%
4. Average expected gain	25-30%

Source: FAA Task Force (see note 10)

Figure 1 shows schematically how MLS differs from the existing instrument landing system (ILS). The curved and segmented MLS approach capabilities enable air traffic controllers to minimize airspace conflicts, get more aircraft safely in the landing pattern, and reduce time in local airspace. The system accomplished these objectives thorough the use of "an electrically scanning radar capable of updating aircraft targets as often as two times a second as compared to once every five seconds for conventional airport surveillance radar."¹¹



Instrument Landing System (ILS)



Microwave Landing System (MLS)

Figure 1. Instrument Landing System contrasted with Microwave Landing System. The ILS provides a precise but narrow approach path. The MLS provides a wider area of navigation coverage and multiple precision approach paths.

The MLS technology has been developed and is currently undergoing extensive operational research and testing at two large United States airports (Memphis, Tennessee and Raleigh-Durham, North Carolina). Current FAA plans are to install MLS at the busiest United States airports. A major goal of this testing and research program is to show that aircraft can be controlled so accurately that bad weather landings can be made simultaneously on parallel runways spaced only 3000 feet apart. If the technology proves out, the FAA estimates bad-weather capacity can be increased by 25 percent at 12 major affected United States airports reducing delays by up to 250,000 aircraft hours in the year 2000.¹²

Another part of the United States plan to reduce airspace congestion is the Advanced Automation System (AAS). The AAS, at an estimated cost of \$5 billion, is the most expensive single project in the NAS Plan.¹³ The AAS includes the replacement of most current ATC computer hardware, software and controller work stations at airport tower, terminal area and enroute facilities. It also includes new software designed to precisely predict en route aircraft positions, identify potential conflicts and generate alternative solutions for controllers to resolve potential conflicts. The FAA hopes this project, led by the IBM Corporation, will (1) increase ATC system availability, (2) save fuel and flight time and (3) reduce FAA operating costs. By automating the process of getting clearance for altitude or route changes the AAS will reduce controller's clerical workload giving them more time to focus on keeping aircraft safely separated.

Another major United States program aimed at increasing flight safety, particularly in the airspace over busy United States air hubs, is a sophisticated aircraft collision avoidance system. By the year 2000 the FAA will require all airliners be equipped with a Traffic and Collision Avoidance System (TCAS). Each airliner will be equipped with a receiver, radio beacon and a computer. If two TCAS-equipped aircraft are on a collision course, the detector in each aircraft will activate a warning signal

in each cockpit. The computer will determine a course of evasive action and will automatically steer the aircraft away from danger or advise the pilot what to do. To reduce the danger of a small, private aircraft flying visual-flight rules (VFR) colliding with an airliner, the FAA will require all small aircraft be equipped with a Mode C transponder.¹⁴ The Mode C transponder will broadcast an enhanced radar echo showing altitude on the controller's screen and at the same time activate the collision avoidance system onboard the commercial airliner.

Ground Radar

The overall NAS Plan also addresses the need for improved ground control at major air hubs by including an airport surface detection (called ASDE 3) project. The purpose of this project is to provide state-of-the-art monitoring of aircraft and ground support vehicle movement on all airport surfaces such as runways, taxiways and aircraft parking areas. The FAA plans to install this innovative downward-looking radar equipment at 30 high-density U.S. airports by 1992.¹⁵ Ironically, Detroit is one of 30 planned implementation sites.

On December 3, 1990 two Northwest jets collided on Detroit's runway 3C killing nine people and injuring 21 others. The pilot of one of the aircraft apparently became confused in the dense fog and icy conditions which limited visibility to 800 feet. He turned onto the active runway and taxied his aircraft directly into the path of a B-727 on takeoff roll. The tower controller could not see either aircraft. At present, at all United States airports, the tower controller must rely on pilots to accurately report their location on the airfield.¹⁶ Had the new airport surface radar been operational at Detroit on December 3, 1990 this tragedy would probably not have occurred.

In addition to the above air traffic control systems improvements, the NAS Plan includes five other major programs. These are:

1. Automated Flight Service Station (AFSS)
2. Integrated Communications Switching System (ICSS)
3. Low Level Wind Shear Alert System (LLWAS)
4. Nondirectional Beacon (NDB)
5. Radio Communications Link (RCL)

The Automated Flight Service Station (AAFSS) is designed to improve flight planning by providing the latest weather, airspace, and general flying conditions information along the planned flight route. The FAA plans on implementing this system at 61 sites by 1995. The Integrated Communications Switching System (ICSS) is designed to enable controllers in air traffic control towers, terminal radar approach facilities and flight service stations to rapidly communicate with each other. The system will have basic intercom, interphone and radar capabilities. The ICSS is scheduled for installation at 221 sites by 1993. A third project, the Low Level Wind Shear Alert System (LLWAS), is aimed at detecting and informing pilots and controllers of dangerous wind conditions at or near airports. This important system will alert controllers and pilots to wind shear conditions and direct aircraft out of danger. The LLWAS will be installed at 331 United States airports by 1993. The Nondirectional Beacon (NDB) is an enhanced navigational aid that pilots use to determine bearing from or to the station. This new system will also help improve the precision of instrument landing approaches. The specific number of required NNB sites is undetermined pending the completion of FAA air network studies. The last NAS project considered is the Radio Communications Link (RCL). The RCL is designed to serve as a general transmission network for data and voice among FAA facilities. This system when fully operational in the mid-nineties will tie together all air control facilities.¹⁷

Summary and Recommendations

Congestion in air transportation systems is a major problem in Europe and in the United States. It is a problem that will likely get worse before it gets better. In the United States, decision makers, both in government and industry, have learned that there is no quick fix with respect to alleviating airport and airspace congestion. They have also learned that remedial programs take time—lots of time and lots of money. Also learned, often with hindsight, is that congestion problems are best handled when they first become visible, not when they have become so critical that safety is compromised. In Europe, the air system congestion problem is even more serious than in the United States. And with the liberalization of European aviation regulations after 1992, it will become worse.

This paper has reviewed four different major approaches to the air traffic congestion problems currently facing Europe and the United States. Of these four approaches, improving the air (and ground) traffic control systems by implementing state-of-the-art technologies appears to have the most merit. The cost is high and implementation difficult but this alternative is much cheaper and far more practical than building new airports or expanding existing ones in the world's major air hub cities. However, while U.S. and European aviation officials move to develop and implement improved air traffic control systems they should not overlook the power of rationing scarce resources. In this respect, the use of local airspace and airport runways is basically an economic problem involving the allocation of a scarce resource, i.e. takeoff and landing slots at particular times during a 24-hour day. Managers learned long ago that a pricing system based on supply and demand is often a most efficient and equitable way of allocating scarce resources among competing users. Market clearing prices and the buying and selling of slots should not be rejected out of hand by aviation authorities as ways to reduce congestion. Spreading out air traffic more uniformly over an 18-24-hour day at major air hubs offers a number of benefits at a relatively low cost.

One final observation, not a conclusion, is in order. Travel patterns in the industrially advanced countries in North America, Europe and the Pacific Rim will undergo major changes in the 21st century, if not before. While air will remain the preferred mode for long distance (over 500 miles) travel, present medium distance air routes will give way to high-speed rail. This is occurring rapidly in Europe and it is no longer a question of whether but when in the United States. And while the love affair between Americans and their private automobiles will slow the movement toward rail and other public transport systems, the movement will only be slowed - not stopped.

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CUSTOMER SATISFACTION IN INTERNATIONAL DISTRIBUTION: DO WATER PORTS KNOW WHAT SHIPPERS REALLY WANT?

by

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Introduction

International trade has grown substantially in the past two decades⁸, rising from 12.8% of U.S. GNP in 1970 to 23.3% in 1988. Although the primary method of transportation for international shipments is water transportation⁵, international trade participants have seen tremendous growth in their transportation choices over the past decade. As a result, some water ports have become more aggressive marketers; for example, the Port of Los Angeles has implemented a customer service center⁶ to answer questions concerning port storage facilities and steamship service.

Given the competitive pressures that currently exist in international distribution, international water ports might consider adopting a strategic marketing approach. According to Assael², this approach focuses on determining and satisfying customer needs, while also maintaining advantages over competing firms in terms of costs and product offerings. Failure to adopt this customer and competitor orientation could have important economic consequences for individual ports, as illustrated by recent experiences at the Port of Baltimore. Between 1985 and 1989, general cargo volumes at Baltimore declined by over one million short tons; Hampton Roads

(Virginia), a major competitor, saw an increase of almost 2.5 million tons over the same time period.³ According to experts³, a primary reason for Baltimore's slippage has been uncompetitive labor practices relative to neighboring ports.

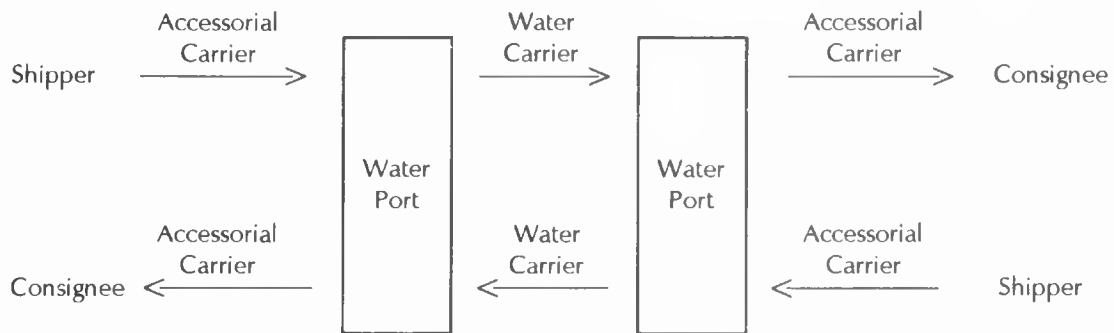
Water ports have historically considered ocean-going water carriers to be their primary customers⁴, to the virtual exclusion of other customer groups. In fact, the authors are aware of a situation⁴ in which a consultant had been called in to help a U.S. port with its marketing efforts. The consultant listed a well-known U.S. freight railroad as one of the port's major customers; the Port Director disagreed, saying that the railroad was not a customer, but rather a railroad.

The ports' emphasis on water carriers is partially attributable to the fact that without the water carriers, there would be no services for ports to provide; for instance, a lack of inbound carriers will strongly influence outbound operations. While water carriers are undeniably key port customers, this paper will argue that water ports can be viewed as "middlemen" in international distribution (see Figure 1). Figure 1 shows that ports have actually several different groups of potential customers, including ocean carriers, accessorial carriers, shippers and other ports. Each of these groups has distinct needs and wants, and for ports to structure much of their operations to satisfy ocean carriers could cause discontent among other key customer groups. Erik Stromberg, President and Chief Executive Officer of the American Association of Port Authorities has recognized that¹¹:

Port managers and their governing boards have had to significantly rethink the port's role in maritime commerce. For example, no longer can efficient port operations be defined based on shipside cargo handling. It must encompass sea lanes to interior rail and highway linehaul routes. As a result, strategic planning and marketing have become the twin imperatives of successful port management.

FIGURE 1

WATER PORTS' AS A MIDDLEMAN IN INTERNATIONAL TRADE



This research will focus on the shipper-water port interface, and will demonstrate that many large U.S. industrial corporations feel that they play a strong role in 1) evaluating port features and 2) selecting the water ports used in international distribution. One part of this paper will compare shippers and water ports in terms of the factors used to evaluate international water ports. In addition, there will be shipper-port comparisons on operational and safety issues that can influence the efficiency of international water port operations. The use of information from both shippers and water ports is valuable because customer assessments of a particular situation often differ from the seller's appraisal of the same situation⁹.

Methodology And Respondent Characteristics

The information in this paper is drawn from mail surveys sent to international water ports (hereafter referred to as ports) and U.S. industrial corporations (hereafter referred to as shippers). For the ports, the surveys were targeted to the highest ranking employees having international trade responsibilities, while the shipper surveys were addressed to the highest ranking corporate logistics executive. A Container News directory of international transportation links and nodes was used to identify 236 international water ports, from whom 86 usable responses were received, representing a response rate of 36.4%. (Resource constraints allowed for the survey to be printed only in English, which likely depressed the response rate.)

The 1989 Fortune 500 listing of U.S. industrial corporations served as the sampling frame for the shippers, with surveys being sent to the 400 highest ranking corporations. Of the 400 surveys mailed, 17 were undeliverable, leaving an effective sample size of 383; 81 usable responses were received, for a 21.2% response rate.

The authors used a variety of sources in the development of the questionnaire items. Questions involving the respondent's roles in port evaluation and selection were drawn from the marketing literature, which suggests that there are several buying roles (e.g., influencer, purchaser) associated with purchasing decisions.⁸

The list of port selection factors was derived from previous transportation choice research such as Burdige and Daley³ and Stock and LaLonde.¹² Respondents were limited to only nine selection factors because consumers rarely use more than six evaluative criteria when making decisions.⁶ Respondents were also asked to evaluate selected international trade issues; while this listing is not comprehensive, it is representative, and was drawn from newspapers, trade publications and discussions with transportation and logistics managers.

Selected demographic characteristics of respondents and their organizations are presented in Table 1. Sixty percent of the port respondents were between 40 and 59 years of age, while a similar percentage had been with their employer for ten or more years. The responding ports have annual revenues ranging from under \$10 million (U.S. dollars) per year to over \$500 million. Thirty percent of the ports handle at least 10,000,000 short tons (i.e., 2,000 pounds = 1 ton) of freight per year. As for the shippers, approximately 65% of their respondents were between 40 and 59 years old, with 62% reporting ten or more years of company tenure. Not surprisingly, the shippers represent large organizations, with nearly two-thirds reporting annual revenues of between \$1 billion and \$4.999 billion. One-third of the shippers have annual shipment volumes of more than 1,000,000 tons.

The information in Table 2 details several aspects of the shipper's participation in international trade. The median tonnage for international shipments was 23,430 tons (low = 0, high = 200,000,000), with nearly 40% of the shippers indicating that international shipments account for at least 25% of their

outbound tonnage. In addition, the median tonnage for international water shipments is 12,500 tons (low = 0, high = 196,000,000), with an average of 62% of international shipments moving by water.

Almost 75% of the international shipments involve the use of freight forwarders, which might be an indication that the shippers are not involved in port evaluation and selection. On the contrary, as shown in Table 2, the shippers indicated that they take a very active role in negotiating with, evaluating, and selecting the water ports used in international commerce. For example, nearly 75% of the shippers indicate a high degree of responsibility for 1) determining the necessary features of a water port as well as 2) selecting international water ports.

Results

1. Port Evaluation Factors. The previous section demonstrated that the top logistics personnel at many large U.S. manufacturing companies feel that they play key roles in evaluating and selecting the water ports to be used in international trade. In order to determine whether ports recognize the evaluation factors important to shippers, the information in Table 3 presents the results of t-tests of mean equality for port and shipper responses to nine port evaluation factors.^a The mean scores were based on port and shipper importance ratings for each attribute, using a five point scale where 1 = very unimportant and 5 = very important. In addition, each group's mean ratings were ranked from highest to lowest; port and shipper rankings were then compared using the Spearman test of rank correlation.

^a*Equality of variance results indicated that t-tests were a feasible technique.*

Table 1
Respondent Characteristics

WATER PORTS	
Respondent's Age	
<u>Age</u>	<u>% of Respondents</u>
Under 30	3.6
30 - 39	23.0
40 - 49	24.0
50 - 59	37.4
Over 59	12.0
Respondent's Years with Present Organization	
<u>Years</u>	<u>% of Respondents</u>
0 - 4	23.8
5 - 9	19.1
10 - 14	20.2
15 - 19	11.9
Over 19	25.0
Company Revenues	
<u>Revenues (U.S. dollars)</u>	<u>% of Companies</u>
Under \$10 million (M)	25.0
\$10 M - \$49.99 M	38.8
\$50 M - \$99.99 M	17.5
Over \$99.99 M	18.7
Short Tons Handled	
<u>Tons (000s)</u>	<u>% of Companies</u>
Under 2,500	28.0
2,500 - 4,999	21.0
5,000 - 9,999	20.0
Over 9,999	32.0

Table 1 Con't.

SHIPPERS	
Respondent's Age	
<u>Age</u>	<u>% of Respondents</u>
Under 30	2.5
30 - 39	21.3
40 - 49	38.7
50 - 59	26.3
Over 59	11.2
Respondent's Years with Present Organization	
<u>Years</u>	<u>% of Respondents</u>
0 - 4	19.8
5 - 9	18.6
10 - 14	16.0
15 - 19	13.6
Over 19	32.0
Company Revenues	
<u>Revenues</u>	<u>% of Companies</u>
Under \$1 billion (B)	11.4
\$1B - \$4.999B	63.3
\$5B - \$9.999B	13.9
Over \$9.999B	11.4
Annual Shipment Volumes	
<u>Tonnage</u>	<u>% of Companies</u>
0 - 99,999	45.9
100,000 - 999,999	19.7
1,000,000 - 9,999,999	14.4
Over 9,999,999	19.7

Table 2

SHIPPER INVOLVEMENT IN INTERNATIONAL TRADE

International Shipments

<u>Tonnage</u>	<u>% of Respondents</u>	<u>Median</u>
0	5.3	
1 - 999	15.8	
1,000 - 9,999	21.0	23,430
10,000 - 99,999	17.5	
100,000 - 999,999	21.1	
Over 999,999	19.3	

International Shipments

<u>As % of Total Tonnage</u>	<u>% of Respondents</u>	<u>Mean</u>
0 - 24.9%	60.6	
25 - 49.9%	24.2	24.9%
50 - 74.9%	6.1	
Over 74.9%	9.1	

International Water Shipments

<u>Tonnage</u>	<u>% of Shipments</u>	<u>Median</u>
0	7.1	
1 - 999	25.0	
1,000 - 9,999.	16.1	12,500
10,000 - 99,999	16.1	
100,000 - 999,999	16.1	
Over 999,999	19.6	

International Water Shipments

<u>As % of International Shipments</u>	<u>% of Respondents</u>	<u>Mean</u>
0 - 24.9%	23.4	
25 - 49.9%	11.7	61.1%
50 - 74.4%	10.4	
Over 74.9%	54.5	

Table 2 Cont.

Use of International Freight Forwarders		
<u>% of International Shipments</u>	<u>% of Respondents</u>	<u>Mean</u>
0 - 24.9%	21.6	
25 - 49.9%	2.7	72.6%
50 - 74.9%	5.4	
Over 74.9%	70.3	

Respondent's Roles in Port Evaluation and Selection

<u>Statement</u>	<u>Strongly Disagree</u>	<u>Disagree</u>	<u>Neither Agree Nor Disagree</u>	<u>Agree</u>	<u>Strongly Agree</u>
I identify my firm's operational need for a water port	3.8%	7.7	9.0	55.1	24.4
I play an important role in collecting information about the features of different water ports	3.8	16.5	12.7	51.9	15.2
I do not play an important role in determining features my firm would need from a water port	23.1	51.3	7.7	11.5	6.4
I play an important role in evaluating different water ports	5.1	8.9	8.9	59.5	17.7
I play an active role in negotiating the prices and terms for the water ports my firm uses	7.6	20.3	6.3	45.6	20.3
I do not have a major influence on the final selection of a water port for my firm's operations	29.4	44.9	7.7	11.5	6.4

Note: Percentages may not sum to 100 due to rounding error.

