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Industry Study

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Transportation Industry



The Industrial College of the Armed Forces

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Transportation Industry 2011

ABSTRACT: The transportation network of aviation, highway, maritime, rail, and pipelines is the life blood of a nation's economy - it enables commerce and supports national security. The transportation system as a whole, and in particular the development of the modes of transport and their integration within national and international environments, is affected by factors of geography, environment, technology, society, finance, and public policy. The transportation sector is a critical and significant contributor to the overall economy; in 2009 the transportation sector accounted for \$1.2 trillion of the U.S. Gross Domestic Product, while employing over 3.5 million people. There are several challenges impacting the ability of the United States to optimize the capacity of its transportation system, to include: an aging transportation infrastructure, government and industry "stovepiped" policymaking practices and the federal government's ability to find a balance between regulating the transportation industry in a way that ensures safe, clean, and efficient transport of goods and people but that still allows for the industry to reap profit and retain its competitive advantage. Our nation lacks a strategy designed to integrate the various modes of transportation into an effective and efficient system for today and the future. One recommendation to improve the transportation system within the United States is the development of a National Transportation Strategy. In an era filled with constant growth in the global trade market and an increasing demand for multi-modal movement over an aging infrastructure, the necessity for implementing this kind of strategy could not be any greater.

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Federal Aviation Administration, Air Traffic Control System Command Center, Dulles International Airport, Herndon, VA
Steven F. Udvar-Hazy Center, Chantilly, VA
National Transportation Safety Board (NTSB) Training Center, Ashburn, VA
United Parcel Service (UPS) Freight, Richmond, VA
U.S. Army Transportation Corps, Fort Eustis, VA
Norfolk Southern Corporation, Norfolk, VA
National Railroad Passenger Corporation (Amtrak) Headquarters, Washington, D.C.
Wells Fargo Securities, New York, NY
U.S. Coast Guard Sector New York, Staten Island, NY
Army Corps of Engineers, New York District, Jersey City, NJ
Vane Brothers Company, Baltimore, MD
USNS Fisher (T-AKR-301), Baltimore, MD
American Trucking Association, Washington, D.C.
American Airlines Flight Academy, Fort Worth, TX
Burlington Northern Santa Fe (BNSF) Railway Headquarters, Fort Worth, TX
BNSF Classification Yard, Haslet, TX
BNSF Inter-modal Yard, Haslet, TX
Shell Pipeline Company LC, Houston, TX
U.S. Coast Guard Sector Houston-Galveston, Houston, TX
Port of Houston Authority, Houston, TX
Federal Aviation Administration, Terminal Radar Approach Control and Tower, George Bush Intercontinental Airport, Houston, TX
American Association of State Highway and Transportation Officials (AASHTO), Washington, D.C.
U.S. House of Representatives, Washington, D.C.
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Washington Metropolitan Area Transportation Authority, Washington, D.C.



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598th Transportation Group, Capelle aan den IJssel, Holland
Dutch Inland Shipping Information Agency, Capelle aan den IJssel, Holland
Port of Rotterdam Authority, World Port Center, Rotterdam, Holland
Flower Auction Flora Holland, Aalsmeer, Holland
Heineken Nederland Supply, Zoeterwoude, Holland
Van der Vlist Special Trucking, Groot Ammers, Holland
Dutch Customs, Port of Rotterdam, Holland
MAERSK, Port of Rotterdam, Holland
APM Terminal, Port of Rotterdam, Holland
European Container Terminal, Port of Rotterdam, Holland
RATP Régie Autonome des Transports Parisiens, Paris, France
Union Internationale des Chemins de Fer (UIC), Paris, France
French Ministry of Transport, Paris, France
Normandy Beaches and D-Day Memorial Visit, Normandy, France
Central European Pipeline Management Agency, Versailles, France
86th AES, Ramstein AB, Germany
Lufthansa German Airlines AG, Frankfurt, Germany
SDDC 838th Trans Bn, RRD Mannheim, Germany
DHL Innovation Center, Troisdorf-Spich, Germany
Rhine River transportation Tour, Rudesheim, Germany



INTRODUCTION

"The ideal transport mode would be instantaneous, free, have an unlimited capacity and always be available. It would render space obsolete. This is obviously not the case. Space is a constraint for the construction of transport networks. Transportation appears to be an economic activity different from the others. It trades space with time and thus money."¹

The transportation network of aviation, highway, maritime, rail, and pipelines is the life blood of a nation's economy. Transportation enables commerce, and supports national security. The transportation system as a whole, and in particular the development of the modes of transport and their integration within national and international environments, is affected by factors of geography, environment, technology, society, finance, and public policy. Capacity is the quantity of throughput a transportation network can accommodate at a given time. When the demand exceeds the capacity of the network, the result is congestion which costs the economy in terms of lost time and productivity.

During travel in the United States and Europe, it was apparent that the United States faces many of the same challenges as the European Union (EU). While both the EU and the United States possess enviable transportation networks, they were defined, and are now limited by, geography and history. Shifts in demographics and trade patterns are putting a strain on the existing transportation networks. Both the public and private sectors will find difficulties in funding capital investment to maintain and improve the transportation infrastructure. Current public and private strategy is "stovepiped" within a single mode, making tradeoffs between modes difficult and unlikely. Government regulation has a significant impact on the transportation sector, sometimes to the detriment of capacity management.

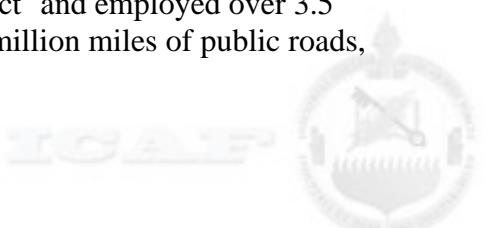
The transportation industry outlook is currently positive, but in the long term, transportation capacity will reach its limit without additional infrastructure investment or a change in demand utilization. Globalization has an economically binding effect requiring increased speed and reliability for the movement of both people and goods.

In studying the transportation industry, it has become evident that the U.S. Government has viewed, legislated, and funded transportation modes as individual entities, resulting in a transportation system lacking a common focus to support passenger and freight movement throughout the country. It is the recommendation of this paper that a holistic, multi-modal approach be taken by the government to establish a National Transportation Strategy that includes public and private financing, adopts progressive user and congestion fees, and seeks to optimize capacity across the transportation modes.

This paper includes three short essays investigating the causes and potential solutions for capacity issues in the rail, aviation and trucking industries.

THE INDUSTRY DEFINED

The United States has the largest transportation system in the world with an extensive physical infrastructure that moves both people and freight. As an industry it consists of five modes: aviation, highway, maritime, pipeline and rail. In 2009, transportation related goods and services contributed \$1.2 trillion to the U.S. Gross Domestic Product² and employed over 3.5 million people.³ The U.S. transportation infrastructure includes 4 million miles of public roads,



160,000 miles of railroad track,⁴ 25,000 miles of navigable waterways, 9,800 coastal and inland waterway facilities, nearly 400,000 miles of oil and fuel pipelines, and 5,200 public-use airports.⁵

The aviation industry provides for the movement of passengers and freight by both large and small air providers. In 2010, over 785 million passengers traveled by air.⁶ The economic downturn had a significant impact on the airline industry; passenger miles are still down from their total of 812 million in 2008.⁷ In 2009, 27 percent of international freight, both imports and exports, moved by air.⁸

The U.S. National Highway System is made up of the Interstate Highway System, arterial roads that support commerce and trade, and the Strategic Highway Network (STRAHNET), which are highways important to military mobilization, and roads that connect intermodal facilities.⁹ It handles a tremendous amount of vehicular traffic to include heavy equipment. The total vehicle miles traveled on all U.S. public roads increased from about 1.5 trillion miles in 1980 to more than 2.5 trillion miles in 2009. Based on current and historical trends, traffic congestion in metropolitan areas is expected to increase, due to population growth, urbanization, increasing freight traffic, and roadway maintenance activities.¹⁰

The U.S. water transportation industry serves the needs of both foreign and domestic commerce and includes companies that carry freight or passengers on the open seas or inland waterways, offer towing services, charter vessels, and operate canals and terminals. In 2009, U.S. water trades (foreign and domestic) amounted to 2.0 billion metric tons. In 2009, container trade accounted for 17 percent of U.S. waterborne foreign trade, up from 14 percent five years before. In 2009, 44 percent of U.S. foreign trade by value was moved by vessel, up from 42 percent five years earlier. In 2009, 6,996 oceangoing vessels made 55,560 calls at U.S. ports.

