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Original Paper

A Theoretical Framework for Developing a National Transportation Strategy

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Abstract

Developing the surface transportation systems the United States needs will require asking and answering a series of questions, beginning with the most basic:

- *What is the main purpose of surface transportation?*
- *What resources are available and what is the best way to deploy those resources?*
- *How do we measure success?*

Determining what future transportation systems should look like will require analyzing a range of economic, demographic, technological and socio-political variables.

As management guru Peter Druker famously said, "The primary goal of every enterprise should be to create customers". Transportation leaders must undertake the critical task of determining what transportation customers want and are willing to pay for. In doing so, they must understand that there are many categories of customers—such as commuters, businesses, and logistics companies—each with different priorities. Measurements of success should also be customer-focused.

Finally, state departments of transportation—not their federal counterparts—are often best positioned to ask these questions and develop the right answers for their own states.

Keywords

transportation, strategy, economic development, marketing, federalism

1. Introduction

Here are some questions we need to think about as we confront the task of overhauling America's surface transportation system:

- ***What should the transportation system look like in the future?***
- ***What options do we have for transforming the system to match this vision?***
- ***What resources are available to carry out these options?***

In the largest sense, these are s***trategic*** questions because they necessarily drive the tactical programs we develop to transform the nation's transportation system into what it should be. But for the most part, these critical strategic questions remain unanswered, mainly because we have yet to ask them in a serious way.

Strategy is a thousand-dollar word with multiple meanings that can lead to all kinds of confusion. So let's be clear and stipulate right off the bat that having a strategy means knowing **what** we're trying to accomplish, **how** we can accomplish it, and **what resources** we need to accomplish it.

Right now, we probably have the surface transportation network we deserve—especially in view of our decades-long inability to properly maintain and invest in it. But there is a nagging sense that we don't have the transportation network the nation really needs to support a decent level of economic growth. This means that the tactical programs we have (either in practice or on shelves full of elaborate studies) lack fundamental soundness.

Therefore, whatever funding gaps we think exist for carrying out these tactical programs are speculative at best. How can they be otherwise when we have not yet developed a sound strategy for turning the transportation system into what the nation needs?

2. Method

In other words, we should stop concentrating on ***form*** and start focusing more on ***content***.

Form is concerned with **how** we do things. It concerns such questions as:

- ***Should we lease existing state-owned toll highways to the private sector and use the upfront cash to fund construction of road and rail projects that have been sitting on the shelf due to lack of funds?***
- ***Should we implement roadway pricing on key links of state-owned highway systems to make them self-supporting enterprises and thereby assure adequate funds for their ongoing maintenance, capital reconstruction, and expansion?***
- ***Should we partner with private firms to build and also operate new road and rail projects on a self-supporting basis?***

- ***Should we try to leverage future federal grants by converting them into an income stream to pay debt service on the bonds we issue today to fund construction of new road and rail projects?***
- ***Should we use federal grant funds to capitalize state infrastructure banks that make revolving loans for transportation projects?***
- ***Should we establish objective, enforceable performance standards against which transportation providers can be held accountable – just as EPA has done for air quality?***

These are all reasonable questions. But they are meaningless until we know **what** we're trying to accomplish with transportation. This is the ***content*** issue, and we must deal with it before we can address ***form***.

We should begin by answering four strategic questions:

- ***What is the main purpose of surface transportation systems?***
- ***What resources are available to make these systems better?***
- ***How can we best use these resources?***
- ***How do we measure success at improving transportation systems?***

These strategic questions have remained unanswered far too long—mainly because those in the transportation community rarely ask them in thoughtful ways. It is time that we start doing so.

Our names may not be Elijah, but we would like to outline some thinking that may help us frame these questions in ways that can generate meaningful answers.

3. Result

3.1 What Is the Purpose of Surface Transportation?

The answer to this question should be obvious enough. Stripped to its essentials, ***the basic purpose of a transportation system is to support the nation's economy***.

It is an unavoidable fact of life that economic activity generates demand for moving people and goods. The more economic activity we have, the greater the demand. Therefore, the capacity of our roadway, freight rail, and public transit systems must be sufficient to accommodate this demand. Otherwise, the level of economic activity will inevitably be less than it could be, and we will be poorer as a result.

After all, a growing economy is what keeps America strong and prosperous. And effective transportation is one of the most important underpinnings of a growing economy.