The information in Table 3 shows that the mean ratings for the ports ranged from a low of 3.00 (neither important nor unimportant) on claims handling to 4.50 (very important) on equipment availability. The shipper range was slightly narrower, going from 3.16 (neither important nor unimportant) on odd-sized freight to 4.38 (important) on both equipment availability and loss and damage performance. With respect to the t-tests, three of the nine port evaluation factors show statistically significant differences at the .05 level. The attribute with the largest difference is large volume shipments, with a mean rating of 4.05 for ports and 3.34 for shippers. The two other attributes with statistically significant differences in importance ratings are loading and unloading facilities for large and/or odd-sized freight (port mean = 3.59; shipper mean = 3.16) and assistance in claims handling (port mean = 3.00; shipper mean = 3.35).

The Spearman coefficient of rank correlation, .7417 (significant at the .05 level), suggests that there are similarities between the port and shipper rankings of the port evaluation factors. For example, there are minimal ranking differences between ports and shippers on equipment availability, loss and damage records, and pickup and delivery times.

The evaluation factor with the largest rating (.71) and ranking (four places) discrepancies between port and shipper participants is large volume shipments. This is an intriguing finding, in part because an important trend in contemporary international water transportation has been load centering, which involves concentrating large volume shipments at only one port in a geographic area. The shipper responses (mean = 3.34) appear to suggest that the ports (mean = 4.05) are overemphasizing the need to handle large volume shipments.

Rather than focusing so heavily on large volume shipments, the results of this study (see Table 3) indicate that port management might improve their offerings in the area of customer service. For example, the mean importance ratings for claims handling (ports = 3.00; shippers = 3.35) are significantly

different at the .05 level, while there is a ranking difference of two places (ninth for ports; seventh for shippers). Moreover, the ranking discrepancy for shipment information is two and one-half places (seventh among ports; tied for fourth among shippers).

2. International Trade Issues. Respondents were presented with statements on a number of contemporary trade issues that might influence the efficiency of international water port operations, and were asked to assess each statement using a five point scale where 1 = strongly disagree and 5 = strongly agree. As was the case in the previous section, port and shipper responses were analyzed by t-tests of mean equality^b, with the results appearing in Table 4. In addition, Table 4 provides information on whether the shippers consider the particular issue to be important. To facilitate the discussion, the issues have been divided into two groups, 1) operational and 2) safety and security.

Operational Issues. As shown in Table 4, port and shipper differences were statistically insignificant on three of the nine operational issues. Ports slightly agree (mean = 3.41) that graft/personal inducements are a minor problem in port operations, while shippers are neutral (mean = 3.16) on this issue. Both groups of respondents are essentially neutral concerning the influence of documentation complexity on port operations (port mean = 3.01; shipper mean = 3.14), while both groups agree (port mean = 3.79; shipper mean = 3.71) that cargo handlers at water ports should be fluent in the primary language of the country in which they work. Interestingly, none of these three issues was considered to be important by a majority of respondents; in fact, only about 25% feel that graft/corruption and language fluency are important. In other words, there is general agreement between the ports and the shippers on issues that are unimportant to the shippers.

^b*Equality of variance results indicated that t-tests were feasible.*

Table 3

Port Evaluation Factors			
Factor	Mean Score* Ports	(Rank) Shippers	t-value
Has equipment available	4.50 (1)	4.38 (1.5)	.81
Provides a low frequency of cargo loss or damage	4.26 (2)	4.38 (1.5)	-.72
Offers convenient pickup and delivery times	4.15 (3)	4.01 (3)	.81
Allows for large volume shipments	4.05 (4)	3.34 (8)	4.12*
Offers flexibility in meeting special handling requirements	4.00 (5)	3.76 (6)	1.49
Has low freight handling charges	3.95 (6)	3.95 (4.5)	.02
Provides information concerning shipments	3.67 (7)	3.95 (4.5)	-1.62
Has loading and unloading facilities for large and/or odd-sized freight	3.59 (8)	3.16 (9)	2.15**
Offers assistance in claims handling	3.00 (9)	3.35 (7)	-2.04**

Spearman coefficient of rank correlation = .7417, significant at
p = .05.

*1 - very unimportant; 5 - very important
**significant at .05 level
*significant at .01 level

Of the six operational issues exhibiting statistically significant differences between port and shipper responses, the one with the largest difference involves the influence of labor regulations on port operations; labor regulations also emerged as the most important (83%) of the issues presented in Table 4. Port respondents neither agree nor disagree (mean = 2.95) that labor regulations are a minor problem in port operations, while shippers definitely disagree (mean = 2.09). The importance of labor regulations on efficient port operations is illustrated by the comments¹¹ of a leading official at the U.S. Maritime Administration, who identified relations between port management and port labor to be the major impediment to efficient port operations in the coming decade.

Both pickup (PU) and delivery (D) times at ports are international trade issues that are important to a majority of the shippers, who feel that PU and D times are too lengthy, while ports do not. For both issues, the mean differences between port and shipper responses exceed .50 (on a five point scale), a strong indication that there are problems with pickup and delivery at ports. Although some causes of these delays may not be directly controllable (e.g., drayage problems, infrastructure-related congestion) by port management, marketing theory teaches that uncontrollable variables/factors/elements are nonetheless key components of a company's marketing environment. As a result, port management should determine: 1) whether PU and D times are a problem at their particular facility, and 2) the sources of PU and D time delays so that corrective action can be pursued.

Another operational issue considered to be important by a majority of shippers (63%) is standardized container sizes. Interestingly, the port respondents (mean = 4.31) more strongly favor standardized container sizes than do their shipper counterparts (mean = 3.75), an indication that shippers may not fully appreciate the operational complexities associated with different sized containers (e.g., increased transfers of freight, increased handling times and costs, increased opportunities for

Table 4

International Water Transportation Issues				
Issue	Mean Score ^a		t-value	Is this issue important to shippers? (% yes)
	Ports	Shippers		
Operational Issues:				
Graft/personal inducements are a minor problem in water port operations	3.41	3.16	1.54	26.6%
Complexity of documentation is the major problem in water port operations	3.01	3.14	-.78	45.5%
Cargo handlers at water ports should be fluent in the primary language of the country in which they work	3.79	3.71	.58	23.9%
International cargo losses are higher at a water port than while in transit	2.68	3.30	-4.25*	45.5%
Labor regulations are a minor problem in water port operations	2.95	2.09	4.87*	83.3%
Containers are more likely to be damaged while in transit than while at a water port	3.31	2.94	2.29**	43.8%
Carrier pickup at water ports takes too much time	2.82	3.36	-3.64*	61.5%

Table 4 cont.

International Water Transportation Issues				
Issue	Mean Score*		t-value	Is this issue important to shippers? (% yes)
	Ports	Shippers		
<u>Operational Issues:</u>				
Carrier delivery at water ports takes too much time	2.71	3.34	-4.14*	55.6%
Container sizes need to be standard worldwide	4.31	3.75	4.31*	62.7%
<u>Safety and Security Issues:</u>				
Hazardous cargoes should not be moved in international trade	1.80	1.91	-.97	58.5%
Packaging standards for hazardous cargo moving through water ports should be more strictly enforced	3.88	3.59	2.25**	63.6%
Water ports are secure from terrorist violence	2.95	2.21	4.94*	57.1%
*1 - strongly disagree; 5 - strongly agree				
**significant at .05 level				
*significant at .01 level				

loss/damage). Improved communication between ports and large shippers could sensitize the shippers to the importance of trying to put their outbound international shipments in uniform container sizes.

The final significant differences among operational variables indicate that ports and shippers do not agree about the location of loss and damage for international shipments. On the one hand, ports slightly disagree (mean = 2.68) that cargo losses are higher when goods are at water ports than while goods are in transit; shippers slightly agree (mean = 3.30) that cargo losses are more likely at ports. On the other hand, ports slightly agree (mean = 3.31) that cargo damage is more likely when goods are in transit, while shippers are neutral (mean = 2.94) on this issue.

While this information suggests that the disagreement is stronger concerning losses than concerning damage, it should be noted that neither issue was considered to be important by a majority of shippers. A possible explanation is that the shippers were asked to evaluate the importance of the various operational (as well as safety/security) issues based on the exact statements appearing in Table 4. As pointed out in Table 3, loss and damage performance is a key criteria when shippers select a water port; however, the actual location of lost or damaged goods (the issues appearing in Table 4) is of lesser importance than whether goods are lost or damaged.

Safety and Security Issues. Table 4 also provides information on port and shipper evaluations of three safety and security issues, along with shipper importance ratings on the issues. Two of the three show statistically significant differences between ports and shippers, with ports more strongly favoring (mean = 3.88) stricter packaging requirements for hazardous products than do the carriers (mean = 3.59). Moreover, packaging standards are considered an important issue by nearly two-thirds of the shippers; these standards may raise legal questions concerning the responsibility--shippers, carriers, forwarders, ports--for errors or accidents that may occur.

There is also rather strong disagreement between the ports and shippers concerning the influence of terrorist violence on port operations (an issue important to 57% of the shippers). Ports are neutral (mean = 2.95) as to whether or not their facilities are secure from terrorist violence, while the shippers disagree (mean = 2.21) that water ports are safe from such actions. Although terrorist activities are, to a large degree, uncontrollable, the magnitude of disagreement (almost .75) between ports and shippers is a clear indication that port management needs to improve at least the perception that their facilities are secure from terrorist behavior.

Summary And Conclusions

A central premise of this study is that water ports have primarily concentrated their marketing efforts on ocean carriers, neglecting other relevant groups of customers. This neglect becomes evident when the responses of ports and one group of "neglected" customers are compared on a variety of international trade variables. Specifically, this study focuses on a comparison of water ports and large U.S. industrial shippers in terms of 1) important factors in water port evaluation and 2) opinions concerning issues that influence the efficiency of international trade.

With respect to port evaluation factors, the locational advantages that individual ports previously relied upon are diminishing. For example, Virginia's inland port at Front Royal is approximately 200 miles from its "parent" ports of Hampton Roads. As a result, water ports must attempt to satisfy customer needs beyond locational preference. This study found that ports tend to overemphasize the ability to handle large volume shipments, while underestimating the informational requirements of shippers, particularly in terms of claims handling and shipment tracing.

In terms of the contemporary trade issues, shippers and ports demonstrated marked disagreements concerning the influence of labor regulations on efficient port operations. The importance of this issue to shippers (83% felt it to be an important issue) also suggests that shippers view labor regulations as more than a minor problem influencing water port operation. Furthermore, the shippers suggest that carrier pickup and delivery times at water ports take too long, situations that may be exacerbated by port labor problems.

Although water ports do not generally view shippers as an important customer group, respondents from large U.S. industrial corporations indicated that they play a key role in evaluating and selecting the water ports used by their companies for international distribution. Shippers--especially large ones--are actually important water port customers.

Some ports view selected operational (e.g. port pickup and delivery times) and safety/security (e.g., terrorist violence) issues as uncontrollable factors, which therefore do not need to be addressed by port management.⁴ However, others have recognized that¹³ "uncontrollable elements...must be considered in the planning, implementation and control of the firm's international distribution network." The necessity of dealing with these uncontrollable factors comes in part from the increasingly competitive international distribution environment, which offers shippers a broad array of choices for their cross-border shipments.

International shipments that historically moved from water port to water port are today facing stiff competition from sea/air and sea/truck/air alternatives. At a minimum, these alternatives to all-water movements offer the potential for reduced business for individual ports. Consequently, water ports might adopt a more proactive approach to their customers--including a broader delineation of their customers (see Figure 1)--because lost business is extremely difficult, if not impossible, to reclaim.

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THE AIRLINE INDUSTRY: CHARTING A GLOBAL FLIGHT PLAN

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Introduction

There are those who believe that in this thirteenth year of airline deregulation that the era of consolidation/merger/acquisition is essentially over in the United States. They are probably right because of two reasons. One reason, very simply, is that the large number of consolidations, mergers, acquisitions and bankruptcies have left very few Major carriers on the competitive playing field. The second reason is that the Department of Transportation's (DOT) authority over mergers and agreements concerning domestic transportation was sunset on December 31, 1988. On the surface, this reduced number of domestic competitors and the additional freedom from regulation appears to hold nothing but benefits not only for the American airline industry but for its international competitors as well. This apparent "windfall" from deregulation will be examined in the following pages.

As a case in point, European air carriers see decontrol as probably their best weapon in the competitive battle. For example, the recently signed Luxembourg II Agreement opened up the so-called Fifth Freedom Right which will allow such carriers as Aer Lingus, British Airways, Air France, KLM and Lufthansa to fly between any two European cities, even if both cities are outside their home country.¹

The Airline Industry Before And After Deregulation

Since 1985, approximately twenty-five (25) mergers and acquisitions have occurred; twenty-three (23) were by major carriers.² There were four Major carriers acquired in 1986: Peoples Express, Eastern, Republic, and Western which left only nine (9) of the former thirteen (13) Major carriers which has been further reduced to eight Majors with the acquisition of Piedmont by USAir in 1989.³

If all of this has taken place in approximately two-to-three years, what has happened to the industry since deregulation began in 1978? In sheer numbers alone, thirty-six (36) carriers began nearly a decade of deregulation. If every air carrier that stated operation, since deregulation of the air passenger segment of the industry, were still in operation today, there would be a grand total of 234⁴ air carriers. However, bankruptcies, mergers, consolidations, and ceased operations have claimed a staggering 68.8%; including the consummation of the acquisition of Piedmont by USAir on August 4, 1989. Over seventy-four (74) carriers certificated as Section 401 scheduled airlines remained in January, 1987. EXHIBIT 1 and TABLE 1 tell the story pictorially and numerically.

Of the remaining seventy-four (74) Section 401 certificated air carriers in January, 1987, a net total of only twenty-five (25) compete for airline traffic within the continental (48 contiguous states) United States (see TABLE 2). Thirty-six operate outside the forty-eight states (in Alaska, Pacific, and the Caribbean) while thirteen (13) others provide feeder service to larger carriers. None of the original mid-sized Regional carriers certificated prior to 1978 exist today. Ozark, Frontier, North Central, Hughes Air West, Southern, and Texas International have all been acquired. Although Allegheny and Piedmont both acquired Major carrier status by the expansion of their route structures, they were both acquired by USAir.⁵

The scheduled airlines are divided into three classifications: Majors, Nationals, and Regionals. TABLE 3: U.S. SCHEDULED AIRLINES, PRE- AND POST-MERGER and EXHIBIT 2: CONSOLIDATION OF NATIONALS BETWEEN 1986 AND 1991 identify the carriers in each classification. For the sake of brevity, MAJOR airline companies are those airlines, once referred to as *trunk carriers*, and who are now classified as MAJORS because they have annual gross revenues over one billion dollars. NATIONAL airline companies are those that generate annual gross revenues between \$75 million and \$1 billion. And while REGIONAL airline companies have a history of their own, they are classified as LARGE REGIONALS if their annual gross revenues fall between \$10 million and \$75 million and MEDIUM REGIONALS if annual gross revenues are less than \$10 million. For 1989, it was estimated that the Majors generated 429 billion revenue passenger miles (RPMs).⁶

Sunset of DOT Merger Authority

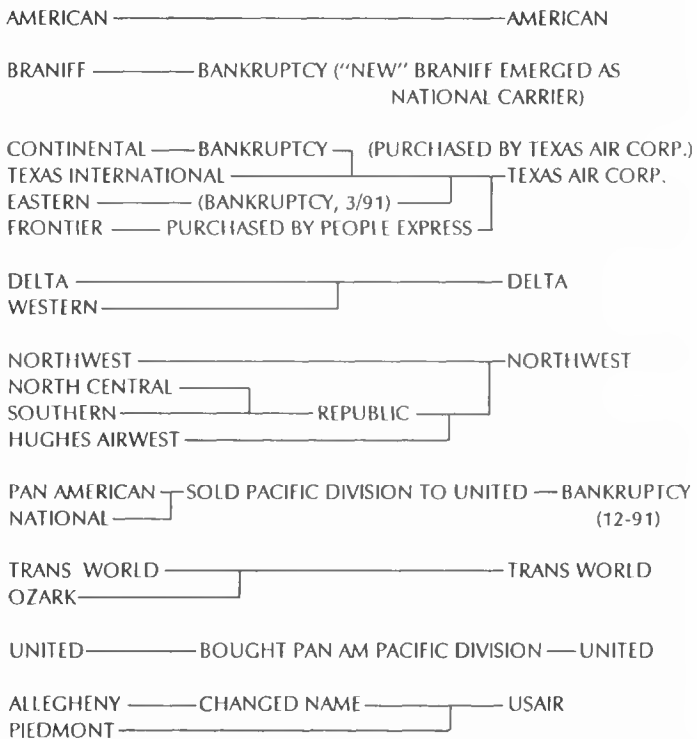
The sunset of DOT's authority to review mergers under Section 408 of the Federal Aviation Act does not transfer authority to review mergers to the Department of Justice nor to any other agency. The bottom line is that airline mergers no longer require administrative approval. However, when the airline industry lost the necessity for administrative approval, it also lost the immunity that airline mergers approved by DOT had previously obtained under the antitrust laws. As a result, airline mergers that violate the Sherman Antitrust Act and the Clayton Act now can be challenged in the courts by the Antitrust Division of the Department of Justice or by private parties.⁷ In short, the airline companies are now fully subject to the same antitrust rules that govern other American industries except for some aspects of international aviation.

Exhibit 1

Consolidation of Pre-deregulation Trunk and Local Airlines into Seven Major Airlines

19 Trunks & Locals - 1978

7 Majors - 1991



SOURCE: ADAPTED FROM AIRLINE CONSOLIDATION, (WASH., D.C.: AIRLINE ECO., INC. 1987) p. 20 AND FAA AVIATION FORECASTS, FISCAL YEARS 1990-2001, U.S. D.O.T., FED. AVIATION ADMINISTRATION, pp. 121-223.

Table 1

A Numerical History of U.S. Scheduled Airlines Operating Under Section 401 Certificates as of January, 1987

Certificated prior to 1978	36
Certificated 1978 - 1986	<u>198</u>
Total	234
Less:	
Merged, Liquidated, Decertificated or not operating under a Certificate	<u>161</u>
Total Currently Operating	73

Source: Adapted from *Airline Consolidation*, (Washington, D.C: Airline Economics, Inc. 1987), p. 16. Updated to March, 1991.