The pipeline infrastructure, comprised of over 168,000 miles of liquid pipelines¹¹ and 217,000 miles of gas pipeline,¹² carries over 71 percent of petroleum transported in the United States and is one of the most strategically important parts of the transportation network relative to energy distribution.¹³ Typically the oil or gas production company owns a significant share of the transportation pipeline system which is operated commercially. They transport oil and natural gas to and from refineries and for distribution to homes and businesses around the country.

The rail industry includes freight and passenger rail. Deregulation has led to industry consolidation over the last 30 years. As a result, the number of Class 1 railroads has decreased from 40 in the 1980s to just eight in 2011. Today, there are seven major freight rail companies operating in the US and one passenger rail entity, Amtrak, which relies on government subsidies to perform its operations. Demand on the national rail system is growing, and for the first time since World War II, some railroads are experiencing capacity constraints on certain lines.

CURRENT CONDITIONS

The strength of the U.S. economy depends in large part on inexpensive transportation. The transportation industry is highly competitive and substitutability between the modes is high, with minimal cost to the customer who chooses to switch from one mode to another (with the exception of pipeline). Buyers are generally price sensitive, but other factors, such as speed-to-market, play a role in the selection of mode and firm to meet transportation needs. Due to government regulation and high infrastructure costs, incumbent firms have a significant advantage and barriers to entry are high. Domestic transportation firms saw economic indicators decline in 2009, but prices, sales and revenues saw increases in 2010 and 2011. Intermodal



container freight traffic has increased over the past several years and this sector is expected to be a growth area in the future.

Air. The airline industry is an oligopoly with only a few major carriers. Most airlines optimize routes and hubs in specific regions, where they compete with a larger number of moderate-sized firms. Since deregulation occurred in 1978, many airlines have consolidated, struggled, or failed. A further study of Porter's Five Forces reveals several reasons for these failures. Little product differentiation exists, which drives extremely fierce competition and small profit margins. The threat of new entrants is low due to the high cost of capital investment and access to infrastructure. Suppliers, such as unionized skilled workers, aircraft manufacturers, air traffic controllers, and fuel companies, all have significant leverage over the carriers. Buyers are price sensitive and are likely to select the cheapest price instead of remaining loyal to one airline. The threat of substitutes for air travel is relatively low in the United States for long-distance travel, but technological innovations such as video teleconferencing may emerge as viable substitutes for business-related travel. The price of fuel is the greatest threat to the air industry, as rising air transport prices may force customers to seek alternative modes of transportation. Outside the United States, rising fuel costs pose an even greater threat due to the availability of other viable modes such as passenger rail.

Highway. More than 514,000 U.S. interstate motor carriers in United States supported the trucking segment in December 2010,¹⁴ down from 600,000 the previous year. The global recession has led many independent truckers to leave the market. Compared to other transportation modes, trucking has a relatively low barrier to entry. The industry is primarily comprised of small companies¹⁵ with only a handful of large interstate trucking carriers. With so many companies available to provide freight services, competitive rivalry continues to be very high within the industry. In addition, traditional trucking-only firms must now also compete with third-party logistics providers, who provide intermodal services. Independent truckers help alleviate capacity constraints today and assist major trucking companies with less than truckload services. By mid-2009, the full effect of the recession became apparent in the for-hire trucking market when industry revenue dropped by 32.6 percent.¹⁶ The threat of substitute products or services in the freight industry appears to have minimal impact on companies so long as capacity is not being optimized. In 2010, the trucking industry began to show signs of rebounding but the United States must prepare for the projected influx of foreign trade. The Port of Los Angeles projects that by 2035, the number of imported containers requiring land transport will exceed trucking capacity.¹⁷

Maritime. Maritime is driven by economies of scale, volume of goods, and commodity transported. Competition is characterized by cost, dependability, and speed of delivery. Technological developments in shipbuilding, navigation information, communications, sensors, and cargo handling continue to "improve safety and efficiency and allow [for] smaller crews."¹⁸ These developments increase the barriers to entry and consolidation of shipping lines to decrease operational costs. As ships and transportation systems become more complex, training requirements have grown to conform to international standards. The United States obtains about "90 percent of its imports by sea, valued at 75 percent of all its imports."¹⁹ The importance of sea trade to the United States also is illustrated by the fact that the Marine Transportation System (MTS) carries "43.5 percent by value and 77.6 percent by weight of all U.S. international trade."²⁰ Growth in use of the MTS, particularly at containerized cargo ports, brings with it the demand for additional staging areas, expanded landside access, and logistics technologies.²¹ More than other segments of the nation's transportation system, marine transportation is a joint

private-public enterprise. Regulatory authority exists to manage and maintain the marine transportation system. The scope of improvements required to remain globally competitive highlights the need to establish new funding mechanisms, to enhance coordination among the various stakeholders, and to develop an overarching federal marine strategy. International shipping brings with it unique environmental challenges that also must be managed and improved through local, state, federal, and international collaboration. Europe, because of its historical reliance on inland waterways, makes extensive use of barges. The use of barges effectively competes with rail and road for the movement of bulk and containerized cargo.

Pipeline. The pipeline industry is an oligopoly with few major carriers. The Federal Energy Regulation Commission (FERC) establishes tariffs and limits the amount companies charge as haulage fees. While FERC limits growth in fees, it also stabilizes unit revenue. On the oil transportation side, declining domestic production and limited refining expansion is constraining future growth of the industry. The profit margin in the oil and gas pipeline industry is 19 percent²² and 23 percent respectively.²³ The threat of new entrants is low due to high capital costs, heavy regulation, and a lengthy permit process involving federal, state, and local level governments. The threat of substitutes is low due to the volume required and the relatively limited capacity of other modes of transportation to fill the need. Power of buyers and suppliers is limited due to heavy regulation. Skilled labor has moderate power, as do steel manufacturers due to limited competition as a result of consolidation in this industry.

Rail. Deregulation of the railroads 30 years ago allowed the industry to engage in price competition and abandon unprofitable routes. Profit margins are estimated to reach 9.1 percent in 2011, an increase of 4.1 percent over 2009.²⁴ Most operators provide bulk and intermodal freight, which are estimated to represent 65.0 percent and 28.3 percent of industry revenue, respectively.²⁵ While the intermodal segment has grown strongly over the last 15 years, investment in developing new markets or customer segments has been minimal. In 2011, industry sources estimate that approximately one-third of industry revenue will be generated from market segments heavily influenced by global factors.²⁶ These goods include agricultural products, coal and chemicals. Passenger transportation has been the industry's slowest growing market over the past five years.²⁷ Amtrak is the dominant provider for passenger transport in the rail sector. It is the only Class 1 railroad that is owned by the U.S. government. The Passenger Rail and Investment Act of 2008 directed the Federal Rail Administration to develop a National Rail Plan to address the needs of the nation in conjunction with the American Reinvestment and Recovery Act of 2009, which provides the framework for the development of high-speed passenger rail in the United States.²⁸ Europe's rail system differs from the U.S. system reflecting its unique history and demographics. Widely distributed railroads encourage smaller manufacturing and production entities to ship relatively small quantities of goods and products via rail. Highway congestion and restrictions on when trucks may travel also can drive shippers to use rail for relatively short distances. Passenger rail, to include high-speed passenger service, remains the focus of Europe's overall effort to modernize and enhance its rail system.

Intermodal. As U.S. and European transportation networks approach physical capacity limits for individual modes, governments are struggling to rebalance and posture for the future. While government has a role to play, private enterprises, such as third-party logistics providers visited during international travel, are already demonstrating how intermodal solutions, driven by market forces, can maximize the network across multiple modes. Additionally, companies such as Heineken are funding their own infrastructure solutions to increase capacity and relieve congestion. Faced with truck congestion when moving product to Rotterdam, Heineken invested

money to establish an inland port along the Rhine River and moved away from trucking to barge operations.²⁹ As globalization intensifies, a concerted effort is required across the whole of the transportation system to maintain the current competitive advantage shared by the United States and Europe as compared to the rest of the world.