This means that transportation is a ***derived demand*** rather than a ***direct demand***. It is a natural consequence of our direct demand for higher incomes and greater economic security. That's why we don't find many Americans sitting around the kitchen table or in corporate boardrooms discussing transportation as such. Nor is it listed it as a major national issue in public opinion polls. Even though effective transportation is a prerequisite for achieving many of the goals for issues that do make the list,

it lacks inherent sex appeal and is therefore easy to ignore.

This may help explain the appeal of arguments by those who oppose many new transportation projects (especially roads) as "self-defeating." At the core of their arguments is a concept they like to call ***induced demand***. This means that a new road or other transportation facility will simply encourage more people to make more trips until eventually its new capacity is saturated, leaving us right back where we started. Admittedly, we have seen this happen often enough in the real world that the factual basis of induced demand is scarcely a matter of debate.

However, the anti-transportation types seem to assume that the new trips generated by induced demand have no economic significance. They are simply idle joy riding.

But the fact is that most of these new induced demand trips have considerable economic significance. The people making them are doing so to buy or sell goods and services, or to produce or consume in ways that were not previously possible.

In other words, these trips generate new economic activity that would not otherwise take place. Therefore, the induced demand potential of building new capacity for moving people by road and rail means such projects don't merely fill a passive role of accommodating existing economic activity; they can actively stimulate new economic activity. As such, they become important tools for growing the economy.

This is not to say that supporting the economy is the only purpose of our surface transportation system. The United States needs transportation that is safe, secure, and equitable, making opportunities such as employment, education, health care and recreation accessible to all, including underserved communities.

These questions must also be asked in the context of an existential climate change crisis, which requires a range of considerations from increasing mobility while achieving net zero emissions to building infrastructure that is more resilient than was required in the past.

At least part of the problem may be that we have yet to develop a coherent strategic vision of what an effective system for moving people and goods by road and rail should look like. And not just for today, but for half a century hence.

Developing such a vision requires that we identify the kinds of services transportation systems will have to provide in the future. Then we can work backward to flesh out the details of the specific needs transportation must satisfy.

This involves two kinds of strategic-oriented activities.

- ***First: we must understand the EXTERNAL ENVIRONMENT within which transportation systems function, both now and in the future***. The external environment is what determines the demands that will be placed on transportation systems. Evolutionary changes in this environment will affect future transportation demands. So, we must position ourselves ahead of the curve in order to

understand how these demands may evolve. This means our analysis of the external environment should be an ongoing function.

- ***Second: we must know the details of the needs transportation customers are willing to pay to have satisfied***. We do this by conducting the right kind of sophisticated ***market research***. Inevitably, customer perceptions of their needs change over time as they respond to changes in the external environment, so market research must also be ongoing.

3.2 Analyzing the External Environment

Back in 1956, Elia Kazan celebrated the tradition-bound world of intercontinental goods movement in his Oscar-winning film, ***On the Waterfront***. But who could have imagined that this world was on the verge of becoming as obsolete as the Marlon Brando character's boxing career?

Yet 1956 was also the year in which an entrepreneurial trucking magnate named Malcom McLean first arranged to pack many individual crates of goods into large steel boxes that could quickly and efficiently be transferred by mechanical cranes between ocean-going ships and land-based trailer trucks. Quite a change from the age-old tradition of having large crews of dockworkers slowly move individual crates by hand from ships to trucks and vice versa.

This marked the birth of a goods movement technology we now know as ***containerization***. By slashing the costs of moving goods from one part of the world to another, it made possible the huge growth in trans-global trade. A person in Kansas City can now buy consumer goods mass-produced in China for a fraction of the price his grandparents would have paid. And in the process, containerization totally transformed the infrastructure and operations of the ocean shipping and port industries.

We should keep in mind that containerization wasn't the brainchild of either the ocean shipping or port industries. It was initially conceived and developed by a visionary ***outsider*** who imposed it on these reluctant industries, which would have much preferred to keep doing the same old things in the same old ways. In other words, it became part of the external environment within which ocean shipping and port operations function. These longstanding industries had to learn how to understand its implications for their businesses. We must do the same when it comes to the external environment within which surface transportation functions.

The key variables of the external environment for surface transportation conveniently group themselves into four broad categories: ***economic variables, demographic variables, technological variables, and socio-political variables***.