Table 2

Total Number Of Carriers Operating In Continental United States Without Feeder Agreements With Larger Carrier(s)

Total carriers currently operating	73
Carriers operating totally outside Continental U.S. (Alaska, Pacific, and Caribbean)	<36>
Carriers with feeder agreements	<13>
Total carriers operating in Continental U.S. without feeder Agreement with Larger Carriers	24

Source: Adapted from *Airline Consolidation*, (Washington, D.C: Airline Economics, Inc. 1987), p. 16. Updated to March, 1991.

Table 3
U.S. Scheduled Airlines
Pre- and Post-Merger

<u>Pre-Merger:</u>	<u>Majors (12)</u>	<u>Nationals (15)</u>	<u>Regionals (4)</u>
	American	AirCal	Air Midwest
	Continental	Alaska	Air Wisconsin
	Delta	Aloha	Atlantic S.E.
	Eastern	America West	Jet America
	Northwest	Braniff	
	Pan American	Frontier	
	Piedmont	Hawaiian	
	Republic	Midway	
	Trans World	New York Air	
	United	Ozark	
	USAir	Pacific S.W.	
	Western	People Express	
		Southwest	
		TranStar	
		World	
<u>Post-Merger:</u>	<u>Major (8)</u>	<u>National (8)</u>	<u>Regionals (2)</u>
	American	Air Wisconsin	Air Midwest
	Delta	Alaska Air Group	Atlantic S.E.
	Northwest	Aloha	
	Pan American	America West	
	Texas Air Corp.	Braniff	
	Trans World	Hawaiian	
	United	Midway - (Bankruptcy, 12-91)	
	USAir Group	Southwest	

Source: Adapted from Dr. G. James. State of The Airline Industry.
Airline Economics, Inc., Washington, D.C., January, 1990.

Exhibit 2

Consolidation of Nationals Between 1986 and 1991

<u>Start of 1986</u>	<u>Disposition</u>	<u>End of 1991</u>
Aircal -----	Merged into American	
Air Wisconsin -----		Air Wisconsin
Alaska -----		Alaska
Aloha -----		Aloha
America West -----		America West
American Trans Air -----		American Trans Air
Braniff -----		Braniff
Frontier -----	Merged into People Express	
Hawaiian -----		Hawaiian
Midway -----	Bankruptcy, 12-91 -----	Midway
MGM Grand -----		MGM Grand
New York Air -----	Merged into Texas Air Corp.	
Ozark -----	Merged into TWA	
Pacific Southwest -----	Merged into USAir	
People Express -----	Merged into Texas Air Corp.	
Southwest -----		Southwest
Trans America -----	Ceased Scheduled Passenger Operations	
Transtar -----	Merged into Southwest	
World -----	Ceased Scheduled Passenger Operations	
Air Wisconsin -----		Air Wisconsin
Jet America -----	Bought by Alaska	
 21 Carriers		 10 Carriers

Source: Adapted from *Airline Consolidation*, (Wash., D.C.: Airline Eco., Inc., 1987) p. 20, and *FAA Aviation Forecasts, Fiscal Years 1990-2001*, U.S. D.O.T., Fed. Aviation Administration, pp. 221-223.

The fact is that, today, not only have the possible combinations among airlines been reduced significantly but if and when any mergers are attempted, they will be closely scrutinized by the Antitrust Division of the Department of Justice. In addition, there are relatively few airports that serve as hubs for more than one airline. Hubs are airports in major cities/metropolitan areas that serve as collection points for passengers and cargo. REGIONALS transport passengers and freight from outlying areas into a Hub location via spokes (routes). Major and/or National airlines complete the move by carrying the passengers and/or freight to their final destinations via other spokes (routes). As a result of the small number of hubs serving more than one airline company, the antitrust analysis will likely tend to focus on an assessment of an airline mergers' impact on national concentration levels. However, the more immediate question is "What strategies do airline companies develop for one, three, five, and ten years in the future that will avoid incurring the wrath of the Antitrust Division of DOJ?"

Four alternatives provide a short but non-exclusion list to this strategic planning question. (1) One of which is to go "BACK TO THE FUTURE!" If we return to the year 1978 when deregulation (of the passenger segment of the airline industry - air cargo having been deregulated in 1977) - was the WAVE OF THE FUTURE, we find that deregulation was to become the FUTURE of the airline industry. Although, it is not "JUST" the deregulation of the American domestic airline industry that is charting the flight plan of domestic and international airline operations of the future. It is DOMESTIC DEREGULATION, INTERNATIONAL DEREGULATION (e.g., Europe, 1992) and WORLD EVENTS (e.g., Iraqi invasion of Kuwait and subsequent United Nations sanctioned trade embargo) of the most recent months, weeks, and days.

The other three alternatives to the strategic planning question include the options of (2) developing marketing alliances not only with foreign air carriers but with national/global hotel and restaurant chains as well; (3) ownership changes (discussed later), and even the different forms of (4) frequent flyer agreements.

Globalization

Globalization is a strategic alliance alternative for which the airline carriers do not have an option if they plan to remain competitive. That is, they must globalize their operations simply to be able to remain competitive not only with their domestic counterparts but with the foreign-based international carriers as well. It is a strategic change forced on the industry by domestic and international deregulation. Globalization of the U.S. Airline industry began in 1977 and 1978 with the deregulation of the cargo and passenger segments respectively. Eventually, Canada, the United Kingdom, Japan, Australia, and other countries experimented with deregulation, liberalization and even privatization of their airline industries. It should be remembered that deregulation of the airline industry, domestically and internationally, has erupted upon the scene as a result of forces outside of the control of the airline industry. Globalization is the airship flying toward tomorrow; (domestic and international) deregulation is the current state-of-the-art fuel being used to power the ship; North America and Europe probably were the first two passengers on that ship to buy - but not pay for - their tickets. Many other passengers (i.e., countries/airline companies) are scrambling for tickets by jockeying for a position in the line that is forming.

The European Common Market added fuel to the fire of regulatory liberalization with the Treaty of Rome test of airline competition and pricing in the 1986 *Nouvelles Frontieres* case which held that the rules of competition which exist under the

Treaty of Rome do, indeed, apply to aviation. At that point, the FUTURE was developing around an attempt to foster overall economic airline integration in Europe which would set up a chain reaction around the world.⁸

As a result, North America and Europe, two of the three major developed regions of the world, are moving rapidly to structurally change air transportation into an arena of open competition by initiating strategic alternatives available to them in the deregulated world of the airline industry. Airline companies in the rest of the world, including the less developed regions, are searching for and signing up partners with whom to dance to the new tune the world is now playing. As a result of domestic and international deregulation, mergers, consolidations, and bankruptcies, these relationships between the airline companies are developing into important strategic alternatives identified earlier; (1) marketing alliances, (2) ownership changes, and the (3) frequent flyer agreements.

Analysis of Globalized Strategies

STRATEGIC ALLIANCES

Of the many types of alliances available to enterprising airline companies, the three most important are **Marketing, Equity** and **Frequent Flyer Programs**. The last few years has seen a dramatic increase in all three types. Out of one-hundred, seventy-two alliances identified by Mead Jennings in the August, 1990 issue of **AIRLINE BUSINESS**, eighty-two of the agreements (47.67%) involved equity investments. More specifically, fifty-six per cent of these 82 agreements were made in the last five years (see TABLE 6, APPENDIX). TABLE 4 is an abstract of the strategic alliances of the U.S. domestic air carriers with domestic and foreign-based air carriers. An example is the first truly "global" alliance between Delta, Singapore and Swissair which includes the coordination of international fares and flight schedules, the loaning of flight attendants and the possibility of joint buying opportunities.⁹

Marketing Alliances

In the category of **Marketing Alliances**, we find the British Airways and United agreement to coordinate schedules and to share codes of international flights; but no equity swaps. Carried to an extreme, one would find a route-specific agreement which refers to an agreement between two airlines regarding the contribution of each airline to a cooperative effort over a specific route (e.g. New York to London). The equity swap - another name for alliance partners buying into each other - is a relatively new variation on the much older marketing alliance theme. It is interesting to note that American Airlines serves as a partner to seven other major airlines; Aer Lingus, Air New Zealand, Cathay Pacific, Finnair, Malev, Qantas, and Singapore Airlines. American has picked up an equity position (7.5%) in only one of these airlines; Air New Zealand. Conversely, these same seven airlines serve as partners for American with Air New Zealand holding a 7.5% equity position in American Airlines. Among these seven partners, American has only one wide-ranging marketing alliance with Qantas. The other six alliances are route-or market-specific agreements.

TABLE 4 provides some insight into the relationships that have been established among the airline companies of the world and U.S. airline companies. The last column indicates what kind of relationship exists between any two carriers; "M" means there is a wide-ranging marketing alliance agreement between the two carriers; "R" means the agreement covers only a specific route/market; "J" means there is a joint venture between the two firms; "C" means the agreement is for cargo only and "MAN" means there is a management contract in existence.¹⁰

Table 4
Strategic Alliances
of American Carriers in the Airline Industry

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	PACT
AER LINGUS	AMERICAN			R
AEROFLOT	PAN AM			M
AIR CANADA	TWA			M
AIR-INDIA	TWA			R
AIR MICRONESIA	ALOHA		10	
	CONTINENTAL		30	
AIR NEW ZEALAND	AMERICAN		7.5	
ALITALIA	USAIR			M
ALL NIPPON	TWA			R
ALOHA	AIR MICRONESIA	10		
AMERICAN	AER LINGUS			R
	AIR NEW ZEALAND	7.5		
	CATHAY			R
	FINNAIR			R
	MALEV			R
	QANTAS			M
	SINGAPORE			R
AMERICA WEST	ANSETT		20	
ANSETT	AMERICA WEST	20		
AUSTRALIAN	UNITED			R
BRITISH AW	DELTA			R
	UNITED			M
CANADIAN AIR.	MIDWAY			R
CATHAY PACIFIC	AMERICAN			R
CONTINENTAL	AIR MICRONESIA	30		
	SAS		9.9	M

KEY: *=PLANNED; **=SUBJECT TO REGULATORY APPROVAL; M=WIDE-RANGING MARKETING ALLIANCE; R=ROUTE OR MARKET SPECIFIC ALLIANCE; J=JOINT VENTURE; C=CARGO; MAN=MANAGEMENT CONTRACT

SOURCE: Jennings, Mead. "Strategic Illusions", *AIRLINE BUSINESS*, August, 1990, pages 27, 28 & 30.

Table 4 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	PACT
DELTA	BRITISH AW			R
	SINGAPORE	2.8		M
	SWISSAIR	5	4.6	M
FINNAIR	AMERICAN			R
GULF AIR	TWA			R
HAWAIIAN	JAPAN AL		25	
JAPAN AL	HAWAIIAN	25		
KLM	NORTHWEST	14.9		
MALEV	AMERICAN			R
	PAN AM			R
	TWA			R
MIDWAY	CANADIAN AL			R
NORTHWEST	KLM		14.9	
PAN AM	AEROFLOT			M
PHILIPPINE AL	TWA			R
QANTAS	AMERICAN AL			M
SAS	CONTINENTAL	9.9		M
SINGAPORE AL	AMERICAN			R
	DELTA	5	2.8	
TRANS WORLD	USAIR			M
UNITED	ALITALIA			R
	AUSTRALIAN			R
	BRITISH AW			M
USAIR	ALITALIA			M
	TWA			M

KEY: * = PLANNED; ** = SUBJECT TO REGULATORY APPROVAL; M = WIDE-RANGING MARKETING ALLIANCE; R = ROUTE OR MARKET SPECIFIC ALLIANCE; J = JOINT VENTURE; C = CARGO; MAN = MANAGEMENT CONTRACT

SOURCE: Adapted from: Jennings, Mead. "Strategic Illusions", *AIRLINE BUSINESS*, August, 1990, pages 27, 28 & 30.

Equity Alliances

It is sometimes difficult to separate the new variation . . . equity partnerships . . . from the old marketing alliance theme. The practice of alliance partners buying into each other has quickly gained acceptance in the airline industry even though the strategy is expensive and time consuming. Delta holds a 5% equity in Swissair who holds a 4.6% equity in Delta. The reciprocal 7.5% equity holdings of American and Air New Zealand were mentioned earlier. The largest equity holdings are the reciprocal amounts of Air Micronesia and Continental Airlines at 30% each. Japan Air Lines and Hawaiian Airlines run a close second with 25% each. The smallest equity positions are those of Singapore and Delta Airline Companies at 2.8% each. These equity holdings are looked upon by some as a method of cementing the relationship between two airlines for the long run. Those who oppose equity swaps do not see the need for the investments. To the opponents, the investments are nothing more than wasted management time and an inappropriate use of investors' money. To many, equity alliances are becoming a symptom of airlines in distress. Others see them as defensive postures which Delta readily admits that the 5% stakes it sold to Singapore and Swissair helped to fend off take over attempts which were in the wings just before the alliance took place.

To understand more clearly why the industry feels there is a need for marketing and equity alliances, a look at the industry in terms of traffic and capacity should provide some clues.

Frequent Flyer Program/Alliances

How can an airline play the passenger number-game and win? However an airline wins new customers - merger, consolidation, buyout, takeover, route purchase, new authority, discount fares, or other promotional programs - it must retain them as customers. One of the current favorite methods is the frequent flyer program. This program allows a passenger to bank his/her flight miles for the purpose of qualifying for a free trip for the passenger, his/her spouse or children, free rental cars, hotel accommodations or some other discounted fare.

For instance, Delta Air Lines' frequent flyer program is supported by a partnership agreement with Air Canada, Air New Zealand, Japan Airlines, Lufthansa, KLM Royal Dutch Airlines, Singapore Airlines and Swissair. These air carriers, except Japan Airlines, allow the passenger to earn 100% of their actual mileage in Economy Class; from 125% to 150% in Business Class and 150% to 200% in First Class.

Delta also has partnership agreements with Alamo, Avis and National car rental firms. For those needing to spend the night, the agreement extends to Hyatt Hotels, Marriott Hotels, Preferred Hotels, Trusthouse Forte or Hilton Hotels/Hilton International. Passengers are eligible to earn 1,000 miles bonus credit each from the car rental firm and/or hotel.

Delta also extends an invitation to join the Crown Room Club which offers an array of services, complimentary beverages, meeting areas for business associates and special travel services ranging from assistance with check-in, seat assignments and boarding passes to personal check cashing privileges. Single membership is available at \$150.00 per year; \$200 for a member with spouse or the deduction of 30,000 miles from the member's Frequent Flyer mileage for one year single membership or 40,000 miles deduction for member with spouse.

Continental Airlines' Frequent Flyer Program is called ONEPASS and includes the following partners: Continental Express, Aer Lingus, Air France, Alitalia, Iberia, KLM, Lufthansa, Sabena, SAS and The Trump Shuttle. Continental allows a passenger who doesn't have sufficient mileage for a specific reward to "lock in" the current mileage level required for qualification for a period of up to three years or until his account accrues the required mileage. A passenger who is short on mileage for a particular reward, may purchase up to 20% of the necessary mileage for \$20 per 1000 miles.

Continental also has agreements with several car rental firms. These include National, Europcar, Tilden, General Hertz and Thrifty. Its hotel accommodations include Marriott, Camino Real, Westin, (Compri) Hotels by Doubletree, Consort, Doubletree Hotels, The Radisson Hotels, and Wyndham Hotels. These hotels offer 500 miles per stay at the published retail or corporate rate.

United Airlines has a large compliment of partner firms through which a passenger can earn Frequent Flyer mileage. Of the airlines, these include Air France, Alitalia, Aloha Airlines, Aloha Island Air, British Airways, Iberia Airlines of Spain, KLM Royal Dutch Airlines, Lufthansa German Airlines, SABENA World Airlines, SAS, and Swissair. A 25% mileage bonus is available for a paid Business Class reservation and 50% bonus for paid First Class travel on United.

If a passenger charges his flight ticket, he will receive one mile for every dollar charged to a Mileage Plus, First Card Visa, Mileage Plus First Card Gold, Master Card Gold, or United Airlines Travel Card.

Participating carriers with American Airlines include American Eagle, British Airways, Cathay Pacific Airways, Qantas Airways, and Singapore Airlines.

American's car rental agreements include Avis and Hertz. Hotels accommodations are available through Hilton Hotels and Resorts, Inter Continental Hotels, Forum Hotels, ITT Sheraton, Marriott Hotels and Resorts and Wyndham Hotels and Resorts. Frequent Flyer Passengers can earn 500 mileage credits per night and a complimentary split of champagne by providing his/her "AAdvantage" number upon check-in at any Inter Continental or Forum Hotel. These mileage credits can be earned for up to seven consecutive nights per property (hotel) per calendar month.

USAir, in addition to its Frequent Flyer Program which seems to be a stand-alone program that is not associated with any other airline company, has segmented its total market into several sub-markets. Two of the more prominent segmented programs are Military Fares and Senior Savers. Military personnel on active duty and their dependents can get 50% discounts off regular coach fares to cities in the United States and Puerto Rico. Dependents are eligible for 50% discounts even if they are not traveling with their active duty family member. Substantial discounts of up to 75% of economy class fares are offered to and from European destinations.

For those 62 years of age or older, USAir offers two special ways to save on flights; 10% discounted Senior Saver Fare and Golden Opportunities Coupon Books which come in two packages of four one-way coupons for \$473 or eight one-way coupons for \$790. A number of restrictions apply which tend to reduce the overall benefits.