National Security. In addition to supporting the nation's economic strength, transportation also fills a critical role in the nation's ability to mobilize, to project power and to sustain forces globally. This mobilization requires the capability to expand the armed forces and project them forward to fight nearly simultaneously in one major theater of operations while supporting a secondary minor front.³⁰ The extant capabilities of the Civil Reserve Air Fleet (CRAF) and the Volunteer Intermodal Service Agreement (VISA) appear adequate to meet current needs. The U.S. transportation system can rapidly respond to support military operations, but such prioritization will reduce capacity required for commerce and will strain an aging transportation infrastructure.

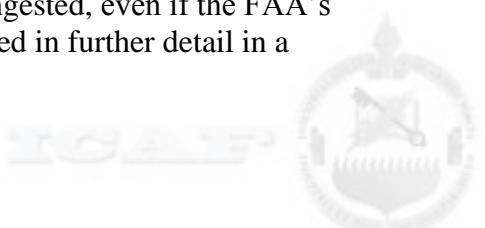
CHALLENGES

Several factors impact the United State's ability to maximize the capacity of its transportation system. In particular, projected demographic shifts, an aging transportation infrastructure, a "stovepiped" policymaking mentality found both in government and industry and heavy regulation all provide significant challenges to enhancing U.S. transportation capacity.

Congestion occurs when demand exceeds available capacity and it is a major challenge confronting the U.S. transportation industry. Traffic congestion costs the United States an estimated \$200 billion a year.³¹ In terms of time and resources, Americans spend 2.7 billion hours on the road and consume 2.3 billion gallons of fuel each year in traffic.³² As vehicle miles increase by a projected 60 percent from 2000 to 2030, congestion will increase, as passenger vehicles and trucks compete for space on the roads and highways.³³ Congested airways also affect American travelers. Current statistics show that more than 20 percent of flights are delayed, a third of which occur in the New York metropolitan region. Air congestion alone costs the U.S. economy an estimated \$9.4 billion.³⁴ Even existing passenger rail lines suffer from congestion. According to Amtrak, some areas within New York metropolitan area currently run at 100 percent of capacity.³⁵

U.S. congestion will worsen before it improves. Most people in the United States live in "mega-regions," which are "networks of metropolitan regions...with shared economic clusters, infrastructure, and natural systems."³⁶ America's mega-regions currently contain 75 percent of the nation's population and economic activity. The U.S. population is projected to reach 420 million by 2050, and most of this growth will occur within these emerging mega-regions, as the population migrates to urban areas. Each mega-region will contain at least 10 million residents by 2050. In the northeast alone, the population is expected to increase 35 percent.³⁷

Congestion will be exacerbated by a deteriorating transportation infrastructure. Inadequate infrastructure affects passenger travel, as well as freight traffic. For example, on the passenger side, the Federal Aviation Administration (FAA) has performed extensive studies on capacity issues and has concluded that the existing airport system is not sufficient to meet future air travel demands. The FAA has plans to improve congestion in many areas, but according to the study, 14 metropolitan airports would continue to be highly congested, even if the FAA's improvements were to occur.³⁸ Airport capacity issues are discussed in further detail in a selected essay at the end of this report.



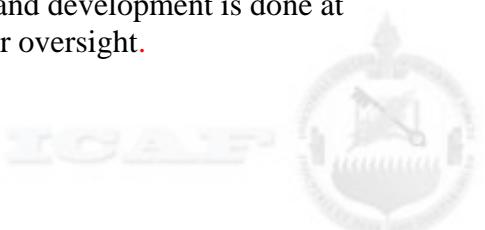
The U.S. transportation industry appears unprepared to meet the anticipated future increase in freight demand, which is expected to double by 2035.³⁹ For example, the trucking industry is a vital part of the American economy and helps businesses send and receive their products. It is also an industry that is heavily dependent on the Interstate Highway System, which is comprised of aging roads that are stretched to capacity. Highways and bridges require investment well beyond current levels to maintain, much less improve, their performance. Projections of freight volume increases reveal that the nation is unprepared and is not preparing fast enough for the freight increase.⁴⁰ As more cars utilize the highways, the ability for a trucker to make his trip in a timely manner decreases. Accidents, traffic congestion and highway construction can all lead to a loss of profit for industry players.

Railroads also play a critical role in the movement of freight within the United States, and considering the expected increase in freight demand, rail has the opportunity to play a much more significant role, as it can reduce strain on the Interstate Highway System and relieve congestion in the urban corridors. To accomplish this, a number of infrastructure improvements must be made, to include replacing antiquated track, reducing railway curvature, renovating bridges and tunnels, and updating signal and control systems.⁴¹

Freight requirements for ports are expected to significantly increase as well - the volume of international containers coming into ports is forecast to grow from 40 million in 2005 to 110 million by 2020.⁴² There are many maritime infrastructure challenges for the industry to address. They include maintenance and upgrading of existing assets, development of new facilities on and off water, and dredging to ensure safe navigation. It is critical to develop an infrastructure that can accommodate the increased projected volume of trade, enhances access by other modes, and improves the ability of communities to pursue recreational use of the nation's waterways.

As for pipelines, there are two options when it comes to improving infrastructure: fix leaks and replace pipes. The number of leaks repaired depends largely on the age of the pipe inventory, the composition of the transported liquid or gas, and the conditions of the surrounding environment. As a result, year after year, the infrastructure becomes older, more corroded, and more susceptible to blowouts. As with the other modes, funding maintenance and improvements will remain a challenge, but new assessment and rehabilitation technology has improved the ability of the industry to keep ahead of problems associated with aging infrastructure. A modern and efficient oil and gas infrastructure is vital in meeting the rising demand for the fuel and chemical products.

The congestion and infrastructure problems discussed above have not gone unnoticed by industry or Government. However, the fact that so little has been done to address them illustrates yet another critical challenge facing the transportation sector – lack of a multi-modal national strategy and mindset. For decades, each independent mode has been allowed to operate in a “stovepipe” environment, typically focusing solely on its own objectives. Unfortunately, these sectors often achieve their objectives without the collaboration of the other sectors that might be impacted by their action. The renewal and expansion of freight transportation infrastructure to date has suffered from an overall lack of system planning. Solutions tend to be local and stakeholder specific and do not consider broader system consequences and costs. For example, the social costs in safety, environmental impacts, and congestion of using trucks for transport are generally greater than moving goods by rail, yet most users do not consider such costs in their planning. Furthermore, most infrastructure planning and development is done at the local and state levels, with little national, central coordination or oversight.



Finally, as it does with many industries, regulation presents significant challenges for the transportation industry. The role of the local, state and federal government in regulating transportation varies greatly by mode. The key challenge for the federal government is to find a balance between regulating the transportation industry in a way that ensures safe, clean, and efficient transport of goods and people but allows for the industry to reap profit and retain its competitive advantage. Well intentioned but ill-advised or misapplied regulations can hurt the industry. An example of this is the Hours-of-Service rules that apply to truckers, an issue that is discussed in further detail at the end of this report.

OUTLOOK

Transportation is an industry vital to the security of our country as well as the national and international economy. The industry's key national security attributes are that it provides a competitive advantage in transportation costs, supports global supply chain management, and enables force projection. To support current and future security operations, "transportation resources are required to support mobilization, deployment, employment, sustainment, redeployment, and demobilization operations."⁴³ Transportation's impact is of such economic significance that it is a leading indicator of industrial trends and vitally supports generation of means or state revenue. Critical to the outlook of the transportation industry are advances in technology, future cost of capital, energy prices, regulatory environment, shift in demographics, generation of public private partnerships, and changes in tax laws. In both the short term and long term, it is paramount that the capacity of the transportation network be enhanced to support the growth of the economy and the nation. Capacity increases need to anticipate economic growth and demographic growth. In the near term, capacity will lag behind requirements due to past underinvestment, but there is an opportunity to catch up in the long term. Because the transportation industry is global in outlook, it is important to view the industry in both the short and long term while taking into account both the domestic and international view.