3.2.1 Economic Variables

The most important of these variables are those involving trends in the growth of ***Gross Domestic Product*** (GDP) at the national, state and local levels, as well as within different industries. GDP is how we measure economic activity, which is what creates the demand for moving people and goods.

Other economic variables include:

- ***Inflation*** (which, among other things, determines the level of interest rates and therefore the cost of capital).
- ***Employment levels*** (in gross terms and as percentages of the total labor force).
- ***Capital formation*** (by both the private and public sectors).
- The ***government fiscal picture*** (federal, state, and local).

3.2.2 Demographic Variables

These variables concern people. Ultimately, it is people who produce GDP, who demand transportation of various kinds and in various quantities for various travel purposes, and who generate the financial resources to fund transportation systems. Therefore, we need to know:

- How many people will live in the United States at various points in the future?
- Where they are likely to live (by state, by region within each state, and by multi-state regions like the east and west coasts).
- How many will live in single-person and how many in multi-person households (with and without children).
- How old they will be (it's no secret that the rising proportion of senior citizens will impose mobility needs we never previously had to confront).
- How large their incomes will be (which helps determine how much they can pay for transportation).
- How much education they will have (higher education levels tend to make people more demanding and selective about what they will pay for, and more willing to use new technologies).

In the arena of the social sciences, demographics can provide projections that tend to be closer to the physical sciences in terms of their precision and accuracy. These projections are especially helpful in determining the shape of the future.

3.2.3 Technological Variables

Interestingly, the field of surface transportation is on the verge of becoming awash with new technology that may be just as transformative as containerization was for ocean shipping and port operations.

We already have new technologies for collecting roadway tolls without making motorists slow down, for measuring the average speeds and densities of traffic flows on roadway lanes at any given moment, and for pinpointing the location of buses and other public transportation vehicles on their routes.

But just over the horizon are technologies with the potential to make transportation much safer and more efficient by:

- Providing instant communications between roadway operators and motor vehicles concerning bottlenecks ahead and alternate routes
- Preventing traffic accidents

- Minimizing deaths, injuries, and collateral damage in accidents that can't be avoided
- Monitoring the contents of containers of goods moving by road, rail, and air without disrupting traffic flows

But these new technologies can be as much curses as blessings unless we learn how to properly manage their implementation. We need as much information as possible about what they are, how they work, what they can do, and the problems they pose. Also, let's not forget that the design and use of these technological innovations must be customer- rather than provider-driven.

3.2.4 Socio-Political Variables

Identifying and evaluating these variables may often seem like exercises in pure futurism, but this doesn't mean they should be regarded as idle speculation. Even when evaluations may seem to lack the scientific precision of demographics, information about the forms and contents of these variables can be very important in helping us determine the future shape of the external environment.

Special emphasis should be given to the potential impact of the following socio-political issues:

- Continued increases in global trade (which stimulates further competition among nations and requires that we regard American transportation systems as links in worldwide travel chains rather than as stand-alone entities circumscribed by national borders)
- Returning to the progressive tax policies of the high-growth Eisenhower era in the 1950s (where the portion of a person's income paid in taxes increased as the size of his income increased) vs. continuing the current trend towards flat taxes (which generally have the opposite effect)
- More open immigration policies (leading to a larger percentage of American residents being born abroad) vs. tighter policies (leading to a larger percentage being native born)
- Increased concentration of the American population on the east and west coasts, accompanied by pervasive depopulation in many areas between the coasts
- Growing political clout among increasingly numerous senior citizens, who will insist that American society provide them with comfortable retirements, special treatment of their particular needs, and meaningful protections for their purchasing power after their working days are over
- Continued decline in the willingness and ability of corporate America to provide its current and retired employees with the kind of social welfare services traditionally provided by government in Europe and elsewhere
- Further replacement of traditional mass markets for goods and services by niche markets as consumer demand becomes more sophisticated and industry responds by "customizing" production methods
- People being willing to "cram more living into each day" by making use of timesaving technologies such as cell phones and the Internet
- Increasing ethnic, income, and educational diversity in workplaces and markets

- Single-person and no-children households becoming the dominant household types
- Rising concern for environmental issues and conservation of natural resources

A vast array of books, articles, and special studies about these four categories of variables are available. Our task is to turn this information into cogent scenarios that detail likely patterns that define the future shape of the external environment for transportation.