In addition to strategic alliances, there are many other methods available to carry out perceived future market opportunities. In addition, to those already mentioned - mergers and acquisitions; geographical (regional) alliances; marketing alliances, computer reservations system (CRS) consortia - must be added the formulation of trading blocs such as the "United States of Europe - the European Economic Community (EEC) of 1992" and the European Free Trade Area (EFTA) which is the EEC's largest trading partner with six countries (Austria, Finland, Iceland, Norway, Sweden & Switzerland).¹¹

In Europe, London's two main airports, Heathrow and Gatwick, lie at the heart of a global network of air services. They are the two busiest international airports in the world.¹² Britain also has more than 20 major regional airports - serving such cities as Belfast, Birmingham, Cardiff, Glasgow, Leeds, Manchester and Newcastle. Tying into an extensive domestic network, they also have direct international links.¹³

Together, Britain's airports handle over 7,000 international flights each week. They also service about 5,000 domestic flights per week, many of them "shuttles" - linking the United Kingdom's (UK) major commercial and industrial centers within one hour's flying time of each other.¹⁴

There are more than fifty (50) airlines operating in the United Kingdom, handling approximately 26 million passengers annually and, in 1988, the UK's airports shipped nearly 800 thousand tons of cargo.¹⁵

However, there are only three domestic carriers in the United States that are already putting the various alliances, mentioned above, together and who have the best chance of survival and profitability over the long term; i.e., American, Delta and United (assuming someone can clear up United's ownership confusion in the very near future). These three airlines have the greatest probability of survival and profitability because they have the CRSs, the large dispersed hubs, the equipment is either on hand or on order, and their international routes are growing.¹⁶

American has gradually become (along with Pan Am, until it ceased operations in December, 1991) the major U.S. Carrier in Miami, American Airlines has a 29-point Caribbean system that is the largest of any domestic airline and is closing ground on Eastern Airlines' old Latin network by receiving, on March 8, 1990, clearance from the Justice Department to purchase Eastern's Latin routes. The \$349 million sale must still be approved by the Department of Transportation and the federal bankruptcy court overseeing Eastern's re-organization. The new authority will give American Airlines control of a 20-city network in Central and South America.¹⁷

By comparison, British Airways and Air France have positioned themselves better than even American, Delta or United since they command over 95% of their home markets, compared to the 15% - 18% controlled by American or Delta.¹⁸

Other European carriers are following British Airways' and major U.S. air carriers' lead who are rushing to gain access to Western European gateways before 1992. For instance, KLM took a large stake in Northwest and a small share of Air UK. Swissair and SAS have agreed to take a 10% share of each other while Air France and Lufthansa have formed their own alliance.¹⁹

The smaller carriers must rely on international traffic to grow and are being very creative in reaching for ownership and alliances. For example, SAS is now allied with Continental in the U.S.; Lan-Chile in South America; Swissair in Europe to tap the Middle East and Africa; and Thai in Asia. Another strategy of SAS's Jan Carlzon is that he has adopted former United Chairman Dick Ferris's concept of building a door-to-door travel network with hotels, reservations systems and car rentals. All of this links together information distribution systems, ground transportation systems and airport ground services. Very simply, SAS's Chairman Carlzon intends to capture the passenger from the moment he leaves the home or office to the moment he returns.²⁰

Tactical Implementation of Strategies

North America and Europe are the two major powers in the move toward a globalized airline industry. Europeans are using the tactic of dividing U.S. air carriers to capture U.S. market share with various alliances. The tactic is working because it is often in the interest of individual U.S. carriers to build international ties with foreign operators even though such action will undermine their own U.S. competition. It is the highly competitive atmosphere that allows U.S. carriers to be segmented by foreign carriers and this segmentation process makes it easier to access U.S. markets through these ownership and marketing alliances.²¹

For example, a foreign carrier looks for two U.S. domestic carriers which are competing for traffic originating within the United States but which has a foreign destination through an international departure point in the United States. The foreign carrier creates an alliance with the U.S. carrier which cannot fly out of that departure point to international destinations. As a result, the foreign carrier obtains (at least part of) the international traffic rather than the other U.S. carrier that did have international operating authority.

In this situation, European carriers hold a significant competitive advantage because domestic competition, while intense in the United States among air carriers, is virtually nonexistent among the major foreign carriers since there is essentially only one large carrier in each home market. Therefore, if a U.S. air carrier wants to create an alliance with a foreign carrier overseas and the foreign carrier says "NO", the U.S. carrier has no option and, very simply, has no access to that specific market.²²

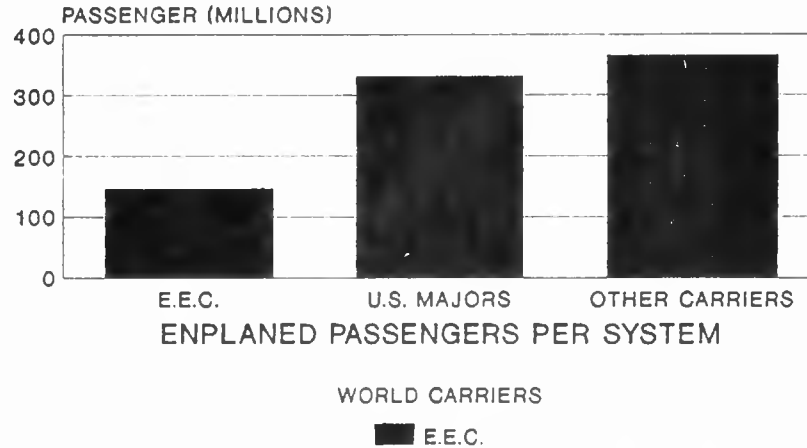
On the other hand, if one domestic carrier in a U.S. market (Hub) says "NO" to an alliance proposal of a foreign carrier, there are often as many as seven (7) or eight (8) other U.S. domestic carriers with whom the foreign carrier can create alliances or take an equity position. Financially more important, if the foreign carrier can develop an alliance, the market accessed by the foreign carrier can often rival the size of its home market. For example, British Airways (B.A.) Deputy Chairman Colin Marshall calls its agreement with United "the best relationship of any two airlines." (and) "We are very complementary and the combination of the two from a marketing standpoint makes all the sense it did originally." The reason that it does make good sense for the foreign carrier is because British Airways' agreement with United gives it access to 48% of the world's international scheduled passenger traffic when, otherwise, it would only have access to 17% of that market!²³ Speaking of markets for air travel, just how does the United States compare with Europe?

United States versus Europe, et al

EXHIBIT 3 illustrates the point that U.S. Majors accounted for 330 million or 39.3% of the passengers enplaning world carrier systems in 1988. It also compares the United States (Major) carriers with two other categories; European Common Market (E.E.C.) - including the European Free Trade Association (EFTA). The European Common Market, including the EFTA, enplaned only 145 million (out of 840 total enplaned passengers) customers for a 17.3% share of the market. All other world carriers enplaned a total of 365 passengers for a 43.4% share of this lucrative market which must be split among a number of smaller carriers. Carried one step further, EXHIBIT 4 illustrates the percentage of total traffic (Shown on the left-hand Y-axis) for six geographical areas - North America, Domestic [N.A.(D)]; Far East (F.East); Europe (Intercontinental); North America (International); Europe-Intra, and a miscellaneous category of Others. Exhibit 4 also estimates the growth experienced in 1989 and forecasts the expected growth for a six-year period (1990 - 1995) for these areas. It is interesting to note that the Far East had the greatest estimated percentage growth in 1989 and is expected also to again be the leader in growth during the six-year period 1990 - 1995. Ignoring the category of "Others", Europe (intercontinental) is forecasted to be second in growth and North America (International) third behind the first two positions.

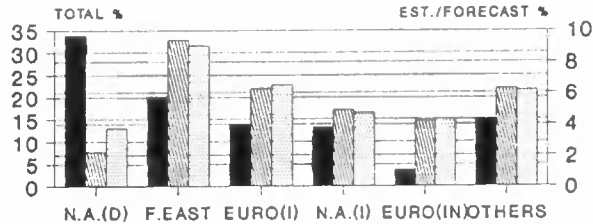
Yet the first five positions, in rank order, of net increase in international passenger enplanements are staffed with two foreign air carriers, British Airways and Lufthansa. EXHIBIT 5 shows that the second five positions have only two American air carriers, Continental and Pan Am. One might say that as far as enplanements are concerned American air carriers are only handling fifty percent while the other half is being shared by a number of different countries.

EXHIBIT 3: WORLD CARRIERS SYSTEM ENPLANED PASSENGERS



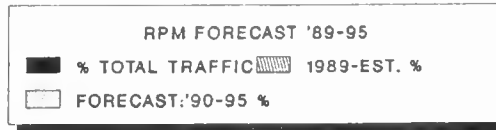
SOURCE: STATE OF THE AIRLINE INDUSTRY,
AIRLINE ECONOMICS, INC. WASHINGTON, DC
JANUARY, 1990.

EXHIBIT 4
 WORLD REVENUE PASSENGER MILES
 GROWTH FORECAST: 1989 - 1995



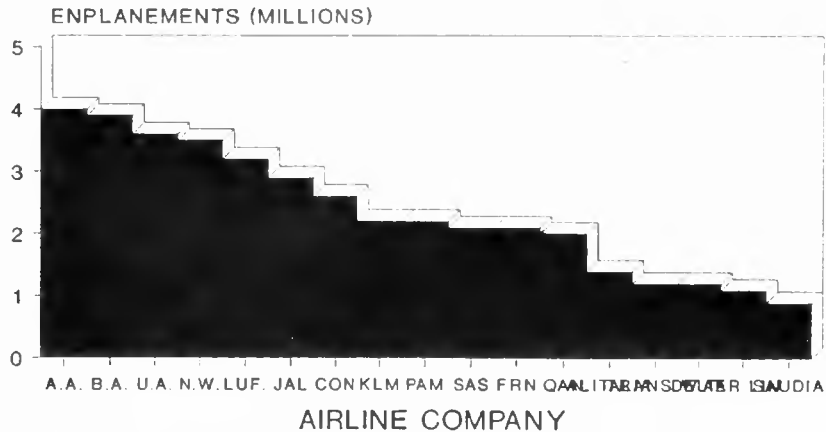
	N.A.(D)	F.EAST	EURO(I)	N.A.(I)	EURO(IN)	OTHERS
% TOTAL TRAFFIC	33.8	20.2	13.9	13.2	3.6	15.1
1989-EST. %	2.2	9.4	6.3	4.9	4.2	6.3
FORECAST: '90-95 %	3.7	9	6.5	4.7	4.3	6.2

TRAFFIC PER GEOGRAPHIC REGION



ADAPTED FROM: Dr. George James, State of the Airline Industry, Airline Economics, Inc., Washington D.C., January, 1990.

EXHIBIT 5 NET INCREASE IN INTERNATIONAL PASSENGERS ENPLANEMENTS



SOURCE: STATE OF THE AIRLINE INDUSTRY
AIRLINE ECONOMICS, INC. WASHINGTON, D.C.

American air carriers do not fare much better in a ranking of the top 50 airline companies by profits. Table 5 indicates that only two American airlines - United and American - were numbers one and two, respectively, out of the top five airlines; Alitalia, Cathay Pacific, and British Airways occupied third, fourth, and fifth places, respectively.

In the second group of five airline companies, the United States again had only two representatives - Delta and Trans World - who occupied the sixth and eighth places, respectively. And once again, the other three positions were held by firms from foreign countries; Singapore (7), Iberia (9), and Air France (10). Therefore, only four American carriers are ranked in the ten most profitable air carriers in the world, The other six positions are held by air carriers from six different countries. Competition, based on profitability on a global basis, is currently alive and doing very well!

When ranked by passengers enplaned in 1988, the United States air carriers occupied three of the top five positions; United (1), American (3), and Delta (4). TransWorld Airlines (6) and British Airways (7) were the only other air carriers that were ranked in the top ten most profitable carriers that were also ranked in the top ten carriers when ranked by enplaned passengers in 1988. In other words, five of the most profitable airline carriers were more economical in operating their companies than five other companies that carried more passengers but made less profit. For example, Texas Air was ranked 46th in profitability but 2nd in the number of passengers carried. Pan American ranked 43rd in profitability but 9th in passengers enplaned.

Table 5
The Top 50 Airline Companies
Ranked by Profits and Passenger Miles

Company & Rank/Profit	Country	(Millions) '88 Profits	(Billions) 1988 Passenger Miles and Rank
1. United Air Lines	U.S.	\$1,124.3	69.1 (1)
2. American Air Lines	U.S.	476.8	64.8 (3)
3. Alitalia	Italy	368.6	
4. Cathay Pacific	Hong Kong	361.6	
5. British Airways	Britain	331.3	30.5 (7)
6. Delta	U.S.	306.8	49.1 (4)
7. Singapore	Singapore	299.0	
8. Trans World	U.S.	249.7	34.8 (6)
9. Iberia	Spain	208.2	
10. Air France	France	193.5	
12. USAir Group	U.S.		30.4 (8)
14. Japan Air Lines	Japan		28.3 (10)
17. Northwest Airlines	U.S.		40.1 (5)
43. Pan American	U.S.		29.0 (9)
46. Texas Air	U.S.		69.0 (2)

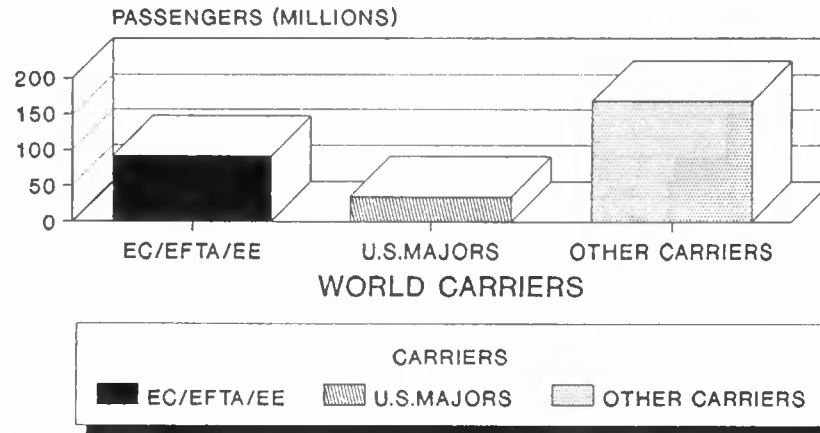
Source: Woods, Wilton. "Revolution in the Air", *Fortune*, January 1, 1990, pp. 58-59.

Specifically, in the international market, we find that U.S. Majors - as illustrated in EXHIBIT 6 - carried only 35 million of the total 294 million international passengers in 1988. This represented only 12% of the total while the European Economic Community (EEC), the Europe Free Trade Area (EFTA), and the Eastern Europe carrier system accounted for 91 million passengers or 31% of the total, Other carriers accounted for the balance of 168 million (57%).

EXHIBIT 7 shows the relative market position of the European Common Market air carriers in terms of enplaned passengers. British Airways (B.A.) leads the group with 23 million enplaned passengers in 1988 for a market share of 21% of the 107 million total passengers. Sabena Airlines had the smallest share of only 1.8% or 2 million enplaned passengers. Iberia, Air France, and Alitalia were all tied for third place with 14% representing 15 million enplaned passengers. Lufthansa was second with 16.8% (18 million passengers), a full 4.2% behind first place British Airways.

The European Free Trade Association (EFTA) did not have the volume of passengers but competition was thriving nevertheless. Of the total 26.8 million passengers, SAS enjoyed a 49.6% (13.3 million passengers) share of the market. Swissair enplaned 7.1 million passengers for a 26.49% market share. A distant third place was held by Finnair (14.2% market share with 3.8 million passengers) which enplaned only 53.5% of the volume enjoyed by Swissair and less than a third (28.6%) of the volume of SAS Airlines. Fourth and fifth places were occupied by Austrian Airlines (1.8 passengers or 6.7%) and Icelandair (.8 passengers or 2.98%) respectively (see EXHIBIT 8).

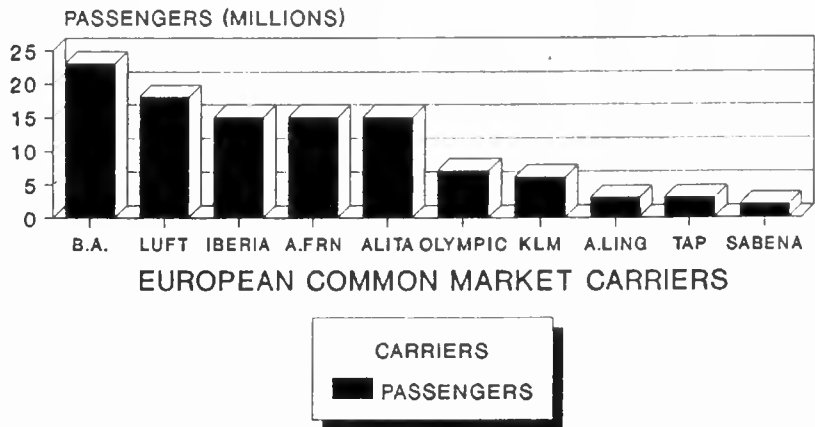
EXHIBIT 6 WORLD CARRIERS INTERNATIONAL PASSENGERS



SOURCE: STATE OF THE AIRLINE INDUSTRY
AIRLINE ECONOMICS, INC. WASHINGTON, D.C.

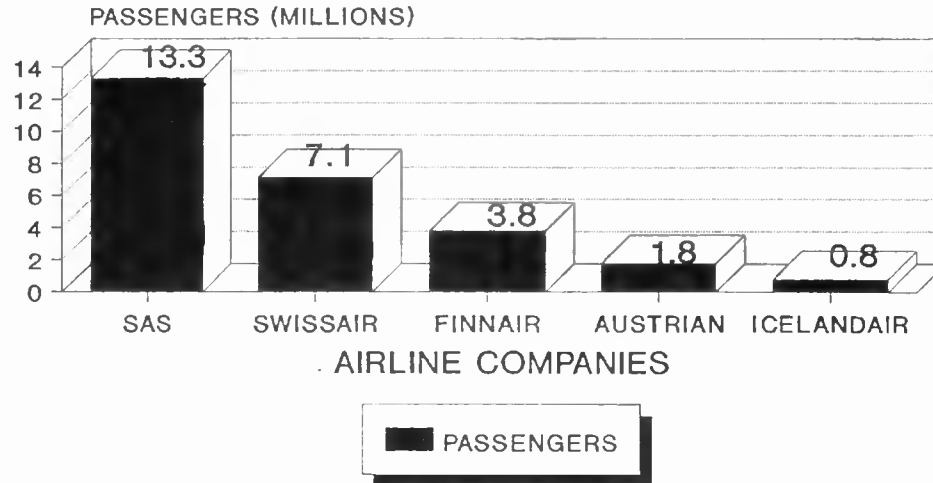
EXHIBIT 7

EUROPEAN COMMON MARKET CARRIERS SYSTEM ENPLANED PASSENGERS



SOURCE: STATE OF THE AIRLINE INDUSTRY
AIRLINE ECONOMICS, INC. WASHINGTON, D.C.

EXHIBIT 8 EUROPEAN FREE TRADE ASSOCIATION SYSTEM PASSENGERS



ADAPTED FROM IATA WORLD AIR TRANSPORT
STATISTICS AND AIRLINE ECONOMICS, INC.

Impact of Domestic and Global Factors

The impact of all of these factors is that airline management must recognize that one of the areas of the FUTURE for the airline industry will be in GLOBALIZATION - WHICH IS BEING FOSTERED ON THE AIRLINE COMMUNITY BY DEREGULATION ON A DOMESTIC AND AN INTERNATIONAL LEVEL - as witnessed by American's purchase of Eastern's Latin America routes; THE EQUITY POSITIONS BEING TAKEN BY NUMEROUS AIRLINE COMPANIES IN OTHER MEMBERS OF THE AIRLINE COMMUNITY ON A WORLD-WIDE BASIS; the marketing alliances being developed between U.S. domestic airlines and foreign carriers; joint computer reservations systems, and the deregulation of the European Economic Community by 1992 are only a few examples of the move to globalization.

Management must not be misled by the apparent increase in the intensity of competition among carriers. As time wears on, and it is found that more and more marketing alliances are developed by once competing carriers; AS MORE AIR CARRIERS BECOME OWNERS OF OTHER AIR CARRIERS, as a few forced mergers (because of economic circumstances - Pan Am has lost \$1.1 billion since 1984)²⁴ take place and as individual carriers stake out their respective niches, the industry will actually experience less competition. More specifically, the FUTURE of the airline industry is going to impact management by demanding more creative responses to such things as:

1. Fare increases that are probable not only over the next few months but over the next few years. This will be true especially in those markets in which carriers experience very little or no competition, However, management should be cautious in increasing its fares in markets where virtually no competition exists because of the possibility of pricing itself out of the market by driving the customers to other modes of transportation and/or attracting the attention of federal regulators who still harbor the notion that the airline industry should be re-regulated.