Short-term (1-5 year) Outlook. In the short term, the transportation industry outlook is good as economic activity returns to pre-recession levels. Current excess capacity will be absorbed rapidly as the economy returns to traditional growth levels. As a leading indicator of industrial production, there has been a gradual increase in the movement of freight and passengers since the decline after record levels of 2006.⁴⁴ The increase in movement seems to show that the world is slowly coming out of the 2007 recession. However, restricting the growth in the near term is fiscal austerity at the federal, state, and local levels. The outcry for reduction in deficit spending both at the federal and state level is causing reduced funding levels for infrastructure improvement projects, maintenance and reconstruction. Federal funding for state highways has been reduced at a time when states can least afford to fund the difference. Additionally, the near-term demand for energy, driven by economic recovery and the instability in the Middle East, pushes energy prices higher, which may curtail economic recovery. With government funding levels likely to be reduced in the near term, it is unlikely there will be significant increases in capacity in the transportation industry. A rebalancing of movement of products and goods between modes mitigates congestion. Third-party logistic firms are finding efficient ways to rebalance movement of products and goods as congestion encroaches upon U.S. infrastructure. The domestic outlook for the industry is modest growth. The modest growth is based upon technology making transportation more productive, but is limited by physical infrastructure investment. The convergence of information technology and fuel-efficient engines

also makes the industry more efficient and effective. The advanced maturity of the system and public resistance to building new infrastructure will increase congestion and wear.

With the continued development of the global supply chain and the desire of more people to travel, the transportation industry continues to expand. It is important to remember that the whole of the transportation network is greater than the sum of its parts. While American railroads, truckers, pipelines and ports don't compete directly outside North America, the United States does compete globally based upon overall efficient use and capacity of the transportation network. America's transportation network and capacity gives U.S. exporters a competitive advantage in areas such as agriculture. For example, while countries like Brazil have lower labor costs, the United States remains competitive largely based upon its ability to transport goods cheaply. In the near term this competitive advantage will continue, but as excess capacity is absorbed, the country will require significantly more investment to increase capacity to fully capitalize on export lead growth, a goal set forth by President Obama.⁴⁵ In the area of maritime, the Jones Act, which requires U.S. built, owned and crewed vessels transport cargo between U.S. ports, limits international competition for domestic maritime companies. Central to the expansion of global trade is the expansion of U.S. port and associated intermodal capacity. In the near term, governmental funds are limited for such expansion and private funds are required to enhance capacity of U.S. ports. The outlook for aviation over the near term is marked by fierce competition in both manufacturing and the opening of Asian markets. Boeing and Airbus are vying to be the aircraft manufacturers that supply the airlines of tomorrow. "Boeing has been losing ground to Airbus for the past three decades, with the tipping point coming in 2003 when Airbus for the first time sold more planes than Boeing."⁴⁶ The intense domestic competition between U.S. airlines weakens U.S. air carriers' ability to compete internationally and expand. Average return on investment for the industry is well below what is expected on invested capital and it is unlikely to improve in the near future for both international and domestic air carriers as a whole. As competition intensifies, profit margins of related industries like aircraft manufactures will continue to be reduced.

Long-term (2011-2026) Outlook. The industry's long term economic outlook is based upon its ability to select the correct technology, adapt to future fuel supplies and to develop the infrastructure to support the changing demographics of the global population. As transportation infrastructure capacity is exceeded and technology reaches the limits of physical efficiency, the transportation network will require increased capacity. Without changes to regulation and new funding mechanisms, the aging of existing transportation systems and public resistance to building new infrastructure will increase congestion and wear. In the maritime area, the Jones Act is unlikely to change. As such, that portion of the industry will remain relatively static. As fiscal government austerity continues over the long term, private and public partnerships will certainly take on a more prominent role over the long term in funding capital improvements. Essential to the long term outlook is the restructuring of the current funding of the Highway Trust Fund. Without increased funding and/or new funding mechanisms, the U.S. transportation infrastructure outlook is marginal over the long term. The continued economic integration of the world will require that regulations become internationally based. This means organizations like the International Civil Aviation Organization and the International Maritime Organization will exert considerable influence in how the transportation industry looks by 2026.

Transportation Assessment. As pointed out in the 2010 Joint Operating Environment⁴⁷, the United States dominates the world economically. This domination is a force multiplier in the global transportation arena. This unmatched capability is based upon the U.S. ability to project

and sustain forces worldwide. “The United States remains the only nation able to project and sustain large-scale operations over extended distances.”⁴⁸ This is accomplished by our convergence of unsurpassed domestic infrastructure of rail, highways, waterways, airports, and pipelines and the technologies to synchronize the industrial base to project and sustain forces anywhere in the world. The projections are affected by the U.S. economic ability to harness international maritime and air assets for strategic movement. While current maritime and air assets suffice in “routine” mobilization efforts, the ability to surge and maximize the utility of military controlled assets is based on the current economic supremacy of the United States.

GOVERNMENT GOALS, ROLES, AND RECOMMENDATIONS

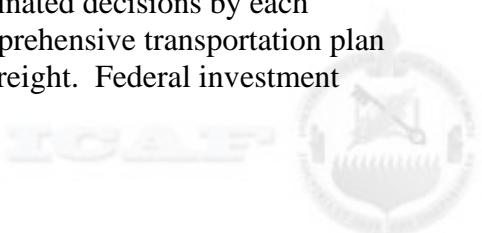
The national transportation network is a vital component of national security and prosperity. An integrated, well-functioning multi-modal transportation system provides a competitive advantage to the national economy as it participates in the global supply chain. The establishment and maintenance of the national transportation network is both a public and private responsibility. In order to position the national transportation network for continued success “we must produce a sustainable, ethical and holistic intermodal freight and passenger transportation network for our country.”⁴⁹ The following recommendations are provided to navigate our nation towards future success.

Recommendation 1: Develop a National Transportation Strategy. The United States’ transportation system has existed far too long without an overarching National Transportation Strategy. Our nation lacks a National Transportation Strategy designed to integrate the various modes of transportation into an effective and efficient system for today and the future. It is vital to America that the national transportation system efficiently supports the nation’s economy and our way of life. The U.S. Chamber of Commerce noted this in its policy declaration on transportation infrastructure, stating, “Long-term underinvestment in transportation infrastructure is having an increasingly negative effect on the ability of the United States and its industries to compete in the global economy.”⁵⁰ “North America and the U.S. would appear to be at a competitive disadvantage without a national or continental policy, planning and investment framework to guide their future.”⁵¹

Unfortunately, federal, state, and local officials have deferred developing a concept for integrating the separate modes into an efficient, highly competitive transportation system—one that optimizes the capabilities of each mode while building synergistic links between them.

Historically, this nation has had a "single mode" mentality, dealing with over-the-road, rail, air and marine transportation separately under the guidance of state agencies. With a new, holistic, intermodal transportation system in place, we should reorganize our state DOTs so they have two separate departments. One would be responsible for the administration of freight transport; the other would oversee the administration of passenger travel. We can no longer afford to administer an effective transportation policy on just a highway-mode basis; we must manage it in a holistic manner.⁵²

Capacity and congestion problems may arise as a result of uncoordinated decisions by each independent mode. The federal government should establish a comprehensive transportation plan that evaluates all modes of transportation for both passengers and freight. Federal investment



tradeoffs made between modes, not within modes, will result in a cost effective plan that accommodates and supports population and economic growth.

Recommendation 2: Transform Public Funding of National Transportation Infrastructure. To fund a National Transportation Strategy, we support the current administration's proposal to transition the Highway Trust Fund to a Transportation Trust Fund. Since 1970, federal investment in highway and air infrastructure has more than quadrupled while investment in rail has remained constant. The Federal Highway Trust Fund, which is funded through fuel and excise taxes, is projected to become insolvent in 2012. The development of a Transportation Trust Fund that collects revenues from highway, rail, maritime, and air will enable investment tradeoffs that optimize transportation options at the lowest cost with the largest benefit to public and economic good.

With an aging infrastructure, it is necessary to increase revenue in support of a National Transportation Strategy. The current method of revenue collection through fuel taxes will become inequitable in capturing revenues from all users of the transportation infrastructure. Fuel tax revenues are projected to decrease as cars become more energy efficient or are transitioned to alternate energy sources. Increasing revenues through progressive fuel taxes, incorporating congestion pricing and comprehensive use-based fees would provide funding to invest in a comprehensive national infrastructure strategy.