But simply describing these scenarios is not enough. We also need to assign meaningful probabilities to the likelihood of each scenario. In the case of scenarios for future GDP growth, for example, we want to be able to tell the public (not to mention each other) that:

There is a 90 percent chance that national GDP growth during the next 10 years will average at least X percent; a 75 percent chance that it will average at least Y percent (larger than X); and a 50 percent chance that it will average at least Z percent (larger than Y).

Once we understand the external environment for surface transportation, we can move on to the task of developing a serious strategic vision of what an effective transportation system should look like.

In November 2021, President Biden signed a bill commonly known as the $1 trillion Bipartisan Infrastructure Bill. The law aims to allocate the funding towards improving various sectors such as transportation, broadband, clean energy, water systems, and more. The hope is that the investments can lead to increased employment opportunities, increased demand for goods and services, and potential productivity gains.

Unfortunately, it does not address issues such as what are the specific goals of the government, economic conditions, and the long-term vision for infrastructure development. Simply stated, the law fails to address the fundamental questions we have raised.

4. Discussion

4.1 How to Develop Transportation Strategy

Needless to say, everyone in the transportation community probably has their own ideas of what such a strategic vision should be. But our ideas aren't what matter. Rather, it's the ideas of our customers. This is where things become really interesting.

More than a generation ago, management guru Peter Drucker said:

"The primary goal of every enterprise should be to create customers".

To make sure there was no confusion about this, Drucker went on to tell us in no uncertain terms that the traditional focus on ***generating profits*** is not a proper goal for an enterprise that wants to be successful. An adequate level of profits is simply one of the costs the enterprise has to cover—just like salaries and wages, payments to suppliers, and capital investments in new plant and equipment. Creating customers is the only goal that matters if an enterprise is to justify its existence in a modern capitalist society.

If we are to successfully run our highway system, for example, in a more business-like way and charge fair prices for roadway usage, we must develop a business manager's habit of regarding those who use the system as customers first and foremost.

Drucker insisted that the goal of creating customers is just as important for public agencies as it is for businesses. We create customers by heightening the perception that what we are selling is worth more than the price we are charging. We do this by improving the quality of what we are selling, reducing its price, or by doing some of both.

Suppose a driver can use two different highways or lanes to reach their destination. One is free, the other charges for road usage but guarantees an average speed of 55 miles per hour, while the free lane is choked with slow, stop-and-go traffic moving at less than 10 mph. If the driver is on her way to an important business meeting and can't afford to be late, she may decide that the value of the time she will save by using the priced lane is greater than the price he must pay. But if she is simply going to a shopping mall to buy gardening tools, she may opt to use the free lane and put up with the additional travel time.

In other words, roadway pricing in one form or another let the provider create value for drivers by offering them shorter travel times for trips that they consider to be high priority.

Drucker's revolutionary insights about the importance of creating customers became the driving force behind the management discipline we now call ***marketing***.

The intelligent application of marketing as a management discipline has been the hallmark of every successful American enterprise during the last generation. And we must make it a cornerstone of our efforts to plan, build, and manage the kind of surface transportation system that can properly support future economic growth. In short, responding to customer needs should be the primary driver for the efficient allocation of transportation capacity.

The four most important components of marketing are:

- ***Defining who our customers are***
- ***Identifying important needs these customers will pay good money to have satisfied***
- ***Developing solutions that satisfy those needs***
- ***Aligning the entire enterprise around creating value for customers.***

These are the most important tools for creating customers. And they are just as relevant for developing effective roadway, freight rail, and public transit systems as they are for developing effective computer applications software or automobiles or toothpaste.

So we should begin by ***identifying important customer needs*** in the transportation arena. We may think we already know what these needs are, but our ideas are really just guesses because we have depressingly little factual information about what transportation customers themselves think they need. And we can't expect to develop a truly effective transportation system by relying on guesswork.

We will also learn about how customers fall into various categories. For example:

- ***Male automobile commuters may fall into a different category than female auto commuters for a wide range of needs***
- ***Both categories of auto commuters are likely to perceive transportation needs quite differently from the managers of businesses concerned with moving the goods they produce from factory to marketplace and the supplies they need from distributors to their factories***
- ***Managers of trucking firms may have views of what an ideal transportation system should be like that are radically different from those who manage freight railroads; not to mention being different from the views of managers of multi-modal logistics firms like UPS and FedEx***

In other words, we are likely to discover that there are far more categories of transportation customers than we ever imagined. Members of each category have their own distinct perception of needs that are worth paying an ideal transportation system to satisfy. This can be the case even in such presumably common areas as safety and security.