2. Even with increasing fares, service is likely to remain about the same - notwithstanding USAir's President stating that " - (Service is) at the top of the heap right now."; in addition to the fact that USAir was **FIRST** in being **LAST** in **ON-TIME ARRIVALS AND DEPARTURES** until most recently when it moved from **LAST** to **FIRST!** Managerially, costs must be kept in line in relation to revenue. However, the reduction of passenger services will likely draw the ire of the flyer unless the fare is reduced appropriately and the passenger knows when he purchases his ticket that it is a "No-Frills" flight. If this is not the case, management must become adept at "Non-Price" competition and communicate to the potential passenger the values he/she will receive for the price paid for the ticket; e.g., a larger selection of flight schedules, fewer (or no) changes between origin and destination, wider seats, ground services, etc.

3. Ownership is going to be the key to the future development of worldwide airline services according to the recent trends in airline ownership through equity alliances. You can find the future survivors if you find the owners of other airlines, hubs, computer reservation systems (CRS's), and new equipment. Ownership provides greater control than marketing alliances. Major examples include: DELTA'S 5% equity swap with Swissair and Singapore; AMERICAN'S do-it-yourself philosophy (even though it owns a piece of Air New Zealand); KLM's partial ownership of NORTHWEST and 20% of SABENA and SAS which has a piece, it seems, of almost everybody - 9.9% of Texas Air; unspecified portions of Lan-Chile and Thai; 24% of Airlines of Britain which is currently seeking authority through British Midlands. A financial link of 5% - 10% has been proposed between SAS and Swissair, Both of these airlines are establishing links with Finnair in order to serve the Eastern European market. While the Austrian government has reduced its share of Austrian Airlines to 51%, Swissair is attempting to increase its share from the current 8% to 10%; All Nippon has 3.5% which it hopes to increase to 5%; Air France has 1.5% and Lufthansa has shown interest in taking a 10% share.²⁵

Management should be aware that changes in the ownership of airline companies could mean significant changes in the labor market. One possibility is that fewer managerial jobs might be available in the domestic market while employment opportunities could well increase on the international level. This could demand increased mobility of airline employees not only within the continental United States but globally also. Management should prepare for the eventual negotiation of labor contracts that cross continental borders for all levels of employees.

4. Another important consideration for management as both marketing and equity alliances increase in popularity is control. Equity, as mentioned, allows for reciprocal marketing practices over which control can be exerted by the owning partner(s). That control can easily be extended to the marketing alliances and the marketing function of pricing. Management will have to be extremely careful to avoid even the appearance of collusion in pricing practices. Deregulation was implemented because there was a desire to increase competition. Deregulation removes external controls over many marketing practices which the industry and its individual members are now going to have to police.

5. The **FUTURE** for the airline industry? Probably five or six mega-worldwide carriers by the year 2000 with each having a subsidiary operation in North America, Europe and Asia. There will be niche airlines, largely state owned or under state controls, operating in the Middle East, Latin America and Africa. These niche airlines will, of course, avoid free market competition as much as possible. In order to avoid this free market competition as much as possible, management must develop its expertise in market segmentation through the practice of **Market Targeting** (identifying the specific market(s) to be served) and **Target Marketing** (developing a marketing mix - product differentiation - that appears to satisfy the demands of each specific market).

6. Those air carriers surviving in the year 2000 will fall into one of three categories: (1) Proactive (Examples: American, British Airways, Delta, United, Air France), (2) Active: Wait-and-See (Examples: Northwest, Continental, Iberia), and (3) Reactive (Examples: Niche carriers such as Singapore, Swissair and others from Africa, Latin America and the Middle East).²⁶ Management will decide into which of these three categories its airline company will participate by the goals, strategies, and action plans it develops. But the important point is that management must make a decision or, at least, recognize the decision that has been forced upon it by the strategies that have been developed. If management does not make a conscious decision, competition will force it into one of these categories by forcing the company to take specific managerial actions regarding such things as passengers fares, service, and flight schedules. It is always more convenient to decide a competitive issue than to have it decided by competitors.

Conclusion

Macro-industry analysis tells us that the major U.S. players in the game will be reduced in number. This reduction continues in the month of December, 1991 as two more carriers are lost to bankruptcy: Midway and Pan American. However, macro-analysis also tells us that the airline industry will become more globalized and that competition on this level will increase significantly. Deregulation was once the future of the airlines. But deregulation led to competition at home and abroad. It now appears that nearly the whole world wants a piece of the action. Out of the ten most profitable airline companies in the world, the United States claimed only four positions; the First, Second, Sixth, and Eighth. The other six slots represented six different countries - Italy, Hong Kong, Britain, Singapore, Spain, and France. When ranked by passenger miles, INSTEAD OF PROFITABILITY, one-half of the top-ten companies changed their

positions. The U.S. maintained its four positions but was only able to place a firm in the First, Third, Fourth, and Sixth rankings.

Part of the answer to the question is that airline companies are going to have to BECOME INVOLVED IN STRATEGIC PLANNING IN ORDER TO DEVELOP STRATEGIES OF GLOBALIZATION FOR EACH OF ITS MARKETS AND FOR THE COMPANY AS A WHOLE - A MASTER STRATEGY, IF YOU WILL. With the United States accounting for 330 million or 39.3% of the passengers enplaning world carrier systems in 1988, the world is beating a path to the front door of America (i.e., "THEY" . . . NOT "WE" . . . are developing marketing alliances with American airline companies). Those who can't get in the front door head for the back door (they buy a piece of an American airline firm); look for a window (share a computer reservations system - CRS) to squeeze through or simply buy out the entire company.

However, once the hype has diminished, the economic analyses have been completed, the mashing and gashing of teeth have subsided; the moaning and groaning have ceased; the knuckle cracking has been silenced, and finger pointing is a thing of the past, we will find that the air under the wings of the future of the airline industry will be provided by four elements: (1) Fares, (2) Service (MARKETING ALLIANCES), (3) Ownership (EQUITY ALLIANCES) and FREQUENT FLYER PROGRAM ALLIANCES. Given these four elements; given the direction of the industry today and barring interference by governmental bodies (i.e., barring a return to re-regulation), we will see that there will be true worldwide mega-carriers by the year 2000. Whether mega-carriers will provide additional services, conveniences, lower fares, a greater variety of destinations or whether they will be regional/hub monopolies with high fares, limited services and fewer destinations remains to be seen.

APPENDIX

TABLE 6
STRATEGIC ALLIANCES
IN THE AIRLINE INDUSTRY

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
AER LINGUS	AMERICAN			R
	LUFTHANSA			RC
AEROFLOT	ANA/AUSTRIAN			R
	CANADIAN AL			M
	FINNAIR			M
	PAN AM			M
	TNT			JC
AEROLINEAS	QANTAS			R
AIR AFRIQUE	AIR MAURITANIE	20		
AIR BOTSWANA	NAMIN AIR			R
AIR CANADA	AIR NEW ZEALAND			R
	B MIDLAND			R
	CATHAY			R
	SINGAPORE AIRLINES			R
	TWA			M
	AIR EUROPE/ILG	AIR EUROPA	25	
	AE SPA	33		
	AE SCAND.	35		
	ALL NIPPON			M
	NFD	49		
AIR FRANCE	AIR INTER	37		M
	AIR MADAGASCAR	3.48		
	AIR MAURITIUS	12.77		R
	AUSTRIAN	1.5		

KEY: *=PLANNED; **=SUBJECT TO REGULATORY APPROVAL; M=WIDE-RANGING MARKETING ALLIANCE; R=ROUTE OR MARKET SPECIFIC ALLIANCE; J=JOINT VENTURE; C=CARGO; MAN=MANAGEMENT CONTRACT

SOURCE: Jennings, Mead. "Strategic Illusions", *AIRLINE BUSINESS*, August, 1990, pages 27, 28 & 30.

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	CANADIAN AL			R5
	EURO BERLIN		51	
	LUFTHANSA			COOP,J
	R AIR MAROC			M
	THAI INTL			RC
	UTA	54.8		
AIR-INDIA	AIR MAURITIUS	8.51		R
	TWA			R
AIR INTER	AIR FRANCE		37	M
	UTA		35.8	
AIR JAMAICA	AIR NEW ZEALAND			R
AIR LANKA	MALAYSIA AL			M
AIR LIBERTE	ALISARDA			M
AIRLINES OF BRITAIN	SAS		24.9	
AIR MADAGASCAR	AIR FRANCE		3.48	
	AIR MAURITIUS			R
AIR MAURITANIE	AIR FRANCE		12.77	R
	AIR MADAGASCAR			R
	AIR-INDIA		8.51	R
	BRITISH AW	12.77		
	CATHAY			R
	LUFTHANSA			R
	MALAYSIA AL			R
	SINGAPORE AIRLINES			R
AIR MICRONESIA	ALOHA		10	
	CONTINENTAL		30	
AIR NEW ZEALAND	AIR CANADA			R
	AMERICAN		7.5	
	BRITISH AW			R
	CATHAY			R
	JAPAN AL		7.5	
	QANTAS		19.9	R
	MALAYSIA AL			R
	SINGAPORE AIRLINES			R
	R JORIANIAN			R
	AIR JAMAICA			R

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	AIR ZIMBABWE			R
	VARIG			R
AIR NIUGINI	CATHAY			R
	PAL			R
	QANTAS			R
	SINGAPORE AIRLINES			R
AIR PACIFIC	QANTAS		19.6	R
AIR UK	KLM	14.9		M
AIR VANUATU	ANSETT		40	
AIR ZIMBABWE	AIR NZ			R
	QANTAS			R
ALISARDA	AIR LIBERTE			R
	MERIDIANA	25		
ALITALIA	ATI	100		
	CANADIAN AL			R
	IBERIA			M
	USAIR			M
ALL NIPPON	AIR EUROPE			M
	AEROFLOT/AUSTRIAN 9			R
	NIPPON CARGO 11.43			
	SAS			M
	TWA			R
ALM	KLM			M
ALOHA	AIR MICRONESIA 10			
AMERICAN	AER LINGUS			R
	AIR NEW ZEALAND 7.5			
	CATHAY			R
	FINNAIR			R
	MALEV			R
	QANTAS			M
	SINGAPORE AIRLINES			R
AMERICA WEST	ANSETT		20	
ANSETT	AIR VANUATU 40			
	AMERICA WEST 20			
	COOK IS INT			M
	LADECO 25			

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	POLYNESIAN			MAN
	TNT		50	
ATI	ALITALIA		100	
AUSTRALIAN	UNITED			R
AUSTRIAN AL	AIR FRANCE		1.5	
	ANA/AEROFLOT		9	R
	SWISSAIR		10	
AVIACO	IBERIA		67	
BALAIR	SWISSAIR		48.9	
BRITISH AW	AIR MAURITIUS	12.77		
	AIR NEW ZEALAND			R
	CALEDONIAN	100		
	CANADIAN AL			R*
	DELTA			R
	GB AIRWAYS	49		
	MAERSK			J
	SWA	20**		
	UNITED			M
BRITISH MIDLAND	AIR CANADA			R
CALEDONIAN AW	BRITISH AW			100
CANADIAN				
AIRLINES	AEROFLOT			M
	AIR FRANCE			R
	ALITALIA			R
	BRITISH AW			R*
	JAPAN AL			R
	LUFTHANSA			R
	MIDWAY			R
	SAS			R
CARGOLUX	LUFTHANSA		24.5	
	LUXAIR		24.9	
CATHAY PACIFIC	AIR CANADA			R
	AIR MAURITIUS			R
	AIR NEW ZEALAND			R
	AIR NIUGINI			R
	AMERICAN			R
	DRAGONAIR	35		

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	JAPAN AL			R
	LUFTHANSA			RC
	MALAYSIA AL			R
CANDOR	LUFTHANSA		100	
CONTINENTAL	AIR MICRONESIA	30		
	SAS		9.9	M
COOK ISL. INTL	ANSETT			M
CRUZEIRO	VARIG		100	
CTA	SWISSAIR		38.2	
DELTA	BRITISH AW			R
	SINGAPORE AIRLINES	2.8	5	M
	SWISSAIR	5	4.6	M
DHL INTL	JAPAN AL		5(20*)	
	LUFTHANSA		5(20*)	
DRAGONAIR	CATHAY		35	MAN
EAST-WEST	TNT		60	
EURO BERLIN	AIR FRANCE		51	
FRANCE	LUFTHANSA		49	
FINNAIR	AEROFLOT			M
	AMERICAN			R
	JAS			R
	SAS	< 10*	< 10	M
	SWISSAIR			M
GARUDA	JAPAN AL			R
	KLM			R
	KOREAN			R
	LUFTHANSA			R
	MALAYSIA			R
	SINGAPORE AIRLINES			R
	THAI			R
	UTA			R
GB AIRWAYS	BRITISH AW		49	
GERMAN CAR. SER	LUFTHANSA		100	
GULF AIR	TWA			R
HAPAG LLOYD	LUFTHANSA		10	
HAWAIIAN	JAPAN AL		25	
IBERIA	ALITALIA			M
	AVIACO	67		

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	JAPAN AL			R
	R AIR MAROC			M
	VIVA	100		
INTERFLUG	LUFTHANSA		26	M,J
JAPAN AIR LINES	AIR NZ	7.5		
	CANADIAN AL			R
	CATHAY			R
	DHL INTL	5(20*)		
	GARUDA			R
	HAWAIIAN	25		
	IBERIA			R
	JAPAN AS	9		
	JAPAN ASIA	100		
	QANTAS			R
	SOUTHWEST	51		
	SWISSAIR			R
	THAI INTL			R
	UTA			R
JAPAN AIR SYSTEM	FINNAIR			R
JAPAN ASIA	JAPAN AL	100		
KLM	AIR UK	14.9		M
	ALM			M
	GARUDA			R
	MARTINAIR	29.8		
	NIPPON CARGO			RC
	NLM	100		M
	NORTHWEST	14.9		RC
	SWA	20**		
	SINGAPORE AIRLINES			RC
	TRANSAVIA	40		
	VIASA			R
KOREAN AIR	GARUDA			R
LADECO	ANSETT		25	
LAN-CHILE	SAS		30	
LINJFLYG	SAS		100	
LTU	LTE	25		
LUFTHANSA	AER LINGUS			C
	AIR FRANCE			C,J

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	AIR MAURITIUS			R
	CANADIAN AL			R
	CARGOLUX	24.5		
	CATHAY			RC
	CONDOR	100		
	DHL INTL	5(20*)		
	EURO BERLIN	49		
	GARUDA			R
	GERMAN CARGO	100		
LUFTHANSA	HAPAG LLOYD	10		
	INTGERFLUG	26		M,J
	THAI INTL			R,RC
LUXAIR	CARGOLUX	24.9		
MAERSK	BRITISH AW			J
MALAYSIA AL	AIRLANKA			M
	AIR MAURITIUS			R
	AIR NEW ZEALAND			R
	CATHAY			R
	GARUDA			R
	R JORIANIAN			M
	SINGAPORE AIRLINES			R
	THAI INTL			R
MALEV	AMERICAN			R
	PAN AM			R
	TNT			R
	TWA			R
MARTINAIR	KLM		29.8	
MERIDIANA	ALISARDA		25	
MIDWAY	CANADIAN AL			R
NAMIB AIR	AIR BOTSWANA			R
NFD	A OF EUROPE		49	
NIPPON CARGO AL	ALL NIPPON		11.43	
NLM/NETHERLINES	KLM		100	M
NORTHWEST	KLM		14.9	
PAN AM	AEROFLOT			M
	MALEV			R
PHILIPPINE AL	AIR NIUGINI			R

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	TWA			R
POLSNESIAN AL	ANSETT			MAN
QANTAS	AEROLINEAS			R
	AIR NEW ZEALAND	19.9		
	AIR NIUGINI			R
	AIR PACIFIC	19.6		
	AIR ZIMBABWE			R
	AMERICAN AL			M
	JAPAN AL			R
ROYAL AIR MAROC	AIR FRANCE			M
	IBERIA			M
ROYAL JORDANIAN	MALAYSIA AL			M
SABENA WORLD AL	BRITISH AW		20**	
	KLM		20**	
	SOBELAIR	100		
SAS	A OF BRITAIN	24.9		
	ALL NIPPON			M
	CANADIAN AL			R
	CONTINENTAL	9.9		M
	FINNAIR	<10*	<10*	M
	LAN-CHILE	30		
	LINJEFLYG	100		
	SCANAIR	100		
	SPANAIR	49		
	SWISSAIR	7.5*	7.5*	M
	THAI INTL			M
	VARIA			R
SCANAIR	SAS		100	
SINGAPORE AL	AIR CANADA			R
	AIR MAURITIUS			R
	AIR NEW ZEALAND			R
	AIR NIUGINI			R
	AMERICAN			R
	DELTA	5	2.8	
	GARUDA			R
	KLM			RC
	MALAYSIA AL			R
	SWISSAIR	5	5	

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
	TRADEWINDS	100		
SOBELAIR	SABENA		100	
SOUTHWEST AL (JAPAN)	JAPAN AL		9	
SPANAIR	SAS		49	
SWISSAIR	AUSTRIAN	10		
	BALAIR	48.9		
	CTA	38.2		
	DELTA	4.6		
	FINNAIR			M
	JAPAN AL			R
	SAS	7.5*	7.5*	M
	SINGAPORE AIR.	5	5	
THAI INTERNAT'L	AIR FRANCE			RC
	GARUDA			R
	JAPAN AL			R
	LUFTHANSA			R,RC
	MALAYSIA AL			R
	SAS			M
TNT	AEROFLOT			JC
	ANSETT	50		
	EAST-WEST	50		
	MALEV			JC
TRADEWINDS PTE	SINGAPORE AIR.		100	
TRANSVIA	KLM		40	
TRANS EUROPEAN	TEA BASEL	?		
	TEA FRANCE	?		
	TEA UK	?		
TRANS WORLD	AIR CANADA			M
	AIR-INDIA			R
	ALL NIPPON			R
	GULF AIR			R
	MALEV			R
	PAL			R
	USAIR			M
	UNITED	ALITALIA		
AUSTRALIAN				R
BRITISH AW				M

TABLE 6 Continued

Carrier	Partner	Carrier's Equity In Partner(%)	Partner's Equity In Carrier(%)	Pact
USAIR	ALITALIA			M
	TWA			M
UTA	AIR FRANCE		54.8	
	AIR INTER	35.8		
	AIR MAURITANIE	20		
	GARUDA			R
VARIG	JAPAN AL			R
	AIR NEW ZEALAND			R
	CRUZEIRO	100		
VIASA	SAS			R
VIVA	KLM			R
	IBERIA		100	

KEY: *=PLANNED; **=SUBJECT TO REGULATORY APPROVAL; M=WIDE-RANGING MARKETING ALLIANCE; R=ROUTE OR MARKET SPECIFIC ALLIANCE; J=JOINT VENTURE; C=CARGO; MAN=MANAGEMENT CONTRACT

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JIT UTILIZATION: SHAPING THE FUTURE OF THE TRANSPORTATION INDUSTRY

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Introduction

The transportation industry is making rapid changes to accommodate the Just-In-Time (JIT) quick response inventory practices that many of their customers are currently using or are implementing. These JIT production methods, made popular by the Japanese, are quite different than previous inventory and production methods.