Investing now in nationwide technology to capture revenue based on use is imperative to fund the nation's critical infrastructure. This provides an opportunity to seek privatization of some infrastructure as pricing can now effectively allow market operations.

Recommendation 3: Encourage public-private partnerships and attract private capital by establishing a National Infrastructure Bank. The government should scrutinize opportunities for private investment and private operation. In order to encourage greater private investment, we recommend adopting the proposal for a National Infrastructure Bank. As stated by the department of the Treasury:

There is currently very little direct private investment in our nation's highway and transit systems. The lack of private investment in infrastructure is in large part due to the current method of funding infrastructure, which lacks effective mechanisms to attract and repay direct private investment in specific infrastructure projects. In addition, the private benefit for investors is less than the benefit for society as a whole, because of positive externalities from infrastructure. A National Infrastructure Bank could address these problems by directly funding selected projects through a variety of means. The establishment of a National Infrastructure Bank would create the conditions for greater private sector co-investment in infrastructure projects.⁵³

A National Infrastructure Bank could help transition to an intermodal focus. It would serve as the single clearing house for infrastructure investment, allowing integrated decisions with greater knowledge of impacts and opportunities across all modes. In addition to being a funding agent, the bank would serve to integrate modes at the highest level.

Taken together, these recommendations will allow tradeoffs and decisions to optimize the national transportation system as opposed to a single mode. While recognizing changes take time, it is important to begin these investments to plan for the future. These investments will preserve the country's competitive advantage.

ESSAYS ON MAJOR ISSUES

Essay 1: Maximizing Freight Rail Capacity

The Growing Demand for Freight Rail

In recent years, a number of factors have combined to highlight the critical need for increased freight rail capacity. Key among these factors is the improving economy, which has generated significantly higher demand for the transport of raw materials and finished goods. The ever increasing congestion on the nation's highways and rising fuel costs also have driven national and regional planners as well as concerned freight customers to focus more attention on rail as a solution for their transportation needs.⁵⁴ Moreover, marketing campaigns by the rail industry have encouraged environmentally conscious customers to gravitate away from trucks toward freight rail with its relatively low carbon footprint.⁵⁵

During the last several decades, the U.S. freight rail industry has invested significant efforts and resources to enhance capacity resulting in increased profits. Continued successes in these endeavors rely on long-term planning that integrates numerous key issues such as improvements in infrastructure and equipment; modernization of operations and control systems; and the establishment of new rail-centric partnerships with appropriate industries and local public and state entities.⁵⁶ Moreover, changes in government regulations will play a critical role in the ability of the industry to achieve desired capacity goals. An examination of ongoing as well as near and long-term options to enhance freight rail capacity and will support recommend policy approaches to attain this goal.

Recent Initiatives and Improvements

A number of recent practical initiatives by the larger freight rail companies have contributed to increased capacity. For example, CSX acquired 600 new covered hopper cars to haul the 2010 bumper corn and bean harvests in longer trains operating under a program that incentivizes shippers to generate fast trip turnarounds.⁵⁷ This direct approach increases the number of freight cars in a typical train makeup, or "consist," from an average of 86 to a maximum of 150 while using existing equipment and infrastructure.⁵⁸ The resultant flexibility in capacity also allows for the freight system to respond to seasonal market forces such as the current strong demand from Russia for U.S. wheat and grains.⁵⁹ Other basic ongoing infrastructure improvements such as replacing antiquated track, reducing railway curvature, and updating signal and control systems all contribute markedly to greater capacity.⁶⁰

Perhaps, the most significant recent enhancement to freight rail capacity is exemplified by the creation of high capacity corridors that in some instances have doubled the number of multi-modal containers transported by individual trains. For example, Norfolk Southern completed major portions of its north-south Crescent and east-west Heartland Corridors in 2010. The Crescent Corridor runs from New Jersey to New Orleans. It incorporates improvements that include "straightening curves, adding signals, building passing lanes and double tracks, constructing and expanding terminals, and running more efficient trains."⁶¹ In further development of the corridor, Norfolk Southern partnered with state and local communities to share the effort and cost of developing strategic intermodal facilities in four states.⁶² This model of sharing costs with local entities receiving direct economic benefits also served to facilitate the development of the Heartland Corridor, which extends from Norfolk, Virginia to Chicago, Illinois. The improvements along this corridor increased height clearance in 28 railroad tunnels in Virginia and West Virginia, removed 24 other overhead obstructions along the route, and built

a new intermodal terminal in Ohio that serves as an inland port.⁶³ This facility receives and transships high-value goods from Norfolk to America's heartland.⁶⁴ It also opens the flow for regional commodities and products to connect to the global market and stands ready to handle projected increased container traffic flows into the East Coast resulting from expansions of the Panama and Suez Canals. The improvements along the corridor also cut 250 miles and 24 hours of transit time from former routes, further enhancing capacity and efficiency.⁶⁵

Nevertheless, physics and technical factors limit the number of rail cars that may be added to freight train consists to increase capacity. One well-proven solution to this problem is to distribute the locomotive power in strategic locations throughout the length of the train. In-train and end-of-train locomotive power compresses the drawbars on the rolling stock and reduces slack along the train, easing both push and pull forces. Synchronized braking commands, originating simultaneously from multiple locomotives, also significantly reduce stopping times and distances and all but eliminate forces that can tear rail cars apart.⁶⁶ Additionally, such systems reduce equipment recycle times "after stopping or during initial setup..." by as much as 12 percent because of faster "brake system recharging time."⁶⁷ Moreover, distributed locomotive systems can typically increase average travel speed by 1 percent and enhance fuel efficiency by approximately 5 percent because of the smoother, more consistent motion of the rail cars.⁶⁸ The efficiencies generated through distributed locomotive systems provide synergistic enhancements to capacity.

The freight rail industry recognizes fuel costs as the greatest threat to profitability and has taken significant steps to increase fuel efficiency, thus freeing up capital.⁶⁹ For example, in selected locations several freight rail companies use new "GENSET" locomotives, which offer low emissions and 40 percent fuel savings by running one, two, or three separate, smaller engines as needed. CSX also uses onboard locomotive lubrication sticks to reduce friction on drive wheel flanges resulting in a 2-5 percent fuel savings. CSX and BNSF both have developed and use trip optimizer systems that automatically control speed and acceleration synchronized to the train location over known terrain, significantly enhancing fuel efficiency.⁷⁰ Projected increased revenues will allow the major U.S. railroads to go ahead with plans to invest \$12 billion in capital improvements in 2011.⁷¹ These capital investments will include improvements and acquisitions directly and indirectly related to increasing capacity.

Long-Term Innovative Opportunities

Over the long term, the development of intelligent railway systems likely offers the most potential for increasing freight rail capacity. Such systems would provide "for command, control, communications, and information," critical to maximizing freight rail capabilities.⁷² Significant synergistic benefits, however, require the integration and interoperability of the various systems rather than isolated or stove-piped implementation.⁷³ Positive Train Control (PTC) provides a salient example of a system with the ability to substantially increase capacity when used in conjunction with other information and control systems. Initially designed for safety reasons, this digital data system uses the global positioning system linked to operational control systems, which can remotely intervene to stop a train if the operator fails to comply with a signal stop.⁷⁴ When linked to and used with equipment sensors, operations centers and information systems, PTC can "enable a railway to run scheduled operations and provide improved running time, greater running time reliability, higher asset utilization, and greater track capacity."⁷⁵ In particular, the use of PTC integrated with Electronically Controlled Pneumatic (ECP) brakes would allow for trains to move faster and closer together in moving blocks representing dynamic operational track usage, greatly increasing overall capacity.

ECP brakes work by electronically actuating the air pressure brake valves on all railcars simultaneously.⁷⁶ The effect is similar to the distributed locomotive system, but the benefits of ECP brakes are more refined and offer even more efficiency. Nevertheless, ECP brakes will require the development and adoption of national standards and significant capital outlays by all rail companies to implement the system across the network.⁷⁷ Significant cost savings realized from higher fuel efficiency, lower maintenance and parts replacement costs may eventually encourage broader acceptance of ECP. Meanwhile, a few long-haul freight rail operations, with dedicated rolling stock, are in the best position to take advantage of this technology. For example, as of early 2009, Norfolk Southern was operating six ECP brake-equipped trains transporting coal on dedicated, long-haul runs.⁷⁸

Numerous additional technologies and systems capable of contributing to a robust, integrated, synergistic, intelligent railway system include in-cab PTC displays providing command and control information to the train operators; wayside track sensors showing real-time route integrity information; locomotive health monitoring systems providing diagnostic information to onboard crew and appropriate maintenance facilities; and intelligent weather systems highlighting critical weather developments concerning affected routes and trains.⁷⁹ Again, when combined in an integrated network, these technologies promise to generate compounded synergistic enhancements to operations, safety, efficiency and capacity.

