

Transportation—Prospect and Retrospect

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Introduction

For transportation professionals, the twentieth century represents the most dramatic changes in transportation technologies and innovations. From the invention of the airplane to the explosive growth in civil aviation in the last three decades; from the mass production of automobiles to the construction of extensive freeway systems; from the invention of the standardized shipping container to the burgeoning growth of ocean-going freight traffic; from the opening of the first shinkansen in Japan to the current extensive European high-speed rail network—the world today is very different from how it was just a century ago. As transportation professionals, we are

proud to say that many of these changes would not have been possible without an effective and efficient transportation system that is adaptable to change and continues to improve. With the new millennium approaching, this is the time to reflect on the past and to ponder the future of transportation. Although the definition of transportation will not change in the next millennium, the means to transport people and goods from one place to another may be significantly different than it is today.

Highway Transportation

The automobile has been one of the greatest forces for human freedom. Some reasons why the automobile remains so

popular are: continuing increases in auto availability and quality; declining real gas costs (when adjusted to inflation); continuing population shifts away from urban areas traditionally relying on public transport to suburban areas where the automobile is more dominant; increasing time pressure in a society that feels the need for flexibility and speed.

The automobile has made some of the things people desire most—independence, mobility, and a greater choice about where to live—affordable to hundreds of millions, and soon billions of people. The so-called ‘automobile culture’ in the USA has been so powerfully introduced and extensively reinforced by many Hollywood movies that the desire to own an automobile will continue to rise in many places of the world.



Interstate 95 and State Road 836 interchange west of downtown Miami

(Author)

The recent introduction of the Ford Excursion (a 7000-lb, 18-foot, 44-gallon fuel tank, gas-guzzling recreational vehicle), is an outsized symbol of prosperity and cheap gasoline. However, with OPEC beginning to flex its muscles (resulting in sharp increases of crude oil prices over the last few months), it is unlikely that this huge 'muscle' car will become a new trend even in the US, and the irony is that although it is brand new, the Ford Excursion is already on the road to becoming a dinosaur.

Dwindling petroleum reserves will accelerate the pace of change to other energy sources over the coming years. Electric cars, hybrid cars, fuel-cell powered vehicles, and other mixed- or alternate-fuel powered vehicles will become widely accepted as costs decline. Cars of the future may not look like cars today but the increasing popularity of private automobiles is expected to continue well into the future.

The introduction of Intelligent Transportation Systems (ITS) in highway transport will make most highways and vehicles 'smarter' in the future. Highways will be safer, but more expensive to build and maintain and the significant costs of ITS will limit the scale of adoption. Privacy and litigious concerns will also present significant challenges to the technology. The simpler use and growing acceptance of the Internet will certainly have a significant impact on the average person making decisions on travel routes, cost, and time. The use of Internet and real-time data interfaces will also facilitate management of transportation demand and supply, allowing limited resources to be allocated more effectively and efficiently.

Telecommuting will reduce some journeys, but also has the potential to induce additional new travel as the globalized world economy introduces a new management paradigm.



Aerial view of Orlando International Airport in central Florida

(Author)

Air Transportation

The air transport industry is one of the fastest growing sectors of the world economy, with at least 24 million jobs dependent upon an industry that contributes over US\$1140 billion per year to the global economy. By 2010, aviation's economic impact could exceed \$1700 billion, including over 30 million jobs. However, these economic benefits will only be achieved if the supporting infrastructure, including airports, air traffic management technology and surface access to airports, is provided to handle the forecast growth. Preserving and enhancing these economic benefits underpins the ongoing mission of transportation professionals to provide cost-effective and environmentally friendly aviation capacity improvements worldwide.

The world's airports must be ready to handle the 2.5 billion air passengers forecast for 2010, and they will be ready if the proper infrastructure investments are made in a timely fashion. Many leading international airports are operating at full capacity today, including some new

airports that were full the day they opened! As airports become larger and more complex, passengers expect more help from curbside to aircraft seat. With extensive hotel, shopping, and recreational complexes spread across thousands of acres, many major airports not only serve cities, but are also becoming cities themselves.

And just as in cities, the biggest challenge in large airports is how to transport people on the ground. An all-too-often ignored element of aviation infrastructure is surface access to airports. If adequate investment is not made in ground access, the improvements to airports or air traffic management capacity may not solve congestion problems, and bottlenecks could merely be shifted from the air routes and airports to the connections between airports and the city centers they serve.

Increasingly, rail-air links play an important role in transporting passengers and airport employees quickly and efficiently to and from airports. With the successful introduction of the high-speed rail service to the Paris Charles de Gaulle International Airport, more and more airports are following this lead in an effort to not only



TGV High-speed rail station at Paris Charles de Gaulle International Airport

(Author)

reduce airport ground congestion, but to also increase their service areas. Instead of serving a radius of 50 miles, with a direct high-speed rail connection, an airport can serve an area up to 200 miles in radius, making the airport more competitive and productive in terms of its investment. The recent crash of a Taiwan-based China Airlines MD-11 at the new Hong Kong International Airport on 22 August 1999 clearly shows the importance of air transportation safety or the lack of it in some airlines. If the airline industry cannot police itself effectively, governmental and international organizations must step in and ensure that air transportation safety is consistent from one airline to another as international borders become almost non-existent in a rapidly changing world. Additional and improved pilot training and air-ground coordination is also critical under adverse weather conditions. Unless the importance of the air transportation safety issue is recognized and widely accepted, the future growth of civil aviation in the Asia-Pacific region will not achieve its potential.