Under JIT practices, parts and raw materials necessary to complete finished products are either produced or arrive at the assembly site just as they are needed within the production process. The system is designed to meet the precise demands of customers for various products with minimum delay and minimal inventories of raw materials, finished goods, and work in process. For JIT to operate successfully, several requirements must be met. All parts must be of a high quality with zero incoming defects. These parts must arrive where, when, and in the exact quantity needed. Also, the parts that are received must be of consistent quality, and finally, the finished product must be immediately shipped to the final consumer in order to minimize finished goods inventory and the associated holding cost.

If implemented properly, JIT can substantially increase product quality and reduce inventory, cycle time, scrap, lot sizes, floor space requirements, setup time, and down time for all JIT channel members including suppliers, manufacturers, wholesalers, and retailers. However, JIT involves more than just the changes on the factory floor. As lot sizes decrease, companies are demanding more frequent, consistent deliveries of a smaller quantity of raw materials. They also require finished products to be delivered to their customers as soon as possible. With the move toward minimizing all inventories, transportation companies are now seen as a major player in the JIT system. In the initial stages of JIT implementation, planning is less precise due to lack of data for accurate forecasting so companies still demand the more time-sensitive transportation and delivery modes. As the JIT system evolves and planning and forecasting control improves, companies begin to move to the less time-sensitive and less expensive modes of transportation.

The successful transportation companies of the future will have to expand their operations to better serve their JIT customers' changing transportation needs. Today's individual transportation segments will begin to merge together to form one-stop-shipping companies. The future of this industry will belong to these conglomerates that were once firms in a single transportation segment. These merged firms will encompass all modes of transportation including air, trucking, rail, and water delivery services.

From the shipper's locus of control and point of view, these full-service transportation companies will be a vast improvement over what is being offered today. Since the shippers will only have to deal with a single source for their transportation needs, they will no longer have to make the detailed arrangements for their many shipments with multiple transportation companies. From a competitive standpoint, these conglomerates will be providing more services and a more complete level of service; thus freeing up time and worry over shipment coordination for shippers. The sole responsibility will lie with

one transportation company to pick up all deliveries (packages, letters, boxes, cartons, containers, bulk cargo, etc.) and carry them to their final destination. The transportation supplier can combine multimodal transportation services to save the customer both time and money. This allows "peace of mind" for the shipper and will eliminate the need to have one transportation provider for air express needs, another for rail, another for truck deliveries and still another for water transportation needs.

From the transportation company's point of view, diversification will open new markets and should lead to increased transportation synergy within the firm. In addition to economies of scale, new economies of scope will provide an enhanced range of flexibility for the transportation conglomerate. This flexibility will allow the transportation provider to better serve the new market segments available with a wider range of services from a single firm. These new conglomerate firms will consist of all the delivery modes from overnight air express delivery to water transportation, as well as warehousing services, transportation and warehouse consultation, package tracking and a wide variety of other transportation-related services.

This paper will analyze this blueprint of the future transportation industry and analyze how the role of the transportation industry will change with respect to the changing needs of the JIT shipper. The paper will outline how the various modes of transportation, merged to form a one-stop-shipping company, will eventually become the industry standard, particularly if transportation companies want to sustain a competitive edge.

The Transportation Environment

The current shipping environment is strong for all the various industries providing transportation services. There has been growth in the air cargo and air express divisions as well as a significant rise in trucking volume and revenues. Operating revenues for rail traffic and water transportation is increasing with growing U.S. exports and imports from Japan, the Pacific Rim, and the European Community. Each of these transportation services and their progress toward concentric diversification will be discussed below.

Air Cargo and Air Express

The outlook for the air cargo and air express industry is promising because many national economies are expanding and there is an increased acceptance and desirability of air freight distribution methods. In addition, overnight and second-day air deliveries are becoming increasingly popular ("Shippers Choose Air...", 1989).

Deregulation in the late 1970's contributed to the high growth rate of air cargo capacity for several years, but today, though still remaining high, the number of carriers is decreasing. Continuing competition with a stable pricing environment has brought about air cargo consolidation. The consolidation and mergers between air express air cargo firms, like the one between Federal Express and Flying Tiger Lines, has formed additional marketing alliances between domestic and foreign carriers with new routes and services being created.

Competitors within the air cargo market are the all-cargo carriers, which includes specialists in the air express delivery of heavy shipments and passenger carriers which haul cargo in the belly of passenger aircrafts. For cargo services, profits are still smaller than those of passenger service, but they are rapidly increasing. The established carriers are showing strong growth and have succeeded not only in taking business away from the passenger carriers but also in generating new demand (U.S.

Industrial Outlook, 1991). The traditional airport-to-airport service offered by passenger carriers is giving way to the much more attractive door-to-door service offered by the all-cargo and air express carriers. In order to be more competitive in this market, passenger carriers have begun to engage in new pricing and advertising strategies in order to compete with the successful all-cargo carriers. While costs to shippers are lower from the all-cargo carriers, many prefer to pay more for the reliable door-to-door service air express firms provide.

Advances in freight handling and documentation procedures are also aiding the traditional air cargo carriers. Included in this market segment is the expedited small package carriers. However, the lines between the air cargo industry and the expedited small package industry are increasingly blurred as the package weight limits of the former letter and small package lines have been increased or even eliminated (Helms, 1989). For example, Federal Express has continued to raise their maximum weight limits for packages to compete with UPS. Now they have eliminated the weight limit entirely.

The air express sector owes much of its innovations to the Federal Express Corporation who made nationwide overnight deliveries possible through their utilization of a central super hub and smaller regional hubs. United Parcel Service (UPS) once only a surface delivery firm has also expanded and brought about competition in the air express market. Being the largest shipper of packages, UPS has beefed up its second-day air service, which was started in the mid 1970's, and in 1983 entered the next-day air market to compete directly with Federal Express. UPS has begun the expansion toward a multi-modal transportation company and is currently very successful as a bi-modal organization.

Both cargo and passenger carriers have expressed a strong interest and have even succeeded in expanding their services abroad. By the end of the 1990's, it is likely that four or five major carriers will have global networks, or transportation

conglomerates merged with computer tracking capabilities with an international market and focus. The removal of Europe's restrictions on trade in 1992 as well as German unification, other changes in Eastern Europe, and bi-lateral free trade agreements with Canada and Mexico will all offer potential for further international growth. Carriers, including Federal Express, UPS, and Emery have already established European hubs, and in the near future, hubs in the Asian and Pacific Rim market will be needed to serve this fast growing transportation customer segment.

Trucking

According to *Industry Surveys* (1989), the \$120-billion-a-year regulated interstate trucking industry is divided into private and for-hire freight haulers. The for-hire group is the fastest growing segment and consists of common and contract carriers. Today, almost 90 percent of the profits generated are in the truckload (TL) division which consists of full or entire truckloads of freights and which carries cargo of 10,000 pounds or more.

Since the 1980 deregulation of the motor carrier industry, the number of ICC regulated truckers has more than doubled from 18,000 to 45,000 carriers (*Industry Surveys*, 1990). This growth has contributed to the beginning of new, primarily nonunion truckload carriers. There is relative ease of entry in this segment in all 48 contiguous states because of the minimal amount of capital required to start and the easily obtainable operating authority. Small, nonunion TL entrants also have a lower cost structure and can therefore undercut the rates charged by larger carriers. To cover the rising costs of staying in business, TL lines are differentiating themselves by offering a growing variety of value-added customer services.

The TL market is highly fragmented and due to intense competition, the small carriers operate on small profit margins. Very few major truck lines have emerged. If viewed as a single entity, for example, Landstar System, which operates Ranger

Transportation and four smaller TL carriers, is the nation's largest truck line. J.B. Hunt takes credit for being the single largest TL carrier. Among others are Schneider National and North American Van Lines, which is a division of Norfolk Southern Railroad (*Industry Surveys*, 1990). It will be advantageous for TL carriers to merge with other transportation carriers. Rail or air express firms, for example, that have already made the capital outlay for tracking technology and other customer services, would be good partners for the TL carriers. Also, shippers' practice of limiting their business to a small group of core carriers will contribute to further mergers in the trucking industry. To differentiate their service, carriers are beginning to offer shipment pick-ups with 24 hours, on-time delivery guarantees, and warehousing services. Over the next decade the number of carriers should be cut in half. "Analysts agree that to survive the anticipated shakeout (in the trucking industry), TL carriers must be well capitalized and able to finance the expensive investment in computers and satellite communication systems that will soon be necessary to compete effectively" (*Industry Surveys*, 1989, p. R41).

Successful carriers must have satellite communication or electronic data interchange (EDI) capabilities to offer on-line shipment tracking and tracing services for their JIT customers. Shippers must know where a shipment is at all phases of the delivery process in order to track materials and expedite or de-expedite shipments as the production line demands. For shippers of time-sensitive freight (which includes anyone participating in JIT), a satellite link or EDI link can provide an early warning for potential delivery disruption. The presence of these services should capture market share at the expense of other firms which lack the package tracing capabilities.

Private carriers. Private carriers, yet another participant in the trucking industry, are carrying their own raw materials or finished goods. They account for 55 percent of all truck movements found among manufacturers, retailers, food companies, and utilities (*Industry Surveys*, 1990). Usually these

private fleets exist because firms demand more service than can be provided by independent freight carriers. In the future, as multimodal transportation services with advanced services capabilities emerge, the number of more expensive private freight carriers should decrease. This private service is limited because it only provides over-the-road delivery. Firms must still go outside the organization and purchase transportation services for other delivery modes.

Multi-modal transportation carriers can also provide a competitive edge over private trucking carriers through faster delivery times. Still other advantages are greater flexibility in scheduling, low cost and more reliable deliveries. Both are essential for manufacturers practicing JIT inventory control. The multi-modal transportation firm can specialize in all facets of transportation while allowing a service or manufacturing organization to concentrate on their core business without having to become transportation specialists. Firms can virtually eliminate their entire transportation departments and rely solely on the services of the multi-modal provider.

Contract-Carriers. Another growing trucking segments is contract carriage. In a contract carriage arrangement, trucking companies provide customized transportation distribution plans including everything from dispatching, maintenance, and billing, to regulatory filing. Most of the freight moved in this segment is TL but a growing portion of the freight is in less-than-truckload shipments. This reflects the practice of minimizing inventories through a JIT system and demanding and shipping smaller quantities. Contract carriers should continue to grow until the end of the 1990's when transportation conglomerates begin to offer these same services as well as other transportation-related services.

Less-Than-Truckload (LTL). The LTL segment has experienced an industry concentration or a contraction in the number of carriers in the past decade. Last year, the three largest companies, Yellow Freight, Consolidated Freightways, and

Roadway Express generated revenues equal to 40 percent of the LTL market. There are two reasons for increased concentration. The first of which is a steady stream of bankruptcies since deregulation, and secondly, the lack of new market entrants to replace firms that have failed. Due to the ease of entry and exit in this market, many firms have lacked the expertise and experience to be successful and profitable. Merger activity in the trucking industry today centers primarily on the fragmented regional market. The strategy seems to be to buy up small firms and create conglomerates (*Industry Surveys*, 1990).

Regional divisions using LTL shipping were ignored until it was recognized that these markets were growing faster than the long-haul businesses. An increasing percentage of this growth is due to manufacturers JIT practices. Although no figures currently exist on the percentage of businesses due to JIT practices, it is evident that more freight is being shipped shorter distances as suppliers are relocating near their major customers. Also shipments are smaller and more frequent as supplies must be brought to the companies on tighter time schedules. Companies are moving to sole sourcing of supplies and the supplier companies are moving their operations to locate near the major manufacturer. In the future, multi-modal carriers will be better able to offer LTL shipments since they will have size and scale advantages and can combine these smaller shipments, offering lower rates.

Rail Shipments

Traffic in the railroad industry is rising with the recent increase in industrial and foreign trade since the late 1980's. Though there are still challenges ahead for this ever-growing transportation segment, sixteen Class I railroads (defined as those with revenues exceeding \$91.5 million annually), are currently in operation, and of these only seven are major players (*U.S. Industrial Outlook*, 1991). Moving forward with innova-

tions in equipment, computerized tracking of freight and scheduling of trains, and market programs, the industry is directly challenging other transportation modes.

The ideas of stacking cars on piggyback and intermodal traffic, such as those with trucking, are emerging to offer different alternatives to ship cargo. Even though these increases in rail traffic are taking place, the industry still has concerns about profitability due to the increased competition between railroads and domestic motor carriers. Mergers between these two transportation providers could reduce or eliminate these concerns due to synergy and lessened competition.

Since deregulation rail services are becoming more flexible and, due to competition, there are increased incentives to improve efficiency, compete more aggressively, and restructure rates and methods of operations. Safety records have also improved along with the financial situation and the physical conditions of the industry. All of this has been done without sharp rate increases, but the real test for this industry is earning adequate profits. Shippers are striving to reduce total transportation costs. Conglomerates can help shippers to meet this goal by reducing shipping distances, transit time, and inventory holdings (Industry Surveys, 1991).

The regulatory environment of the railroads, as it relates to pricing, service, and financial structure, has been shaped by the Staggers Rail Act of 1980. Through this act, industry flexibility has increased so that carriers could compete more aggressively for traffic. Railroads have also become more sensitive to shippers' demands by adjusting their own operations and capital plans to reduce cost and redirect expenditures to maintenance and service. The restructuring of the railroad industry is still continuing. "Others agree that although the pace of mergers between major railroads has slowed, restructuring continues through the purchase or transfer of smaller portions

of rail systems and acquisitions of, or coordination with, carriers in such other modes as trucking and barge transportation" (U.S. Industrial Outlook, 1989, p.52-12).

Since 1979, there have been several major rail consolidations, and in 1984, the first major rail-barge merger occurred between CSX Corporation and American Commercial Lines, a subsidiary of American Commercial Barge Lines. In 1985, Norfolk Southern Railroad, which was the merger of Norfolk, Western, and Southern railroads, acquired North American Van Lines, Inc., a household goods and general freight trucking company. In 1987, Union Pacific Corporation's acquisition of Overnite Transportation Company (a trucking firm) was approved by the Interstate Commerce Commission (U.S. Industrial Outlook, 1991).

Union Pacific reported improvements in operating income net income, and earnings in rail operations due to an increase in carloadings. Major gains were in intermodal traffic. Union Pacific Corporation is continuing its emphasis on cost cutting and productivity improvements ("Income Stronger at Union Pacific, 1990").

Rail intermodal volume is growing. Intermodal transportation contributed 14 percent of Burlington Northern's revenues in 1989 and they are continuing to combine highway trailer and rail shipment movement. Another rail company, Kansas City Southern Lines, has invested in facilities and equipment to advance the efficient rail movement of shipments. Their container/trailer system can transport products by rail, air, sea, or highway combinations. CSX rail, with Sea-Land Logistics, is designing and providing customized multimodal, integrated transportation packages as well.

The primary source of rail traffic traditionally has been from bulk commodities. Barge carriers have been the major competitors of railroads for these bulk shipments. However, as JIT experience and forecasting improves, rail transportation will become a more viable transportation alternative for other shipments too.

Water Shipments

The U.S. Water Transportation industry consists of International sea and domestic transportation (including passenger ship), Great Lakes - St. Lawrence Seaway Carriage, Inland Waterway Movements, and Local Waterborne Cargo Shipments (U.S. Industrial Outlook, 1989). Deep Sea and domestic water transportation includes general cargo, dry bulk, and liquid bulk. General cargo operations include the movement of finished goods by regularly scheduled liner-type vessels operating as common carriers. Liquid cargos are handled by tankers and tank barge fleets and are transported as contract or proprietary shipments. While water carriage is not a primary mode of transportation for the beginning JIT shipper, customers that have moved along the JIT experience curve can begin to use less time-sensitive delivery services like water transportation. This long-term movement to slower and more reasonable transportation forms will benefit both shippers and final customers as evidenced by reduced shipping costs and price savings.

The future of foreign water transportation also depends on continued growth of U.S. exports. International expansion and the expected growth of exports will mean profitable growth for deep sea operations. For example, Miller Transporters Inc. a bulk tank carrier with 30 U.S. terminals recently formed a partnership with Wim Vos, a tank container operator based in Holland. The joint venture gives customers of both firms the capacity to ship products in bulk tanks anywhere in the world. Ocean transportation is provided by the parent company of Wim Vos and the company has depots in the United Kingdom,

the Netherlands, Sweden, Denmark, Spain, France, Germany, and Italy. Their JIT customers include food manufacturers and soap companies as well as chemical manufacturers. Miller felt their customers would be shipping more products overseas so they established the relation with this European Firm (White, 1990). Another intermodal container firm, American President Companies Ltd., provides distribution and transportation services within and between Asia and North America through an organizational structure that combines ocean, rail, and truck transportation ("American President...", 1990).

It is assumed that as companies continue to expand internationally and export products abroad, domestic water shipping operations will become a more important source of freight movement. In addition, as JIT penetration increases, JIT planning and forecasting improves, and as organizations locate on inland waterways and port cities to take advantage of the reduced transportation costs, water shipping will increase. As delivery time needs become subordinated, the primary factor influencing the JIT customer's choice of transportation carrier will be price.

Conduct Within Transportation Industry

The economic markets in today's environment are blurring and a worldwide global economy is emerging. Many businesses are in the process of changing to an international industry structure. At the same time, many of these companies are moving to a JIT inventory system to eliminate inventory holding costs and streamline their production and service operations. While no exact figures exist on the number of firms using JIT inventory control procedures the growth of the current literature on JIT and its related partner of total quality management (TQM) suggest its pervasive popularity. JIT is changing the mode of transportation service that the industries have traditionally used as well as their internal transportation practices.

In terms of logistics, no longer do traffic managers want to deal with ten or twelve different transportation firms to send a variety of shipments domestically and internationally; they are demanding to deal with fewer and fewer transportation parties (just like they do with their own JIT suppliers) with the ultimate goal of working with only one, fully-integrated, multi-modal transportation provider. The shipping customer's demand for one-stop-shipping is rapidly changing the transportation industry by having all shipments move from one door (manufacturer) to another door (destination) by one party, perhaps over a variety of transportation modes. To accommodate the changing market, many transportation companies are growing and adapting to meet these needs.

Some transportation providers are moving toward the multi-modal industry structure already. For example, United Parcel Service (UPS) began with an extensive ground fleet, and augmented ground delivery by expanding their air fleet to meet the company's needs. They currently service every address in the United States and Puerto Rico and more than 100 foreign countries in which they operate in the door-to-door freight market.