A Cogent Way for Freight Railways

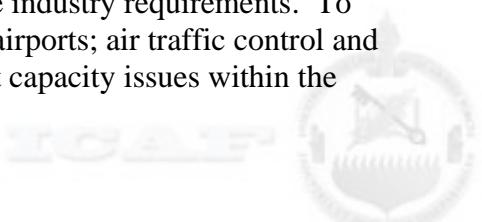
The U.S. Department of Transportation's ongoing efforts to engage and lead critical stakeholders in the development of a National Rail Plan will help create an integrated, collaborative process capable of reducing transportation congestion while increasing capacity, thus enhancing personal quality of life as well as opportunities for individual and national success in the globalized market.⁸⁰ The plan also aims at reforming regulations "that [currently] increase costs and impose unequal burdens on performance... to better serve the transportation industry and... [national] goals."⁸¹

"Unlike other [transportation] modes, rail must... maintain its own infrastructure."⁸² The "misallocation of resources for transportation services" obfuscates the true costs of individual modes of transportation, making true cost comparisons difficult.⁸³ Other endeavors requiring freight rail support or funding "may provide a broad public benefit" but may not equitably recoup costs.⁸⁴ In these and in many other development cases involving railways, public-private partnerships that share planning efforts and costs related to benefits point the way forward to build the high-performance freight rail systems of the future.

-Bart Merkley, Dept. of Homeland Security

Essay 2: Major U.S. Airport Capacity

The United States' air traffic system is undoubtedly one of the best in the entire world. The Federal Aviation Administration (FAA) estimates its largest user, civilian aviation, "directly supports about \$200 billion in economic activity and 1.1 million U.S. jobs."⁸⁵ However, the system is not positioned to maintain its robust support in the future. If fact, danger signs are evident with increasing delays and cancellations at many of our nation's major airports. Ultimately, major U.S. airport capacity is inadequate to meet future industry requirements. To support this position, I will discuss two inadequacies of our major airports; air traffic control and runway capacity. First, I will provide a brief background of airport capacity issues within the



industry. Next, I will take an in-depth look at both air traffic control and runway capacity to explore why they are significant concerns for the future. Finally, I will discuss viable options to address these concerns including policy recommendations for the government.

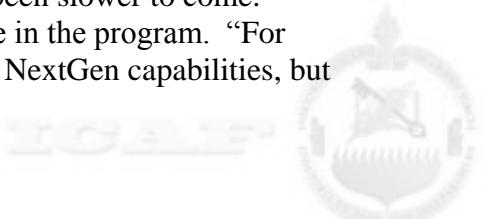
Background

The Airline Deregulation Act of 1978 is one of the greatest catalysts of change the airline industry and the air transportation network have ever seen. It opened the floodgates of competition, free enterprise, and innovation to revitalize the entire industry and placed it on a flight path of growth for the next 25 years. With this incredible growth came increasing pressures over the years to expand our national air traffic infrastructure to meet demand. By the early 2000s, the FAA convened a team of experts to begin what was then called the Future Airport Capacity Task (FACT), an in-depth effort to study the issue. Their 2003 FACT I report “revealed that many of our hub airports and their associated metropolitan areas could be expected to experience capacity constraints (i.e. unacceptable levels of delay) by 2013 and 2020, even if the planned improvements envisioned at that time were completed.”⁸⁶ A second FACT study in 2007 revealed “18 airports around the country are identified as needing additional capacity by 2015, and 27 by 2025, if the airport system remains the same as it is today without the planned improvements.”⁸⁷ These shortfalls are caused by two primary capacity inadequacies: air traffic control and runways.

Air Traffic Flow Capacity

Air traffic control is the process used to maintain control of aircraft both in the air and on the ground. Its purpose, according to the Reason Foundation, is “to provide safe separation between aircraft in all phases of operation (including on the ground).”⁸⁸ Air traffic controllers have done this fairly safely in our country since the early days of aviation, although the technology and methods have evolved over the years. However, recent trends show the ATC system has not evolved fast enough to meet exploding demand. According to the Brookings Institute, “The limited precision of 1950s-era radar requires controllers to maintain wide safety buffers between aircraft, thus limiting airspace capacity.”⁸⁹ These inefficiencies are evident in congestion statistics from before the economic downturn when travel was recently at its highest. The overarching solution being pursued by the FAA to address congestion is the Next Generation Air Transportation System (NextGen). NextGen is an umbrella term for a wide-ranging transformation of the U.S. National Airspace System (NAS) and “represents an evolution from a ground-based system of air traffic control to a satellite-based system of air traffic management.”⁹⁰ The expected improvements from this massive upgrade are impressive. The FAA estimates a 35 to 40 percent reduction in delays and a savings of about one billion gallons of fuel.⁹¹ However, NextGen is not without its skeptics and problems. One primary issue is the excessive program delays. John Hughes from *Bloomberg Businessweek* described the delays plaguing the program in a recent article. He said, “For years, airlines have been frustrated with the U.S. government’s slow progress in adopting a satellite-based navigation system for landings and takeoffs.”⁹² Such delays are caused by an ineffective and inefficient FAA. According to the GAO, they are “reminiscent of the schedule delays and other issues that plagued FAA’s previous air traffic control modernization efforts.”⁹³

A second issue for NextGen is the uncertainty with regard to financing. This program is based on a combined public and private investment business framework. The FAA has been fairly successful at gaining public funding, but private funds have been slower to come. According to GAO, the reluctance comes from a lack of confidence in the program. “For example, aircraft operators must purchase equipment to implement NextGen capabilities, but



some airlines have been reluctant to do so until FAA specifies requirements, addresses funding concerns, and demonstrates benefits.”⁹⁴ This is a major problem for the FAA as investments by the industry are key to the continued success and progress of the program. Both the delays in the program and the lack of industry investment are critical problems which must be resolved.

Runway Capacity

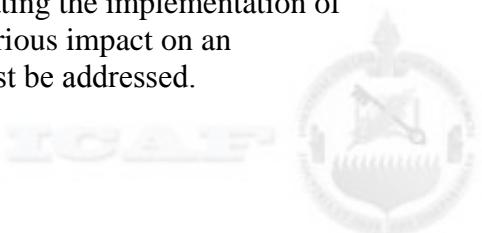
The second area of capacity issues deals with runways at airports across the country. This is not necessarily a problem for all airports, but it is definitely an issue in the major traffic areas. For runways, there are really two separate aspects to address. First is the lack of runways; there are simply not enough runways to meet the current and future aircraft demand. In their 2007 FACT study, the FAA spoke to this growing capacity issue. The report said, “Our data indicate that many existing airports will need to be expanded to meet future demand. The metropolitan areas that have traditionally driven aviation demand will continue to do so.”⁹⁵ In addition to new airports, building new runways at existing airports is also needed for capacity relief. Even in the most air traffic stressed part of the country, New York, new runways have not appeared. In fact, as recently reported by the *New York Times*, “The last new runway at the three airports was built in the early 1970s, at Newark, although officials at the Port Authority of New York and New Jersey, which operates the region’s three major airports, noted that they had renovated runways and installed additional taxiway routes that can help alleviate congestion.”⁹⁶ Although building new airports and runways seems like the easiest solution to the problem, it is hardly simple or easy.

A second major contributor to runway capacity issues is efficiency: how well are the facilities being used? In most areas with flight delays, evidence shows airlines over schedule the facilities beyond their preplanned capacity. This is possible because there are no restrictions on the number of flights they can schedule, only on the number which can land and take off in a given hour. For example, a 2008 DOT inspector general report analyzing airline schedules at 15 airports showed the significance of airline over scheduling during peak periods. “That study revealed that six of the airports had flights scheduled either at or over maximum airport capacity at peak hours of the day during the summer of 2007.”⁹⁷ So as is evident, both the number of runways and their use are contributors to ground capacity problems in the U.S. air transportation network.

