

System at Risk: The Economics of U.S. Transportation

By Harold W. Worrall

Our long-term economic success as a nation is linked to the efficiency of our transportation system, and both are mutually at risk. For an entire century, the United States has developed using essentially the same philosophies. We depend on the automobile for passenger travel and, increasingly, on the truck for freight transportation. Not only has that dependence continued, it has grown to the point that highway congestion threatens to affect the national economy drastically.

Our ability to change the behavior of the individual transportation customer is severely limited in a free democratic society. We've unsuccessfully attempted to encourage and subsidize mass transit through public policy, and all the while more SUVs are purchased and more automobiles registered and driven farther. We've tried to encourage the most efficient movement of freight while experiencing significant growth in highway freight transportation.

More Demand, Stagnant Capacity

Much has been done in the past 30 years to provide alternative modes of transportation in the United States; however, our transportation capacity remains inexorably tied to the rubber-tire vehi-

cle. The reasons for this are many, but the fact is undeniable. Our love for the automobile is philosophical but also arises from the desire for convenience and the need to accommodate ever more hectic schedules. Concurrently, more freight is being delivered “just in time” by tractor-trailer combinations to assembly lines and retail operations, moving from a “push” to a “pull” model of logistics. In the pull model, business market profitability is driven by manufacturers producing only those products ordered by retailers, which are then “pulled” to the stores through the ordering process.

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Conversely, historically the model was to produce as many units as was economical at the manufacturing site and then “push” them through the inventory and sales supply process. Meanwhile, little or no highway capacity is being added.

Our transportation system is the evolutionary result of a patchwork of transportation policy decisions over nearly two centuries of economic progress. It is the result of a swirling mix of changing politics, business lobbying, economic decision-making, and evolution. The resultant expectation of the citizenry is that transportation, especially highways, should be free and that sufficient funds already exist to provide highways, if only the public sector were as efficient as business. We’ve been lulled into a sense of peace and continued prosperity arising out of the existence of superior highways typified by the Interstate Highway System. We’ve been collectively unwilling to address the issue economically or politically.

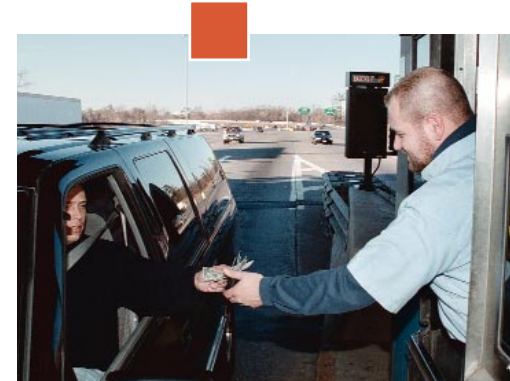
Through the prism of transportation economics, it is clear we are fast approaching a crisis that will directly affect our ability to compete in the global marketplace. The ability to move people and goods over great distances quickly, at low cost, and in a flexible manner has produced tremendous economic growth in the United States and results from our superior highway system. Yet this system is at risk from the effects of accelerating congestion.

Growing congestion also jeopardizes the safety of the traveling public. Such safety concerns entail great personal and economic costs that the public must bear. With more vehicles competing for the same space, accidents become more likely, therein creating delays and the likelihood of further incidents. All of this significantly reduces highway capacity. Taken in combination, the effect is a growing impediment to economic efficiency.

Transportation and Economy Entwined

There is little doubt in the academic community that an inherent close relationship exists between transportation and economic vitality. The movement of people and goods is fundamental to a healthy economy. What is not well-understood is the definition of this relationship. At the core of the transportation–economic relationship are the concepts of time utility and place utility, critical to understanding the economic link.

The economic value of goods and services is derived from time utility. For a good or service to have value, it must arrive on schedule, especially in a just-in-time business model. Consider the consultant who arrives at an important corporate client meeting after the meeting has ended. Services that require special expertise and must be performed in the presence of the client are especially time-sensitive. Even services that don’t necessarily require the presence of the customer, such as lawn services, pest control, and cable TV repair, involve a time limit before the customer will choose to use another service. Congestion levels in urban areas particularly affect the costs of providing these services. I recall a particularly salient presentation by the CEO of a large pest-control company describing his logistics plan and detailing how congestion directly related to the need for more trucks and people to handle the same level of business because of increases in congestion.