Federal Express increased their market penetration with the purchase of Flying Tiger Lines, an international air carrier with bulk shipment capabilities. This purchase provided Federal Express with a larger market share while simultaneously giving them additional international routes. In the trucking arena, Consolidate Freightways Inc. purchased Emery Air Freight Corporation to expand their services to air delivery and to provide customers additional transportation choices. In another example, Santa Fe Railway and J.B. Hunt Transport Services recently established intermodal freight transportation with Santa Fe providing the line-haul service and J.B. Hunt coordinating shipment pickup and delivery (Bowersox, 1990). While these mergers have not yet resulted in profits, these strategic alliances have growth potential to be profitable in the future.

As can be seen by these mergers, the transportation industry is beginning the consolidation needed to form the transportation conglomerates. Another way JIT is changing the transportation industry is in the frequency and size of shipments. With continuing adaptations, transportation carriers can become one-stop-shipping companies for both small and large shipment quantities. In a recent study by Lieb and Miller (1988), the biggest transportation beneficiary of JIT was the contract truck carrier because their schedules were tailored to the customers' needs. Air transportation also increased considerably in both inbound and outbound operations due to the implementation of the JIT system. The experiences of large corporations including Northern Telecom Canada Ltd., Chrysler Corp. and Kodak Inc. show that judicious use of air freight can lead to significant distribution benefits even though air transport is a premium service, the demand for emergency service often occurs with little advance notice. The pressures of JIT manufacturing are intense and in some cases parts must be flown to the assembly line to keep the line running. Airfreight has always been the preferred mode for handling JIT emergencies. It also can offer enhanced customer service (Tausz, 1989), and it is this value-added service of time utility that is the basis for the profit of the airfreight segment of the transportation industry.

These air and trucking modes are utilized more heavily in the introduction stage of JIT, but it would naturally follow that as firms move along the JIT learning and experience curve they should move to slower and more inexpensive modes of transportation as their ability to forecast demand and schedule production flows improve (See Figure 1). Emergencies should be less frequent and coordination should improve thus eliminating the need for relying solely on the more expensive and more time-critical shipment modes.

When JIT customers were asked about carrier selection and what factors were important to them, their responses included on-time performance along with responsiveness to short-term

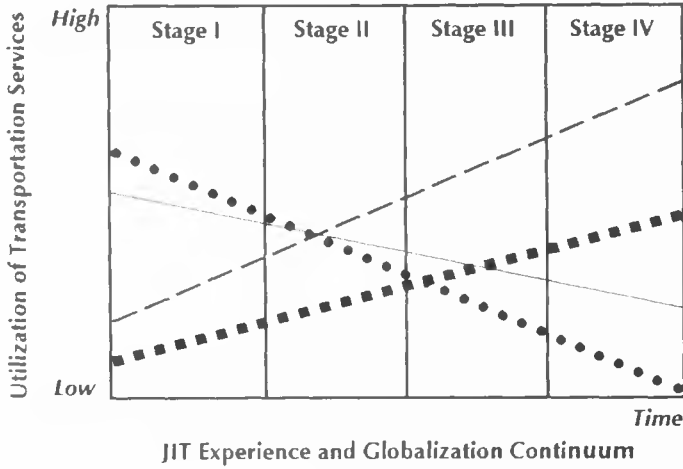
needs. Both of these characteristics are very important to the JIT system. Other important factors were tracking capability, which will become more important as schedules become tighter and tighter (Lieb and Miller, 1988.)

Another change occurring in the transportation industry is in customer service. Many carriers are no longer playing pricing games to get a short-term contract but just like JIT principles, they are establishing long-term relationships with their domestic and international customers. An example of this can be seen in the relationship between GM and Robin Transport. Robin holds a three-year contract that covers 15 loads each day. Robin did not receive the GM contract on price alone, but sold them on all aspects of their delivery system including equipment, on-time delivery, and flexibility. The long-term contract helps the transportation firm and their customers to better plan for the future and allows the transportation company the time and scheduling flexibility (due to the security of the long-term relationship and level of communication) to provide better service. Another company benefiting from long term relationships is Roadway Express. With long-term, secure contracts Roadway has purchased almost two thousand new trailers and has begun calling itself "America's just-in-time-carrier" ("Transportation Changes..." 1984). Roadway adopted this marketing strategy for differentiation as well as for targeting the needs of the growing number of JIT customers.

The transportation industry is combining various modes to better serve their international customers as well. One example is the assembly of the Cadillac Allante, an expensive (\$50,000+) two-seat sports car designed by Cadillac to compete directly with BMW and Mercedes Benz. The chassis is built in Detroit and flown to Italy in specially designed Boeing 747F jet freighters. In Italy, the bodies are assembled with the chassis for a perfect fit, and then they are flown back to Detroit for final assembly. The merger of global assembly and air freight sounds

Figure 1

The JIT/Transportation Stages And Usage Level



air ● ● ● ● ●
 truck — — — — —
 rail - - - - -
 barge ■ ■ ■ ■ ■

<u>Stage I*</u>	<u>Stage II</u>	<u>Stage III</u>	<u>Stage IV</u>
air	truck	truck	rail
truck	air	rail	barge
rail	rail	air	truck
barge	barge	barge	air

*Carriers are listed in order of their usage at each stage, from highest to lowest usage

somewhat less than practical for automobile production, but, when the reduction in transportation time, theft, and damage are taken into account, this operation becomes feasible. It also saves time and money, and the cars can be tailored by experts in each stage of the JIT operation (Kaufman, 1989). Operations such as this are becoming more commonplace in today's transportation industry as it adapts to the new JIT-induced trends.

According to Bowersox (1990), these examples illustrate logistics alliances. These alliances are becoming more prevalent as manufacturers and transportation firms combine to lower distribution and storage costs and at the same time improve the quality of service.

Electronic-Data-Interchange(EDI)

The transportation industry is also changing by adopting advanced computerized electronic data interchange. EDI allows transportation shippers to perform a myriad of services including electronic billing, calculation of rate charges, scheduling pickup and delivery, tracing shipments, and creating customized databases using a customer's traffic history. The catalysts for EDI growth are high interest rates, (which speed the adoption of the JIT inventory system) and the sharp drop in computer costs (which puts personal computers on almost every business desk). Shippers practicing JIT inventory control techniques demand EDI for timely and accurate information about the status of their shipments. The benefits for shippers and carriers who use EDI are: (1) reduced clerical costs, (2) less paper handling, (3) faster transaction processing time, and (4) fewer mistakes (*Industry Surveys*, 1991).

American Airlines (AMR Corporation) is testing their own fully automated, bar-coded tracking system for their air cargo. The system will enable American to track each air cargo

shipment as well as to simplify operations. Through their AMR Information Services American Airlines has created a computerized reservation system for Europe's railroads, working with the French National Railway System to coordinate and schedule international shipments.

United Parcel Service (UPS) has implemented internal computer systems integrated into their shipping business. They have replaced the microcomputer with local area networks to reduce clerical time and to help UPS keep track of packages more economically (Eskow, 1989).

At Federal Express, EDI is used in all aspects of the business. When a courier picks up a package it is scanned and automatically put into the beginning of the system. As the package travels from point to point, it is scanned to allow continuous tracking. If any information is needed about the package, it can be retrieved and analyzed. This helps Federal Express experts to see if they have any steps in their operations that could be corrected to better serve the customer. In addition, their EDI can be accessed by their customers at any time.

Roadway Package System (RPS) offers customers scanning technologies. With their automated hubs, they offer the customers less package handling, more efficient distribution, and the elimination of sorting errors. Technology has also allowed RPS to offer a wide range of services with package tracing and itemized billing, specialized pricing programs, voice encoding, and image processing.

Roadway Express trucking company has a personal-computer software system to allow customers to create and print bills of lading and express documents directly to a Roadway terminal. With their system they can also receive shipment status information, manifests, claims, and communicate via computer with the customer.

Consolidated Rail Corporation has merged all their customer service functions into a single corporate unit. This has added simplified pricing and billing systems and has added the capability for the electronic filing of rates. Customers can access this information from their remote computer terminals.

As more participants in the transportation industry continue to use EDI and computer tracking, additional customer services can be offered. Another service that will become available is inventory and transportation consultation.

Consulting Services

With the use of portable personal computers, a transportation sales specialist in carrier sales can quickly show a customer a variety of transportation shipment scenarios and the current rates for each alternative transportation mode. When the customer places an order, it can be sent by telephone and automatically entered. All of the shipment instructions will automatically be sent to the proper locations and a hard copy can be printed for the customer immediately. The salesperson can also track existing shipments if customers have questions about a current shipment location. This consulting service is even more advantageous to the shipper if the transportation company has multiple modes under one umbrella. They can simulate numerous combinations of rail, water, truck and air delivery to determine the optimal balance that best meets the customer's specific needs.

Transportation conglomerates have added these consulting services to expand their range of customer service offerings. Burlington Northern Inc. railroad view transportation services as an extension of their customer's businesses and have developed a software package that enables customers to evaluate all relevant logistical factors and costs when selecting among the various transportation options.

Federal Express established a corporate division to address the custom logistics needs of customers, giving Federal Express the opportunity to assume primary responsibility for the customer's inventory management needs. As more firms in the transportation industry move toward the conglomerate organization structure, the consulting services will be a vital department. JIT customers are requesting help coordinating and scheduling all their transportation needs. Proactive transportation providers will address these consulting needs.

Warehousing

Another trend in the transportation industry is the use of third party distribution. This service is rapidly gaining acceptance, especially in the manufacturing environment as customers demand dedicated and consolidated distribution operations. One firm implementing this distribution system is Federal Express. Their "Parts Bank" combines a storage facility with an expedited-delivery system that can dispatch medical equipment, electronic components, and other critical parts to users around the country on the next available plane (Quinn, 1985). All storage, warehousing, and insurance concerns are handled by Federal Express.

To capture business that combined rail, warehousing and truck delivery, CSX railroad has begun a network of bulk intermodal distribution centers and has formed Total Distribution Services Inc. Shipments are transferred by rail to the distribution centers and are stored and scheduled for local or just in time delivery by truck.

Many manufacturers are using similar warehousing services instead of setting up and maintaining their own multiple regional warehouses. The warehousing services keep their customers' equipment and products in working order because the immediate shipment of a part can minimize machine and

production downtime and save everyone both time and money. Warehouse services are growing as U.S. companies reevaluate how they maintain inventories and move their materials. To meet JIT inventory needs, more companies will eliminate their own warehouses and purchase warehouse inventory systems as well as their transportation services from outside in order to better maintain their production schedules. Firms who are considering exporting their goods or who want to rapidly enter the global market will also consider using warehousing services.

Leaseway, a \$1.4 billion transportation company has "assembled a group of services targeted at manufacturers ranging from public warehousing, sub-assembly of finished goods and consolidation of shipments of warehouse management systems and, of course, distribution of goods. Since its conception, Leaseway has established 30 distribution and consolidation centers throughout the country and serves more than 150 clients, many major manufacturers" (Davisson, 1986, p. 69). These examples have been possible due to the deregulation of the trucking and airline industries and lessening of anti-trust lawsuits, and both have capitalized on the JIT environment. Other transportation firms should add warehousing services as they make the commitment to developing and providing totally integrated distribution systems.

JIT and the Transportation Industry

The primary reason transportation companies must merge to combine the various forms of service is due to the JIT experience continuum. As shown in Figure 1, firms implementing JIT procedures are less experienced with the production and inventory control concepts. Therefore, they experience more problems that demand expedited shipment. Planning, forecasting, and demand levels are not as accurate, causing firms to primarily use air express services and time-sensitive truck delivery. There is very limited rail and barge use at this initial level of JIT experience. Truck delivery replaces air

shipments as firms better plan lead times and schedule production runs. In the mature stages of JIT, fewer and fewer production changes occur and there are minimal scheduling problems. Lead times expand from several days to several weeks or more. Usually at these JIT stages, companies have added international operations and can rely on the less expensive forms of rail and barge transportation. Throughout the various levels however, on-line tracking services as well as consulting services remain important.

Transportation firms, like the customers they serve, must become just-in-time shippers in order to remain competitive. The improvements brought about by JIT will benefit all firms adopting the improvement principles. As customer needs change, the transportation companies must have all transportation modes and services at their disposal. As shippers demand full-service transportation providers, the providers must have these services available. Thus JIT is the stimulus behind the changing future of the transportation industry.

Industry Performance

The goal of all the emerging multi-modal carriers is to provide shippers with high-quality, flexible transportation services over one mode or over several transportation modes. By combining transportation forms synergy in profitability, performance, and service is possible.

One company on the leading edge of multi-modal transportation is CSX Corporation. Based in Richmond, Va., CSX is an international, multimodal transportation company with interests in rail, ocean container shipping, intermodal, trucking, warehousing and distribution. They have the largest railroad in the United States (as measured by operating revenue and track-miles), a container-shipping company, and an inland barge line. In the 1990's CSX's business plans call for continued emphasis on improving profitability by controlling costs, particular in rail

and ocean shipping, while expanding services in key growth markets for rail, container shipping, barging, intermodal and other transportation related activities. Since 1985, their revenues have grown from \$5.3 billion to over \$7.7 billion, and CSX executives see room for continued expansion. The only area that CSX has not yet ventured into is the air express segment of the transportation industry (CSX Annual Report, 1989). Similar performance levels are possible for other multi-modal transportation providers.

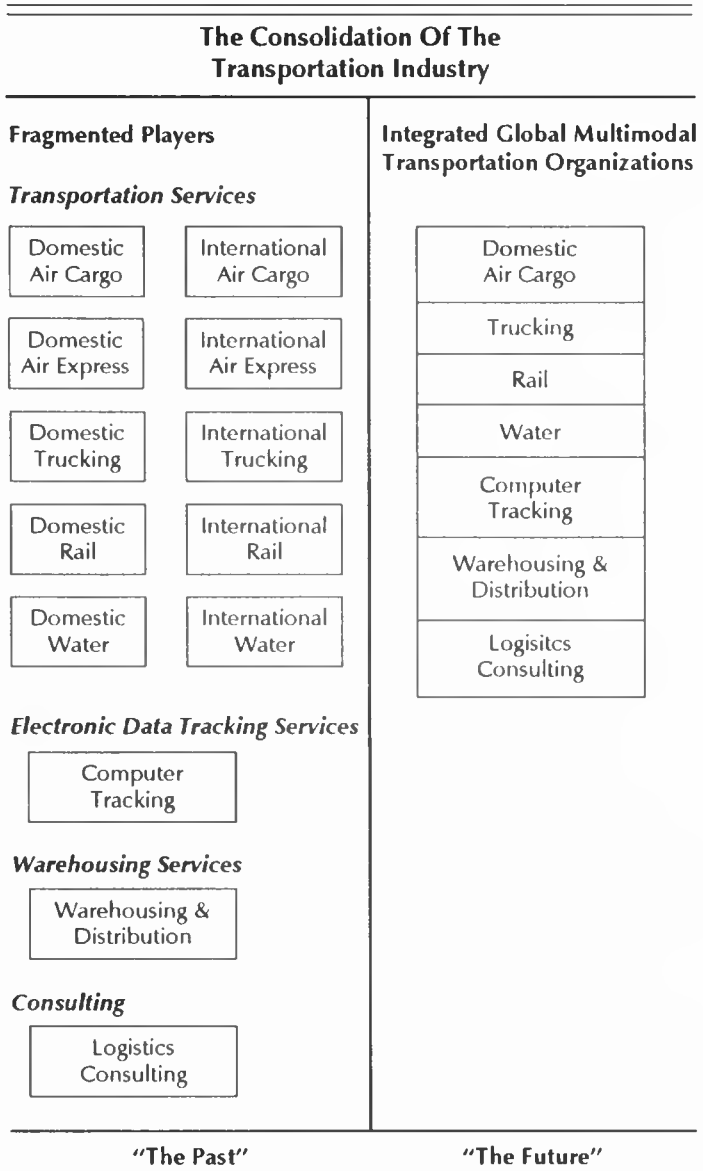
Multi-Modal Transportation: The Future

Since the deregulation of the 1980's, the largely artificial boundaries among transportation modes (LTL, TL, air freight, railroads, and barges) have been vanishing. Without the arbitrary restrictions imposed by regulatory systems, the market is becoming less specialized and as shown in Figure 2, additional transportation services are merging.

Many examples in the transportation industry signal this movement. For example, UPS ground package delivery has added air express services and tracking to the services they offer. Federal Express has moved from air transportation of small packages to the international air cargo market with their purchase of Flying Tiger Lines and has added tracking, consulting, and warehousing services. CSX Corporation has rail, barge, and surface modes under one company. CF trucking has combined with Emery Air Freight and gained air and international markets. Two railroads now have merged with trucking firms to gain synergy in piggy-back services--Union Pacific Railroad is now combined with overnight trucking and Norfolk Southern Railroads is part of North American Van Lines Trucking and the list of multi-modal examples continues to increase.

In fact, largely as a result of just-in-time inventory, transportation customers are increasingly oriented toward a total, integrated logistics operation (including inventory management, handling, and warehousing) rather than simply purchasing transportation services alone. Regulatory rigidities once obstructed the provision of reliable, fine-tuned, custom-tailored transport service. Today these multi-modal, enhanced combinations are both feasible and necessary. In the recent future the transportation industry should see these changes rapidly increase due to the increasing customer emphasis on JIT. Successful transportation companies will be the ones that have the ability to meet their customer's one-stop JIT shipping needs.

Figure 2



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PERCEPTUAL DIFFERENCES BETWEEN MOTOR CARRIERS AND SHIPPERS REGARDING THE IMPORTANCE OF CARRIER SELECTION CRITERIA

by

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Introduction

Expectations are that in the nineties even more attention will be paid to satisfying consumer preferences. In all likelihood, this trend will extend to the unregulated motor carrier industry. An effective marketing strategy results in consumer satisfaction for profit. Shipper satisfaction is a function of carriers providing a selection variable mix which best serves shippers. In the transportation industry much less has been done to determine the nature of understanding that carriers have regarding the most significant selection variables as perceived by shippers. According to the literature, few carriers appear to really know what factors actually influence the shipper's choice of carrier. In fact, previous studies have found that the carrier choice decision may be regarded by shippers and carriers in a much different manner. Specifically, some shippers and carriers appear to have very different notions of what it is that constitutes satisfactory service by carriers.