Policy Recommendations

As discussed earlier, the air traffic control system problems center on delays in implementing the NextGen system. These program delays involve both ineffective and inefficient administration by the FAA, as well as a lack of certainty in funding for the program. Regarding the need for good administration, one solution must be to refocus the agency on long term planning. The Department of Transportation (DOT) should do an assessment of the FAA’s current structure, staffing and funding of the NextGen program to determine proper strategic focus by the FAA for adequate long term planning.

A second solution for administration woes involves the current structure, staffing and funding of the FAA itself and its cooperating partners. A separate GAO report found “Stakeholders and partner agencies identified several other challenges to improving interagency coordination and collaboration, including (1) limited funding and staffing to dedicate to NextGen activities, (2) competing mission priorities, and (3) undefined near-term roles and responsibilities of some partner agencies. The FAA also faces challenges coordinating the implementation of NextGen across multiple FAA offices.”⁹⁸ These items can have serious impact on an organization’s ability to adequately accomplish its mission and must be addressed.



The third major solution needed for the NextGen program involves funding. As mentioned above, there are some questions concerning whether the FAA and its cooperating partners have the appropriate funding and staff to correctly execute the NextGen program. An outside agency needs to investigate this issue and determine what corrective actions are needed. A further area of funding uncertainty lies in the investment from commercial industry. A lack of confidence in the program within the industry needs corrective action by the FAA using better long-term planning to solidify specific requirements, funding concerns, and benefits to the industry. The FAA must investigate and correct industry concerns with the NextGen program to secure adequate confidence and investment in the program for the coming years.

As noted earlier, the second area of capacity issues deals with runways at major airports, specifically the lack of sufficient runways and the inefficient use of existing runways. First, for the number of runways, stricter federal oversight and direction in the regional planning process is needed to ensure adequate planning and execution. Currently, there is a fairly robust regional planning process, called the Regional Airport System Plan (RASP), which helps identify additional solutions, such as the increased use of alternate airports or other modes of travel, to help relieve airport congestion. However, the program doesn't have the necessary teeth to get results. DOT should seek strict enforcement of RASPs and other regional airport plans in regions where congestion is a problem or projected to be an issue in the next 10 to 20 years.

Second, we discussed the inefficient use of existing runways. The solution here is again increased regulation. The status quo allows airlines to over schedule airports to the point of gridlock. A pricing mechanism is needed to help alleviate this problem using market based principles of supply and demand. According to the 2009 GAO report, this type of control mechanism is not allowed: "Current airport revenue rules generally do not allow airports to price their services regionally; therefore, using pricing to even supply and demand among various airports is not possible."⁹⁹ This type of rate structure can actually make congestion problem worse as landing costs remain lower at older, busier airports than newer alternate regional airports. DOT should seek legal authority to implement congestion pricing at airports currently experiencing heavy congestion to immediately help alleviate the problem.

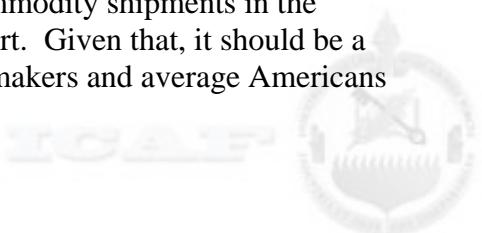
Conclusion

Through the evidence provided, the author argues that major U.S. airport capacity is inadequate to meet future industry requirements. Both air traffic flow capacity and runway capacity are key bottlenecks, which left unaddressed will only get worse in the future. Action is needed from both DOT and the FAA to address government problems and industry concerns with the NextGen Program. Additionally, DOT should also take actions to strengthen regional airport planning and develop effective congestion pricing to help alleviate runway capacity issues at the nation's busiest airport. Strategic and well-thought out steps now will reap monumental benefits for our nation in the decades to come.

-Mike M. Brantley, U.S. Air Force

Essay 3: The Driver Shortage in Long-Haul Trucking

The long-haul trucking industry can be considered one of the engines that drive the U.S. economy. The Bureau of Transportation Statistics has estimated that trucks are responsible for transporting approximately 70 percent (in value and weight) of commodity shipments in the United States,¹⁰⁰ significantly more than any other mode of transport. Given that, it should be a great cause of concern for trucking executives, government policymakers and average Americans



alike that the U.S. trucking industry is facing an impending driver shortage so severe that it threatens to impact the current economic recovery and over the long-term, significantly constrain the industry's capacity.

Background and Contributing Factors

The driver shortage issue has actually existed for well over a decade,¹⁰¹ but it has been masked by the natural ebbs and flows of the economic cycle – in times of recession and slow economic growth, consumers demand less which reduces production, and in turn, the need to transport goods. However, as the economy rebounds and consumer demand increases, so does the demand for freight services. Without a sufficient labor pool to draw from, trucking and shipping companies are unable to meet the increased demand, resulting in higher rates and ultimately higher costs for consumers. In a 2005 report, Global Insight concluded at that time that there were 1.3 million long-haul truck drivers and that even at that level, a shortage of 20,000 drivers already existed. The report projected that by 2014, the industry would be short 111,000 drivers.¹⁰² In 2010, the Council of Supply Chain Management Professionals significantly upped that figure stating that between 2010 and 2011, the industry would need a total of 400,000 new drivers.¹⁰³ Several different factors have contributed to the driver shortage. Among them:

Demographics: Global Insight identified several trends in the overall population and trucker population that will impact the shortage in coming years. First, nearly 20 percent of all long-haul truckers fell in the 55 or older category in 2004.¹⁰⁴ Replacements need to be found for these drivers, presumably and preferably from younger segments of the population, but the ability to do so will be constrained by the fact that the overall growth of the labor force is predicted to slow to only 0.5 percent growth by 2014 and the middle-age segments (35-44 and 45-54, accounting for 55 percent of the total driver population in 2004), most likely to feed the trucking industry, is expected to remain flat or decline.¹⁰⁵

Changes in life-style preferences: By anyone's standards, the life of a long-haul trucker is a hard one. The decision to pursue this career results in being on the road constantly, often for weeks at a time, making it a particularly tough career choice for those who place a high priority on family life and time spent at home. Quality of life is also impacted by other factors such as having to deal with government rules and regulations, inadequate infrastructure, facilities, and equipment, excessive time spent waiting to load/unload, and lack of respect for the profession.¹⁰⁶ Given the harsh realities of "life-on-the-road," trucking companies are finding it harder and harder to attract potential new drivers, especially when other "blue-collar" jobs in the construction and manufacturing sector can offer better pay and nights at home.

Reduction in wages (as compared to construction): As mentioned above, trucking competes with construction for labor. In the 1990's trucking presented itself as a favorable alternative to construction in that on average, it typically paid 6-7 percent more. However, the 2000-2001 recession brought trucking wages down relative to construction and as of the 2005 Global Insight report, they had not regained their previous edge. In 2004, the average trucker driver earned approximately \$40,000 a year;¹⁰⁷ according to the 2009 figures put out by the Bureau of Labor Statistics, the average salary for a tractor-trailer driver was \$39,260.¹⁰⁸

High turnover rates: Historically, the long-haul trucking industry has had one of the highest employee turnover rates, reaching an all-time high of 136 percent in the fourth quarter of 2004.¹⁰⁹ To put that figure in perspective, a turnover rate of 100 percent means that, on average, a driver changes jobs once a year.¹¹⁰ While much of the churn is a result of dissatisfied workers leaving for jobs in other industries, some of it is caused by competition among trucking

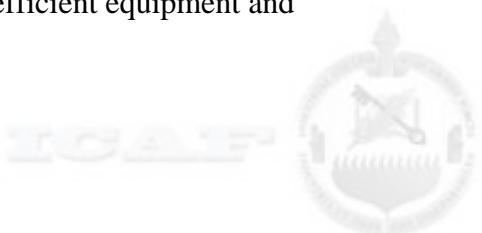
companies, especially in good economic times when the effects of the shortage are most painfully felt. Regardless of the cause, high turnover is a tremendous cost for the industry as surveys have shown that each turnover costs a company \$4,000 to \$7,000 per driver¹¹¹ (covering replacement and retaining), translating to billions of dollars for the industry every year. In addition, it negatively impacts a firm's competitiveness and continuity through disrupted delivery schedules, underutilized equipment and lost sales opportunities.¹¹²