These examples demonstrate how critical dispatch and tracking control systems have become in today's transportation system. They also shed light on why the Internet thrives in our services-based economy. Information and transportation systems have become inextricably linked and interdependent. As a corollary, transportation information has become increasingly valuable, and the competition for information can be the deciding factor between surviving and thriving. In those busi-

nesses in which transportation is a major cost component, information about the instantaneous location of goods in transit plays an ever-increasing role. The value of a retail product is the sum of the cost of production, marketing, transportation, and profit. The same equation holds for the value of an hour of service. Transportation is central and can be the determining factor in profitability.

The companion concept to time utility is place utility; that is, the value of a good or service is directly related to its location. An orange in Florida has less value than an identical one in Saskatchewan, Canada. By transporting oranges from an area with high supply to an area with low supply, one increases the product's value and coincident price. Transportation adds value, therefore, by moving the product from one set of demand-and-supply market conditions to another. Consider a supply-demand chart for oranges in Florida and a similar chart for Saskatchewan. While they would be quite different in terms of price derived in their respective locations, transportation provides the means for balancing these charts one with the other. The cost of transportation can't exceed the difference in the price structure of the two locations or the goods won't move. Once the demand in Saskatchewan has reached a level to justify the cost of transport, the goods will be moved. All of this,

of course, assumes the perfect provision of information by all parties in the transaction.

Place utility likewise affects the value of a service. Consider a surgeon trained to perform a unique procedure. A patient who requires that procedure to live would place an enormous value on the services of the surgeon. If there were no way to transport the surgeon, however, the value of his services would be zero to the patient. Telecommunications and the Internet are changing this relationship via very sophisticated remote surgical equipment.

Heading for a Crisis?

With the relationship between the economy and transportation established, the question of immediacy arises. How much time will pass before events create a transportation crisis? What if nothing is changed? What are the risks if transportation policy and practice remain unaltered?

The impending crisis is only beginning to become evident, predominantly in urban areas. Congestion-rate statistics reveal growing travel times that convert directly to economic inefficiency, reduced safety, environmental damage, and an overall lowering of the quality of life. The 2003 Urban Mobility Study prepared by the Texas Transportation Institute places 2001 delay costs for only 75 urban areas at \$69.5 billion. That exceeds the total highway capital outlay for all levels of government documented in the 2002 Bottom Line Report, published by the American Association of State Highway and Transportation Officials.

Over the past 40 years, as the U.S. population has grown, it has urbanized, suburbanized, and become more mobile. For a time, mobility was served by the construction of the Interstate Highway System and the accompanying urban arterial network. Increasingly, however, the urban and, in some cases, rural arterial capacity is being absorbed by traffic.

Freight traffic has grown tremendously with the creation of the North American Free Trade Agreement, just-in-time logistics, the deregulation of trucking, and the demand for more flexibility in the delivery of goods. This heavy-vehicle traffic growth, added to automobile traffic growth, is a recipe for a poor safety environment. Vehicles with vastly different acceleration and deceleration characteristics residing on the same increasingly congested highways yield fertile ground for reduced safety and higher costs to society overall.

The Global Context

While these are momentous national issues, we must view them in a global context. Global economic competition and the global exchange of goods and services is a reality. It is significant that nations such as China are showing strong sustained growth in economic power and that other nations are confederating into larger and more efficient economic units, such as the European Union. The competition has recognized the need to improve transportation

systems and has defined the transportation investments necessary to support continued economic growth. To remain competitive, the United States must renew its vigor to sustain a well-planned, well-funded, and aggressively implemented transportation system.

The subject of transportation policy in America is not simple, but it can be made understandable.

The country has been the envy of the world in terms of our ability to move people and goods by public highway, air transportation, water transport, and rail, whether publicly or privately. Yet, though we've been living off one of the greatest public-works projects in history, the Interstate Highway System, we've obscured this fact with elaborate treatises and political agendas resulting from short-term election cycles.