Water Transportation

The invention of the standardized shipping container has greatly facilitated cargo loading and unloading at the world's ports and harbors. Larger and more powerful ships are on the horizon to increase the shipping industry's productivity. Satellites and the Global Positioning System (GPS) have made shipping safer and more reliable over the years.

The size of ships is limited by the width and depth of the Panama Canal. To increase the size and capacity of ships, the Panama Canal will have to be widened. However, the substantial costs and who is going to pay are a thorny subject. This is a difficult but not impossible issue, and advances in technology make it probable that widening and/or building of a new parallel canal will be completed in the coming century.

For inland waterway transportation, the need to dredge to maintain the proper channel depth creates a potential environmental problem—some of the silts are heavily contaminated and create problems when disturbed and excavated. Proper disposal of these hazardous deposits

can be very expensive and challenging. How to balance both the needs of progress and the environment will present a major challenge for transportation professionals. The other issue concerning inland waterway transportation is also related to the environment. To maintain the water quality and preserve wildlife, ship operators must not treat waterways like sewers. Better and stricter environmental control measures regarding the shipping industry will no doubt increase shipping costs, but should be regarded as an investment for a better future, and will be well worth it.

Rail Transportation

One of the most exciting developments in rail transportation in the twentieth century is the high-speed rail system. With high-speed railways, distance and time are shortened to such an extent that greater regional development becomes a reality. The time saving translates into increased productivity. Accident reduction is more difficult to quantify, but the benefits can be clearly demonstrated by the greater acceptance of this exciting technology. Japan's shinkansen is the most famous high-speed rail system in the world. The first shinkansen was inaugurated between Tokyo and Shin-Osaka in 1964. Today, the JR group of companies operates five full-standard shinkansen (Tokaido, San'yo, Tohoku, Joetsu, and the Nagano-bound Hokuriku shinkansen) and two mini-shinkansen (Yamagata and Akita). The shinkansen network boasts both high speed (the fastest at 300 km/h), and service frequency. For example, during the day, at least six trains operate each hour each way between Tokyo and Shin-Osaka. The frequent service and perfect safety record have made shinkansen the world's most successful high-speed rail system. With the adoption of newer and faster trains, the shinkansen is expected to continue its great success of the last 35 years.

With a borderless and united Europe, this has been the worst year for flying in the Continent; one third of European flights take off at least 15-minutes late, with average delays running at more than 40 minutes. The culprit is Europe's air traffic control system, consisting of a patchwork of 49 control centers run by national governments. Each has its own rules on use of air space. As a result, it is easier to travel by high-speed train than by airplane. In addition, rail travel generally costs less than flying, and delays are rare. Business travelers are turning increasingly to Europe's expanding network of high-speed trains, which is faster than flying on many routes when issues like time for ground transportation, check-in, and boarding are factored in. The rapid expansion of the European high-speed rail network has dramatically changed the landscape of Europe, and travel in Europe is more exciting on the high-speed rail network.

In Taiwan and Korea, the development of the proposed high-speed rail system was delayed by financial and political problems. With Asia's economy improving and a Taiwanese presidential election approaching, it is expected that the delayed high-speed rail project in Taiwan will soon move forward. In Korea, the high-speed rail project will need more government intervention if it is to become a reality.

In the US, the long-awaited high-speed rail system is almost here. Amtrak is scheduled to begin its first high-speed rail service on the Northeast Corridor later this year. The *Acela* high-speed trains can travel at speeds up to 165 mph (264 km/h) and all 20 trains are due to enter service by September 2000. The new service is expected to generate 2.5 million new riders and \$180 million in revenue during the first full year.

In rail freight transportation, better integration with other transportation modes (especially at ports and harbors), is the key development in the coming century. With

advances in ITS and GPS, cargo handling and transfer can be planned to maximize speed and minimize time and costs.