Government regulation: Hours-of-Service (HOS) rules are promulgated by the Federal Motor Carrier Safety Administration (FMCSA) and govern the working hours of individuals who operate commercial motor vehicles, to include long-haul truckers. The purpose of the regulations is to reduce motor vehicle accidents that are a result of driver fatigue. Changes to the existing HOS rules are currently being considered, which would reduce the maximum allowable consecutive drive time and increase mandatory rest periods.¹¹³ Opponents of the proposed rule, which include trucking companies, industry trade associations and businesses, contend that changes to the current rules are unnecessary as fatalities have fallen 33 percent since the rules' enactment in 2004,¹¹⁴ proof that the current rules are working and that further restrictions would not result in improvements significant enough to justify the additional costs and disruptions to the supply chain. Furthermore, proscribed sleep times will reduce nighttime driving (which many restaurants and retailers depend on) and add to congestion on the roadways.¹¹⁵ In terms of the driver shortage, the new rules would require additional capacity to transport the same amount of product – and additional capacity means more drivers. Add to that the impact that greater congestion and added stress would have on quality of life issues for drivers, and the new HOS rules would further contribute to the difficulty trucking companies already have recruiting and retaining drivers.

Like the HOS rules, the FMCSA's Compliance, Safety, Accountability (CSA) program was designed to ensure motor carrier safety. The program was launched in 2010 and is a comprehensive data collection and measurement system that ranks companies on seven Behavior Analysis and Safety Improvement Categories (BASICs).¹¹⁶ The greater focus on safety is expected to shrink the pool of eligible drivers anywhere from 4-8 percent,¹¹⁷ and competition for the remaining qualified drivers is expected to increase. Given that a weak CSA score can negatively affect a carrier's insurance rates and its ability to capture new business from shippers, qualified drivers may be able to demand higher wages.

Policy Recommendations

"Let the Market Sort It Out" – The Industry Solution: There are those who argue that high turnover in the industry is not a problem, that it is simply the nature of industry.¹¹⁸ The argument is not entirely invalid. Human resource specialists and strategic business consultants may dispute that it is the best way to run a business, but after decades of such high rates, it's hard to argue that the situation is unsustainable. In fact, it may be what creates the conditions for the higher wage rates that so many believe are necessary to attract new entrants to the industry – and with the greater focus on safety as a result of CSA, those higher wages now have a greater chance of going to the best and most responsible drivers as opposed to just someone with a Commercial Drivers' License. Companies that truly do care about retention will develop training and incentive programs to retain drivers¹¹⁹ or change their scheduling practices to keep drivers closer to home,^{120 121} while others will compensate where they can, whether that means charging customers for excessive wait times or by operating more efficient equipment and increasing truckloads.



“The Government Should Just Relax” – The Government Solution: The proposed revisions to the current HOS rules are grounded in the same safety arguments, however, critics have argued that the new rules were arrived at using misapplied scientific data¹²² and that any further decreases in accident statistics will not be significant enough to counterbalance the loss in productivity. Further restrictions to the rules will significantly impact the need for additional capacity and exacerbate the effects of the driver shortage, thus additional regulation should be considered very carefully. If the proposed HOS rules are ultimately implemented, the productivity losses and the need for additional trucks and drivers could be somewhat mitigated through legislation such as the Safe and Efficient Transportation Act (SETA), which would allow states to increase the weight limits on federal interstates from 80,000 pounds up to 97,000 pounds for trucks that are equipped with a sixth axle, which provides for maintained stopping capability and current cargo load weight per tire.¹²³

“Treat Driver Shortage as a STEM-like Problem” – A Government/Industry Partnership:

For years, U.S. officials and industry leaders have been lamenting about how fewer and fewer young Americans want to pursue careers in science, technology, engineering and math (STEM), the implication being that this will lead to the United States eventually losing much of its technical superiority and thereby weakening its position in the global economy. To be certain, no one is asserting that the truck driver shortage is on par with the seriousness of a STEM decline. However, as has been demonstrated, the trucking and logistics industry is critical to the economy’s overall performance and without an adequate workforce to support it, the economy will suffer. Thus, Government and industry should be working together to address the problem and to date, the Government has not taken serious note of the issue, leaving it to industry alone to solve.

The Government could be doing more in the way of providing financial assistance for vocational programs and steering individuals toward trucking. An example of where this is currently being done is the “Troops 2 Truckers” program, whereby the process for obtaining commercial truck driver qualifications is facilitated for veterans that had experience operating large vehicles in a military environment.¹²⁴ As with STEM, the Government and industry, through increased vocational training and apprentice programs can attempt to attract younger workers before they choose alternate career paths.¹²⁵ In addition to working with industry to find, attract and assist individuals that are interested in trucking as a career, the Government should also be partnering with industry to make investments in infrastructure and facilities that would affect quality-of-life on the roads. While industry should take the lead in providing the infrastructure to support “life on the road,” it is unlikely that they will invest on their own, especially if they can continue to operate with high turnover and only occasional wage increases.

Truck driving may never be considered a glamorous occupation but it is critical to the success of the U.S. economy. As such, the driver shortage issue must be addressed by industry and Government policymakers alike.

-Kimberly Villarreal, Defense Logistics Agency



CONCLUSION

The modern transportation system is vital to the economic prosperity and security of a nation. The development of this wondrous, interconnected network clearly influenced, and was in turn influenced by, civilization and its history. In particular, domestic industry study visits to the Port of Houston and New York, as well as international trips to the Port of Rotterdam in The Netherlands, revealed the historical aspects of the development of transportation systems, but also the necessity for all modes of transport to work together in delivering the necessities of daily life as well as providing for the movement of goods and passengers. The transportation sector is responsible for 8.6 percent of the U.S. GDP.¹²⁶ It was responsible for 16 percent of household expenditures, and employs 9.3 percent of the nation's workforce.¹²⁷

In spite of the strategic importance and interrelated nature of the transportation industry, the transportation infrastructure has been viewed and managed, by both the public and private sectors, as separate and distinct modes. As the population grows and shifts to mega-regions, and as global trade increases, the transportation system needs to be viewed as an integrated part of the global economy. The importance of an integrated strategic transportation network cannot be overstated. Deficiencies in the transportation infrastructure affecting capacity result in the loss of national treasure, opportunity and productivity. A failure to take required actions to address current and future capacity issues will place the economy and national security of the United States at risk.

Dwight D. Eisenhower said, "Our real problem, then, is not our strength today; it is rather the vital necessity of action today to ensure our strength tomorrow."¹²⁸ The development of an overarching National Transportation Strategy is a necessary first step in preparing for the future needs of the United States as a major contributor to the global economy. The next step is the development of a Transportation Trust Fund in conjunction with a progressive system to tax those who benefit from the transportation infrastructure based on their use. Finally, the establishment of a National Infrastructure Bank that provides incentives for more private investment will allow market forces to have more influence over transportation investment decisions.

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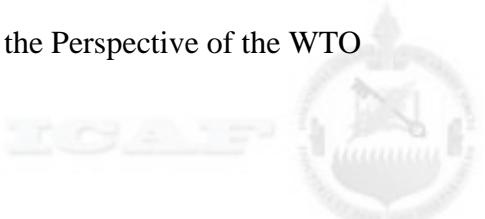
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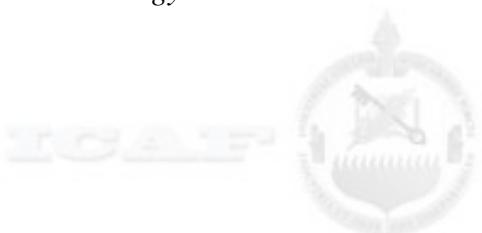
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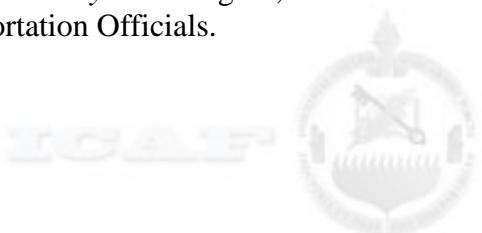
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