But just as with analyzing the external environment for transportation, this kind of market research can't be a one-shot effort. Instead, it must be ongoing for two important reasons:

First, customer opinions are the only meaningful way to ***measure our success*** in developing the kind of transportation system the nation needs. We have to let our customers tell us whether we are doing the right kind of job, and this means listening to what they have to say at frequent intervals.

The second reason why market research must be ongoing is that ***customer needs are likely to evolve over time***. Given the long lead time needed to plan and build transportation assets, we must try to get ahead of the curve in anticipating how customer needs are changing. Simply playing catch-up is one of the reasons why so many of our major metropolitan areas are crippled by traffic congestion. Ongoing market research is the only way we can anticipate tomorrow's transportation needs soon enough to meet them in a timely fashion.

Planning and managing the ongoing functions of analyzing the external environment and conducting effective market research are major undertakings, but we must do each before we can develop a meaningful strategic vision of what American transportation should look like. This requires making decisions about where the responsibility for carrying out these functions should lie.

4.1.1 The Responsibility Issue

In an ideal world, it might seem logical to assign this responsibility to the federal Department of Transportation. After all, we are talking about issues of national significance.

But today's federal government is a far cry from the one we had during the 1930s and 40s. This was the government that led us bleeding and moaning out of the Great Depression, turned us into an overpowering Arsenal of Democracy to defeat the forces of darkness in Germany and Japan during World War II, and then propelled us into the greatest era of economic prosperity and world leadership

our nation has ever known. That prosperity led to the Interstate Highway System, the space program, and ultimately to victory in the Cold War.

The federal government of the 1930s and 40s seemed to epitomize the can-do spirit of American know-how, and we could generally trust it to do things right. But today's federal government is paralyzed by the polarization that has become a defining characteristic of our society, leaving it nearly powerless to drive change.

Fortunately, there are encouraging signs that state governments are willing to step into the vacuum left by the federal government. Almost out of desperation, forward-thinking state transportation departments are seeking out new ways to implement badly needed transportation improvements that don't rely on Washington; even forming partnerships with the private sector to tap its management expertise, marketing savvy, and capital sources.

This suggests that state transportation departments should assume responsibility for analyzing transportation's external environment and conducting market research among its customers.

4.2 Conclusions

State DOTs must arm themselves with detailed information about the external environment for transportation, solid market research into the needs of transportation customers, and improved management capabilities. Only then can they proceed to develop meaningful strategic visions for their transportation systems. At that point, discussions of funding gaps and other issues concerning the tactics of translating these visions into reality begin to make sense.

Admittedly, these tactics concern the issues we feel most comfortable discussing because they are closest to the experience of transportation professionals and seem most relevant to the pressures we are under to improve transportation. So we are naturally anxious to find out:

- ***What should we start doing?***
- ***What should we stop doing?***
- ***What should we keep on doing?***

The fastest way to come up with meaningful answers to these tactical questions is to frame them in the context of a true strategic vision for the future shape of transportation in America. We have attempted to show some of the approaches we should pursue in to develop such a vision.

In this paper, the authors have made liberal use of the term "we". But it's important to define this term properly. In the narrowest sense, "we" refers to those who plan, design, finance, build, and operate transportation facilities and services. In other words, the people on the front lines.

But transportation stakeholders also include elected officials, managers, and technical professionals in Washington, state capitols, and local governments whose responsibilities involve transportation to one degree or another.

In the private sector, important stakeholders include the many firms whose primary businesses involve selling goods and services to transportation providers; not to mention those firms that provide various kinds of services to move people and goods.

Finally, and perhaps the most important stakeholders of all, transportation customers—whose concerns are too often overlooked.

Isn't it strange, for example, that the American Automobile Association seems to have no place at the transportation policy table? Triple A has more than 49 million members who constitute the largest organized group of roadway users in the nation. They have an obvious stake in expanding roadway lane capacity, and in not over-burdening the roadways they depend on with goods movement trips that could be better handled by rail. So where is Triple A in the ranks of transportation policy makers?

In short, the collective we in transportation turns out to be more encompassing than many of us may have imagined. And it is vital that all these voices be heard in order to develop a meaningful strategic vision for the future of American transportation systems.