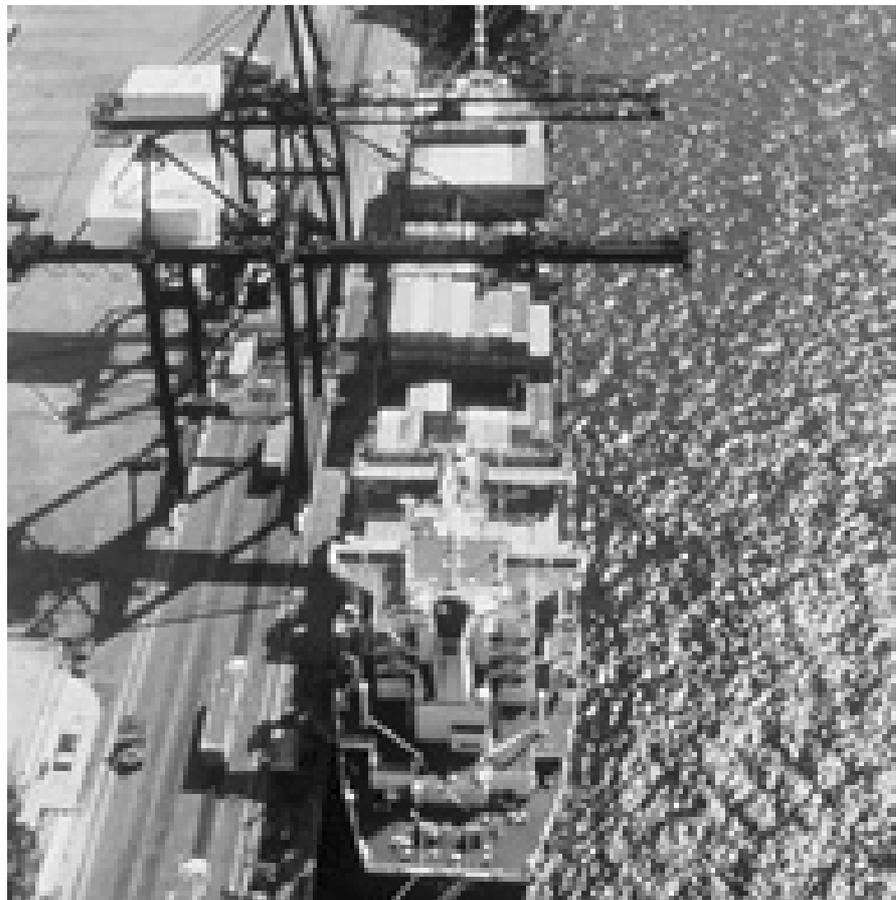
Another critical area of rail transportation is rail crossing safety. Grade separation should be done whenever possible. If grade separation is not feasible for financial reasons, better rail crossing control is needed to cut crossing accident rates. Rail crossing safety must be a top priority for railroad companies and governmental agencies.

In developing countries like India, where two passenger trains recently collided head-on at Gaisal in west Bengal killing 300 people, the culprit is the ongoing problem of inadequate and poorly maintained train control systems. Instead of spending billions on nuclear weapons,

the Indian government would be better off allocating scarce resources to improving the antiquated train systems. And the international community must help make this feasible.

Non-Motorized Transportation

Concerns about the environment and the economy, lack of adequate resources and the enormous costs of new technologies are reminding people that non-motorized transportation (NMT) continues to be a viable mode of transportation. NMT still dominates in Asia and Africa where it accounts for 25% to 70% of all daily trips. For example, China has 300 million bicycles, and India, 45 million.



Container ship docked at Port Everglades in south Florida

(Author)



The Hong Kong subway system is one of the first mass transit systems to use smart cards. (Author)

Many Asian cities suffer from severe air pollution with pollutant levels far exceeding the limits suggested by WHO. Increasing car and motorcycle ownership will not reduce pollutants and better use of NMT as part of a balanced approach to solving urban traffic congestion must be seriously considered.

A good transportation policy should be economically efficient, ecologically balanced, and provide social equity. In flat terrain without adverse weather conditions, NMT must be part of urban transportation. Planning processes and methods that include NMT, including air quality, public health and social equity, are strongly recommended. For example, bicycle paths must be part of a comprehensive highway system.

In France, the amended National Traffic Code that recently went into effect allows children up to 8-years old to ride bicycles on sidewalks, and also requires drivers to leave a clearance of 1.4 meters (about 5 feet) when overtaking cyclists. The revised code also authorizes local mayors to take steps that promote the amenity and security of cyclists. Current estimates put

the number of bicycles in France at about 20 million with cars at 26 million. The success of NMT in the Netherlands and the NMT-friendly policy changes in France all represent positive steps forwards.

Smart Cards

One of the most successful ITS measures is the 'smart card'. Smart cards allow integrated ticketing between competing operators of public transport services, permitting seamless intermodal transfers. As a result, they can help local and central governments to open up provision of public transport to competition while

providing integrated services to passengers.

Most public transport operators face the need for general financial stringency and accountability, and the control of revenues that comes with smart-card ticketing quickly justify the costs. Smart cards can help increase passenger numbers and revenue, and help operators provide appropriate services for the next century.

Summary

The transportation problem is basically a problem of supply and demand. As the world's population grows, more demands will be placed on all types of transportation infrastructure. Expanding the supply to accommodate the demand is one way to solve this problem. The other way is to manage demand (adoption of flexible working hours) and supply (application of ITS technologies) creatively. Transportation technologies in the next millennium may be quite different from today, but the basic fundamentals of supply and demand will always be the same. As transportation professionals, our job is to make sure that we utilize the limited resources so as to maximize the benefits while minimizing the costs and other adverse impacts on the society and the environment. Our pride should come from building a better quality of life. ■



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