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To develop solutions, we must define the problem. We can only do that by first dissecting the greater transportation question into its component sub-systems. It is not sufficient, and many times not helpful, for the public agenda to discuss transportation generically. Statements about what we should do to improve transportation too often overlook the various and variable facets of the issue. What may be true in urban areas is not necessarily true in rural areas. What is true for freight movement might not hold for passenger traffic. What is so in one part of the country may not be so in another. Transportation planners must incorporate these differences in determining strategies for improvement.

To compete globally in the long term will require a change in our assumptions about transportation and particularly the implementation model. While much can be said for and against methods of planning for transportation systems, it is in the implementation stage that the greatest challenges exist. We must begin to think like a business without the requirement to be one. We must seriously consider private-sector models for financing and managing some of our country's greatest assets; it is an acceptable practice to do so for other public infrastructure. Government can function using private-sector models, but the public trust must be held paramount.

We must not assume that the goal of operating public facilities is the exclusive domain of public agencies. Many organizational models operate around the world wherein the private sector operates the entity. Such organizations and approaches should be considered complementary to, not competitive with, the public process. As organizational arrangements are modified, public finance and the sources of capital will transform.



Time Is Truly Money

Funding of public infrastructure in the United States has evolved within the doctrine of equity, or fair share, to the detriment of efficiency. A balance must be struck between the two based on market rather than political forces. We must realize that current funding methods are inadequate and consider other scenarios based on pricing and demand management that create a potential for balancing equity and efficiency through market-driven mechanisms.

Finance plans must take into account the time value of money and the loss of buying power as projects are delayed. Further, we must begin to realize that opportunity costs resulting from delays are perhaps our largest economic loss. Finally, the concept of a linkage between use and cost must exist. It should not be surprising that demand has outstripped the ability of public agencies to provide a

public good when the perceived cost is zero. Attempting to fund public infrastructure on a pay-as-you-go, categorical funding basis further complicates matters because of the delay it introduces in waiting for sufficient funds to accumulate for construction. The many categories of funds also restrict funding flexibility.

Why haven't we recognized the urgency of our transportation problems and adopted better techniques to solve them? First and foremost is the lack of understanding among political leaders, the public, and even some transportation profession-

als of the critical consequences of delaying needed transportation facilities. Second is the confusion resulting from an overly complex funding process devised more for encouraging policy adherence and ensuring equitable allocation by geographical region rather than for funding needed transportation infrastructure. Such political processes have tremendous momentum. U.S. transportation policy must focus on maintaining current transportation advantages,

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such as the interstate system, and leverage our transportation corridors to expanded purpose. The networks of rail, highway, pipeline, waterways, and air corridors are established and well-traveled. Our strategic future use of these assets may well determine our global competitiveness.

Policy is inherently political, and a great challenge in our country today is the need for political courage. It is extremely difficult for political leaders to take long-term views when election cycles are short term and their outcomes can affect political careers. Political courage can come at the price of losing an election. It may be more expedient to satisfy popular opinion regardless of the facts. It may be politically convenient to accept recommendations for minor reallocations of funds to satisfy the desires of influential special interest groups or constituencies. These tests of political courage accumulate incrementally, and substantial changes in transportation policy are unlikely until it becomes evident that the economic vitality of the country is threatened. When that time arrives, a very long recovery period may result.

The question of our economic competitiveness and the need to take bold action in transportation policy, finance, and delivery systems in the future will center on the concept of pricing transportation. Pricing transportation through direct user fees will generate the funding necessary and do so in a way that affects demand for the valuable commodity of transportation.



The Future in Jeopardy

It is important to note that our discussion thus far has not addressed questions of social justice and ensuring transportation availability. Access to an automobile in most U.S. urban areas is essential. If an automobile is not available to an individual, he or she may be partially disenfranchised from employment, recreation, education, and the basic freedoms that make up our quality of life.

The attention of citizens and transportation policymakers alike must be alert to the probability that the future for transportation and the accompanying economic success of America are in jeopardy. Our economic malaise is not the result of the Internet bubble, corporate greed, or other short-term factors alone; rather, it results from a long-term, transportation-generated, economic pathology only now beginning to be felt.

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