TRANSPORTATION SYSTEM ORGANIZATION, MANAGEMENT, AND INTEROPERABILITY

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Summary

Transportation systems can significantly affect the economic success of regions and urban areas. Not only do they provide the basic mobility and accessibility for people and goods, but they also influence the way communities develop over time. Government agencies and private companies, in varying degrees, have important influence over how the transportation system changes in response to economic demands and community goals. However, the relative roles of both the public and private sectors in how the transportation system is organized have changed over time. Historically, the role of government was very limited, providing infrastructure in some cases for primarily military purposes, and granting concessions to companies for providing tolled facilities or for-revenue services for domestic travel. As economies expanded, and as transportation for personal use became available to the public at large, governments became more involved in the provision of transportation infrastructure and in operating the transportation system. Today, the institutional structure for transportation planning and decision making in most urban areas is quite complex, with various agencies providing different services, and with private transportation firms responsible for important segments of system operation.

With so many organizations involved with transportation system operation, the potential for disjointed and ineffective service provision is high. Transportation system

management is the process of coordinating the many different services and functions that are part of a transportation system. This includes coordinating the construction, operation and preservation of transportation facilities and services, implementing strategies and policies to better manage the demand for transportation, and establishing the linkage between land use strategies and transportation investments. Important to the coordination of operations is making sure that system components are interoperable, which can be done primarily through standardization.

1. Introduction

The physical characteristics of a transportation system evolve over time, the cumulative result of numerous decisions to rebuild, expand or, in a variety of ways, change the extent and performance characteristics of the system. Historically, this evolution has been the result of decisions both of government agencies and private companies. Throughout history, the respective roles of both have changed with respect to the responsibility for providing the infrastructure and subsequent operating support for the transportation system. Many of the most important investments in transportation, that is, those that had significant impact on the development of nations and cities, came from private companies. Canals, railroads, steam ships, airlines, and even the early urban transit services were the result of private sector initiative and investment. In many cases, governments gave concessions or in other ways enabled these investments to occur. However, the risk of investment and the corresponding profits were enjoyed by private companies.

The 20th Century saw a dramatic change in the organization and management of urban and regional transportation. Through regulation of market entry and service provision, and with a steadily increasing role in providing transportation infrastructure and services, governments became a leading, if not dominant, actor in managing the urban transportation system. The advent of the motor car and motor truck in the early 1900's, with the corresponding need for all weather roads, resulted in new responsibilities for state and provincial governments in road building. The competition from these same motor vehicles caused many private urban transit services to go out of business, resulting in government takeovers of these services and corresponding public subsidies. Still today, there are very few urban transit services in the world today that cover the costs of operation.

The evolution in the management of the urban transportation system over the past 100 years has thus been one primarily of increasing government responsibility. Interestingly, the large financial demands on public resources to support the many needs for improving the transportation system have caused many governments to once again look toward the private sector for funding support. Toll roads and privatization of transportation services are examples of the increasing role of private investment in transportation. Known in some parts of the world as "innovative financing", in reality, this trend represents a form of transportation system organization and management that was prevalent in previous centuries.

The organization of urban and regional transportation systems thus reflects the activities of numerous agencies and private companies that each have responsibilities for some

aspect of system operation. Although these organizations are responsible for building new roads and transit facilities to accommodate expected demands, they are also responsible for managing the day-to-day operational performance of the transportation system. Transportation system management is a term that has been used to describe a strategy for improving transportation system performance through improved operations strategies. Such strategies include the use of intelligent transportation systems (ITS) technologies to better monitor and control traffic flows (see section 1.32.8.6), improved coordination among different providers of transit services, staged project construction to minimize disruption to the traveling public, flexible timing of employee departures to avoid peak periods, and peak period pricing of facilities to reduce congestion.

One of the key issues in providing for a coordinated system operation is making sure that the design, control and communications technologies used by one operation is consistent and compatible with those of other operations. The interoperability of transportation services and facilities has become an especially important issue as coordinated transportation operations have gone beyond national boundaries. For example, interoperability of the national railways of Europe is a major goal of European policy. In North America, providing compatible communications and computer database technologies for Canada, Mexico, and USA border agencies has become an important initiative of all three governments as part of the implementation of the North American Free Trade Agreement (NAFTA). Interoperability is thus an important prerequisite for coordinated transportation system management not only among countries, but also within urban areas.

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Biographical Sketch

Dr. Michael D. Meyer is a Professor of Civil and Environmental Engineering, and former Chair of the School of Civil and Environmental Engineering at the Georgia Institute of Technology. From 1983 to 1988, Dr. Meyer was Director of Transportation Planning and Development for Massachusetts where he was responsible for statewide planning, project development, traffic engineering, and transportation research. Prior to this, he was a professor in the Department of Civil Engineering at M.I.T.

Dr. Meyer has written over 140 technical articles and has authored or co-authored numerous texts on transportation planning and policy, including a college textbook for McGraw Hill entitled *Urban Transportation Planning: A Decision Oriented Approach* . He was the author of *Transportation Congestion and Mobility: A Toolbox for Transportation Officials* , a book sponsored by the Institute of Transportation Engineers and the Federal Highway Administration that focuses on transportation actions that can be implemented to enhance mobility. He is an active member of numerous professional organizations, and has chaired committees relating to transportation planning, public transportation, environmental impact analysis, transportation policy, transportation education, and intermodal transportation.

Dr. Meyer is the recipient of numerous awards including the 2000 *Theodore M. Matson Memorial* Award in recognition of outstanding contributions in the field of transportation engineering; the 1995 *Pyke Johnson Award* of the Transportation Research Board for best paper in planning and administration delivered at the TRB Annual Meeting; and the 1988 *Harland Bartholomew Award* of the American Society of Civil Engineers for contribution to the enhancement of the role of the civil engineer in urban planning and development. He was recently appointed to the Executive Committee of the Transportation Research Board.

Dr. Meyer has a B.S. degree in Civil Engineering from the University of Wisconsin, an M.S. degree in Civil Engineering from Northwestern University and a Ph.D. degree in Civil Engineering from M.I.T. He is a registered professional engineer in the State of Georgia .