In the 1973 Bardi study, representatives of a number of firms were surveyed to determine the relative importance of 21 carrier selection determinants. This study revealed that there was general agreement on five of the most important determinants, but there was disagreement regarding many of the remaining variables.¹ Evans and Southard's 1974 study of manufacturers, wholesalers, retailers and motor carriers in Oklahoma investigated how shipper and carrier perceived 28 factors, thought to be important in the selection decision. Respondent evaluations were measured on a five-point scale. Perceptions were then compared by means of t-tests. Evans and Southard found that there were six perceptual differences between shippers and carriers.²

In 1978, Jerman, Anderson and Constantin presented the results of their survey of individuals at the operations level in both shipper and carrier organizations. Each was asked to assess the importance of 26 variables believed to be important in the carrier selection decision making process. Differences in the perceptions of both groups were identified for 12 selection variables.³ The authors also explored the perceptions of a group of traffic managers, sales managers, and sales representatives with regard to 15 carrier selection variables. Perceptions were measured with a five-point scale. Mean differences were isolated by way of multivariate and univariate ANOVA. Significant differences between shippers and carriers were found for seven of the fifteen variables.⁴

Of the above cited empirical research, only the Evans and Southard study sampled both shippers and carriers and specifically investigated the variables related to the selection of motor carriers. This study seeks to expand on previous studies and provide the information necessary for carriers to better understand the importance of various selection criteria to shippers. Specifically, this research attempts to determine the factors that influence carrier selection, and how both carriers and shippers differ in relation to the importance they place on these variables. A systematic sample of traffic managers and motor carrier

sale managers provided the data base for this study. The sample of traffic managers was composed of individuals employed by various manufacturing, wholesaling and retailing organizations and was drawn from The Official Directory of Industrial and Commercial Traffic Executives. This directory contains the names and addresses of 24,000 traffic managers. The motor carrier sales manager sample was drawn from motor freight trucking companies. The sampling frame used for the selection of the sales managers sample was a list of 18,446 motor carriers supplied by American Business List Inc.

A mail questionnaire was chosen because of the time necessary to complete the questionnaire and the geographic dispersion of the respondents. Questionnaires were mailed to 500 shipper traffic managers and 500 carrier sales managers. Of those queried, 119 shippers and 103 carriers responded. The number of usable questionnaires was 102 and 94, respectively. The usable responses comprised 20.4 percent and 18.8 percent of the survey population, which should provide a reasonably accurate representation of the actual population.

Only nationwide motor carriers were surveyed. These carriers estimated that the majority of their shipments were truckload. The averages for the sample were 68 percent TL shipments and 32 percent LTL shipments. However, it should be noted that these percentages are averages of the total sample of respondents' estimations. The sample population may well haul special commodities, but this information was not specifically addressed in the survey.

Of the shippers responding 31 percent were food producers, 23 percent were producers of home products, 21 percent produced industrial goods destined for further processing, 7 percent produced electronics products, 3 percent of the respondents produced chemicals, and 15 percent classified themselves as "other" types of producers. Seventy-three percent of the shipper sample stated that they normally ship in large lot sizes.

Previous studies used a varying number of carrier selection criteria. Therefore, it was logical to draw from previous work in selecting the criteria to be included in the survey. Once variable repetition was eliminated 35 possible selection criteria, which were thought to be used by shippers in their motor carrier selection decisions, were isolated (see Table 1).

Both carriers and shippers were queried regarding 35 variables commonly thought to be important in the carrier selection decision. A scale was used to indicate the importance of each of these factors to both shippers and carriers. Shippers were asked to rate these factors in their own motor carrier selection decision. Carriers were also asked to rate the factors indicating the carrier's perception of the importance of these factors to shippers. The following scale was used:

1. Not important
2. Slightly important
3. Moderately important
4. Very important
5. One of the most important factors

Perceptual Differences Between Shippers and Carriers Regarding Motor Carrier Selection Decisions

Initially, descriptive statistics in the form of frequency and crosstabulation tables were computed. These calculations were performed to get a "feel" for the data. Then, a comparison was made to determine if a difference existed between the perceptions of shippers and carriers regarding 35 motor carrier selection criteria. Analysis of variance was used to compare the perceived importance assigned to each selection criteria by both shippers and carriers. A mean rating score was calculated for each of the factors for both carriers and shippers. These responses were compared, and an "F" statistic computed. In all

cases a significance level of .05 was used. The variables with a statistically significant difference between the perception of shippers and carriers are identified by asterisks. In order to evaluate the level of satisfaction provided shippers by carriers an analysis of the importance of various selection criteria to shippers was conducted. The statistically significant mean ratings and rankings for both shippers and carriers were analyzed and the overall results presented in Table 1.

A comparison of both shipper and carrier rankings revealed that only six carrier selection variables were ranked exactly the same by both groups. A review of the information in Table 1 further revealed that there was general agreement on the relative importance of sixteen of the thirty-five selection variables. However, statistically significant differences resulted between shipper and carrier mean ratings for nineteen of the thirty-five selection criteria. Only four of the nineteen statistically significant selection variables were rated higher by shippers. The other fifteen statistically significant selection factors were rated higher by carriers.

Carriers ranked only two of the shipper ten most important selection variables similarly. Only three of these ten variables were statistically significant. Two of these factors were rated higher by shippers than by carriers. The fact that carriers were not as concerned as shippers with emergency response and providing leadership in offering more flexible rates, could well result in shipper dissatisfaction. Not only was the emergency response issue statistically significant, but it was ranked third by shippers and eighteenth by carriers. The ranking discrepancy of the rate flexibility issue was even greater, with a shipper ranking of seven and a carrier ranking of twenty-five. The likelihood of shippers being dissatisfied is heightened because these criteria are among the ten most important variables as ranked by shippers.

Table 1**Summary of Findings: Perceptions of Shippers & Carriers Regarding The Importance of Carrier Selection Variables**

Carrier Selection Criteria	Shipper Mean Rating	Carrier Mean Rating	Shipper Ranking	Carrier Ranking
Reliability of on time delivery.	4.41	4.50	1	1
Reliability of on time pick-up.	4.32	4.44	2	2
Total transit time for the shipment.	4.21	4.15	3	10
Carrier response in emergency situations.	4.21*	3.74	3	18
Financial stability of carrier.	4.14	4.07	5	11
Handling expedited shipments.	4.12	4.18	6	9
Carrier's leadership in offering more flexible rates.	4.11*	3.33	7	25
Carrier reputation for dependability.	3.94	4.44*	8	2
Geographic coverage of carrier.	3.87	4.05	9	12

*variables were found to be statistically significant at the .05 level.

Table 1 continued

Carrier Selection Criteria	Shipper Mean Rating	Carrier Mean Rating	Shipper Ranking	Carrier Ranking
Discount programs offered by carriers.	3.81	3.79	10	17
Carrier cooperation with shipper's personnel.	3.79	4.37*	11	4
Condition of equipment (cleanliness).	3.79	4.05*	11	12
Past performance of the carrier.	3.75	4.20*	13	8
Ease of claim settlement. (loss or damage)	3.75	4.02*	13	14
Freight loss experience with the carrier.	3.73	3.82	15	16
Carrier representative's knowledge of shippers needs.	3.69	4.37*	16	4
Scheduling flexibility.	3.68	3.69	17	19
Freight damage experience with the carrier.	3.64	4.30*	18	7
Carrier assistance in obtaining rate or classification changes.	3.54	3.65	19	21

*variables were found to be statistically significant at the .05 level.

Table 1 continued

Carrier Selection Criteria	Shipper Mean Rating	Carrier Mean Rating	Shipper Ranking	Carrier Ranking
Carrier attitude toward acceptance of small shipments.	3.53*	2.76	20	31
Carrier honors shipper's routing requests.	3.45	3.17	21	26
Computerized billing and tracing services.	3.44	3.17	22	26
Personal relations with the carrier.	3.44	3.95*	22	15
Overcharge claims service.	3.35	3.37	24	24
Courtesy of vehicle operators.	3.33	4.35*	25	6
Feedback from the consignee to the shipper about the quality of service given by specific carriers.	3.24	3.69*	26	19
Information provided to shippers by the carrier.	3.07	3.62*	27	22
Carrier transportation equipment designed to facilitate easy and fast loading and unloading.	3.02*	2.61	28	33

*variables were found to be statistically significant at the .05 level.

Table 1 continued

Carrier Selection Criteria	Shipper Mean Rating	Carrier Mean Rating	Shipper Ranking	Carrier Ranking
Carriers ability to handle special products.	2.99	3.07	29	29
Diversion and reconsignment privileges.	2.79	2.81	30	30
Regular calls by carrier sales representatives.	2.74	3.60*	31	23
Opinions or recommendations of employees of other firms.	2.46	3.16*	32	28
Carrier willingness to participate in freight consolidation practices.	2.39	2.44	33	35
Fabrication in transit privileges.	2.10	2.51*	34	34
Gifts/gratuities offered by carriers.	1.46	2.62*	35	32

* variables were found to be statistically significant at the .05 level.

The next statistically significant variable ranked higher by shippers than carriers, dealt with the carrier's attitude toward small shipments. Shippers ranked this variable twentieth, while carriers ranked the variable thirty-first. Such ranking discrepancies combined with statistically significant rating differences could result in additional shipper dissatisfaction.

Although providing transportation equipment designed to facilitate easy and fast loading and unloading was also statistically significant, and ranked higher by shippers than carriers, the actual ranking was twenty-eighth by shippers and thirty-third by carriers. Even though there is a statistically significant difference, this criteria is ranked so low that it is probably less of a priority for shippers than are the other three selection factors.

As was previously mentioned, carriers rated fifteen statistically significant selection factors higher than did shippers. Surprisingly, carriers ranked their representative's knowledge of shipper needs as the fourth most important carrier selection variable. However, there was a statistically significant difference between the ratings of shippers and carriers with regard to this variable. Carriers rated this selection factor higher than did shippers, but apparently are not striving hard enough to really understand actual shipper needs.

The majority of the remaining selection criteria, where statistically significant differences appeared and where carrier mean ratings were higher than shipper ratings, are tied to past performance and having established relationships with customers. Carriers rated reputation for dependability, carrier cooperation, past carrier performance, ease of claim settlement, freight damage experience, personal relations, courtesy of vehicle operators, feedback concerning quality service, information provided to shippers, regular calls by carrier sales representatives, and opinions and recommendations of employees of other firms, higher than did shippers. Carriers also

ranked all but one of these selection variables higher than did shippers. Carriers appear to be primarily concerned with emphasizing previous performance factors and with nurturing past relationships which led to successful carrier operations.

Only three of the statistically significant variables which were rated higher by carriers than shippers, were not directly related to past performance or customer relations. Condition of equipment, fabrication in transit privileges, and gifts and gratuities offered by carriers are costly, and probably do not significantly enhance shipper satisfaction, as would increased emphasis on other more highly rated factors. Even though the rankings for shippers and carriers of the condition of equipment were eleventh and twelfth, the statistically significant difference indicates that carriers are overemphasizing this factor. Possibly carriers are increasing their operating costs unnecessarily, thus limiting their ability to respond to the more significant needs of shippers. Fabrication in transit privileges and gifts and gratuities were ranked quite low by both groups which may present an opportunity for carriers to de-emphasize these criteria somewhat.

Summary of Differences, Causes, and Methods of Overcoming Differences

As was previously mentioned, an effective marketing strategy results in consumer satisfaction for profit. Shipper satisfaction is a function of carriers providing a selection variable mix which best serves shippers. In order to evaluate the level of satisfaction provided shippers by carriers an analysis of the importance of various carrier selection criteria is essential. Areas where statistically significant differences were evident should be of major concern to carriers. Recognizing the existence of these differences, and possible causes of each difference affords the carrier an opportunity to develop more effective strategies to better serve shippers. A comparison of both shipper and

carrier rankings revealed that only six selection variables were ranked exactly the same by both groups. Statistically significant differences resulted between shipper and carrier mean ratings for nineteen of the thirty-five selection criteria.

Only four of the nineteen statistically significant selection variables were rated higher by shippers. Shippers rated carrier response in emergency situations, carrier's leadership in offering more flexible rates, carrier attitude toward acceptance of small shipments, and providing transportation equipment designed to facilitate easy and fast loading and unloading, higher than did carriers. It is interesting to note that of the four variables which were ranked higher by shippers, and were also statistically significant, one was related to rates, and three were related to specialized services. These differences could be caused by carriers clinging to the trappings of the regulated motor carrier environment, where rates and services were contingent on many factors, none of which involved consumer satisfaction as a carrier priority. Obviously, these differences could have a significantly negative impact on shipper profitability. Since carrier selection decisions are often made to maximize gains an inappropriate mix could result in lost business for carriers who misinterpret the importance of these selection factors. These differences and the resulting shipper dissatisfaction could be overcome by offering a selection variable mix which offers these services, and provides for rate flexibility based on the specific needs of individual shippers.

Carriers rated fifteen statistically significant selection factors higher than did shippers. Carriers rated reputation for dependability, carrier cooperation, past carrier performance, ease of claim settlement, freight damage experience, personal relations, courtesy of vehicle operators, feedback concerning quality service, information provided to shippers, regular calls by sales representatives, and opinions and recommendations of employees of other firms, higher than did shippers. These differences may be caused by carriers resting on their laurels, and placing too much emphasis on past relationships, rather

than being responsive to current shipper needs. In a deregulated environment this strategy may well invite disaster. Equipment condition, fabrication privileges, and gifts were rated higher by carriers than shippers, but were not directly related to past performance or nurturing relationships. Overemphasizing any or all of these selection factors is costly and probably does not significantly enhance shipper satisfaction. Quite possibly carriers overemphasize these factors because shippers are prone to select carriers based on their past performance record and established relationships with shippers. However, shippers may well change carriers if they are not responsive enough to their actual needs, especially those needs that are most important. An opportunity exist for carriers to overcome these differences by de-emphasizing the above criteria somewhat, and using any recovered resources to reformulate their selection variable mix.

The basic method of overcoming these differences involves the development of a reformulated mix which focuses on offering shippers better response in emergency situations, acceptance of small shipments, and providing real leadership in offering more flexible rates. If additional resources were available the reformulated mix would incorporate carrier equipment designed to facilitate easy and fast loading and unloading. Basically, the new mix should enhance the quality of service and profit picture of shippers in the carriers' target market.

Implications

Carriers, in the survey group, ranked their representative's knowledge of shipper needs as the fourth most important carrier selection variable, but apparently are not striving hard enough to really understand shipper needs. A lack of understanding could make it impossible to effectively serve shippers. Carriers should strive to appreciate the importance of various selection criteria to their target markets, and develop a market-

ing strategy to properly address these needs. A superior carrier strategy emphasizes a mix of selection variables in line with the importance placed on them by shippers. Structuring a service system which places too much emphasis on the less significant variables, and deemphasises the more significant selection variables will lead to shipper dissatisfaction, and subsequent carriers losses.

For motor carriers aspiring to provide their customers with the highest possible level of satisfaction, an understanding of the most important criteria used by shippers in selecting and retaining carrier services is essential. Since there were significant differences between the perceptions of this group of carriers and shippers regarding the relative importance of the selection criteria, carriers may not be satisfying shippers to the greatest degree possible. To overcome these differences carriers should take the forefront by providing leadership and innovation in relation to their selection mix, rather than keying on what they did in the past. Carriers may well have been selected because of their past performances and relationships, but shippers may not continue to utilize their services if carriers are not more responsive to actual shipper needs. Specifically, carriers should identify and emphasize those elements of their selection mix that are perceived as most important by the decision makers in the shipping organization. Carriers who are able to establish which of the selection criteria are most important are better able to develop a selection variable mix which will more thoroughly satisfy shipper needs, and thereby attract new customers and maintain existing clients.

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BOOK REVIEWS

The Management of Business Logistics
John J. Coyle, Edward J. Bardi, C. John Langley, Jr.
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Improvements

My first browse through the 5th edition highlighted what users anticipate: new and current examples from actual companies, and tables and graphs that have been updated to the most recently available information (which, for transportation and logistics activities, can be a chore). The 80s decade is reflected in both content and terminology. The transportation chapters include the expected changes and even a page devoted to the Maislin decision. "Supply Chain Management" has become a separate chapter as has "Logistics Quality." The authors don't dwell too much on contemporary buzz-words, although Dr. Demming et al. are referred to as "gurus."

The second impression from Edition 5 is that the chapters and sections aren't where they used to be. Physically, the chapters are of more similar lengths, from 6 to 7 percent of the total text pages each and they have returned to a semester-fitting 15 chapters. The authors have done far more than simply update their material; they have re-integrated it, recognizing that some of the last chapters on strategic planning and future perspectives in the previous edition did appear "tacked-on."

Along with a set of study questions, most chapters include one or two brief cases. Seven comprehensive case studies follow the final chapter. Other welcome additions, making this edition more than just another textbook, are compilations of logistics publications and associations preceding the existing glossary. Students will find this material more useful as their careers progress.

The new organization fits together fairly smoothly. "Global Logistics," greatly strengthened and moved up to Chapter 4 (from Chapter 12 in the fourth edition), following "Supply Chain Management" as Chapter 3, finishes a broad framework in Part I before the more detailed topics of inventory and transportation in Parts II and III. These two groups of chapters are keyed to the **systems** of information, inventory and transportation, and **management decisions**, respectively. (The chapter on "Logistics Information Systems" has been moved to lead-off Part II, separating it by 8 chapters from "Organization of the Logistics Function," which followed it in the 1988 edition. Using the philosophy that organizational form governs information flow, some instructors may still assign these chapters as an integrated pair.) The chapters in Part IV may be viewed more as **staff activities** than line management. Chapter 12, "Facility Location," has an improved title over the former "Nodal Locations" and retains the useful appendix summarizing the classical theories.

Future Considerations

Having taught from the earlier editions, I recognized some old picayune details that still might be improved the next time around. Chapter 1 has always included a fixed vs. variable cost problem that might better fit a succeeding chapter that one providing a logistics "overview". (The problem serves more to scare off those students whose math skills would benefit from attention to this exercise--but let's get them immersed in the course first.)

The authors say (page 49) that "logistics frequently is called the other half of marketing," (although in earlier editions this read "sometimes called . . ."). With the more developed focus of each field, this phrase should at least be stated in the past tense and probably footnoted or deleted.

The transportation chapter provides three more examples that might be cleaned up in future editions. First, the modal comparison chart (page 285) has never rated pipelines for transit time, reliability, accessibility and security; other texts do not find this a problem. Second, regardless of whether from an actual example or a transposing error, the class rate table (page 333) would certainly be easier to explain during lectures if the class 50 rates actually were 50 percent of the class 100 rates, the class 45 were 45 percent, and so on. A third, more minor irritant, is the continued use of a diagram of intermodal services that refers to "birdyback," a term virtually unused outside this text, making it neither cute nor accurate.

The new art work is generally good, notably the larger graphs showing the tapered rate effects. This accuracy was not re-applied to the older total cost graphs which remain less-than-accurate sketches (e.g., page 205). A map showing landbridge concepts (page 126) and a drawing of a forklift truck (page 392) both require further explanation of their labels in the text.

Summary

This 5th edition is more complete, up-to-date, and readable than its successful predecessors. Its chapters are more successfully arranged as a logical body of logistics knowledge. The physical appearance has also been tightened without resorting to the high cost of multiple colors as found in many texts designed for basic business courses. (This last clause begs the question of whether or not logistics is a basic business course: it should be. Enough said.) It will be a good adoption for

established transportation and logistics programs with an integrating course (possibly preceding a case-work course), as well as for schools with one management-oriented course in this area.

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