

INSTITUTIONS FOR SUSTAINABLE TRANSPORTATION MANAGEMENT: PRINCIPLES AND EVOLUTION

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Keywords: transportation institutions, spatial spillovers, cost benefit analysis, technology, international trade, metropolitan planning, transportation financing

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Summary

Sustainable transportation institutions must promote efficient transport utilization and system production and maintenance. User charging approaches are attractive if and only if individual costs are well known and understood. However, sustainability must reflect local views of civic priorities with respect to issues such as equity and the environment. This makes public representation critical in institutions for sustainable transportation management. Globally traditional transportation management and governance institutions are being transformed by advances in information technology and new trading regimes. Cross-pressures from the interdependence of transportation and societal goals will continue to make institutions evolve, but not simply towards privatization.

1. Introduction

Following the Brundtland Report sustainability has become a widely appreciated concept with strong political and popular support, especially in the international community. According to Ahmed, El Seraph and Lutz environmental, energy, and economic sustainability refers to the ability to maintain an activity without that activity using up crippling levels of resources and creating a future debt that is not offset by equal levels of future benefits. Among the transportation activities that appear to be unsustainable over the long run at their present level of resource costs is our pattern of private automobile utilization. However, in some cases it may be that it is not the transportation mode itself but the institutional framework within which the mode is

operating that is unsustainable. Below we look at the institutional framework of transportation management with a particular focus on the two ends of the spatial scale spectrum. First we look at transportation as it relates to trade and globalization, and then we look at localized issues in US metropolitan centers.

Any evaluation of institutional sustainability must go beyond an economic or resource analysis of the time distribution of costs and benefits. It must also respond to the related decision structure within which investment, management, and taxing decisions take place, because these decisions set the incentive pattern for the transportation behavior of firms and individuals. It must also recognize the importance of technology and its role in restructuring choices in delivering mobility services. Obviously, this is a complex and multi-layered issue.

Operationally, institutional sustainability means that there needs to be a coincidence in time and space between the distribution of the explicit costs and benefits of a set of transportation decisions for use of a specific mode and its possible substitutes. Further, all direct and indirect costs must not only be part of the decision process but must fall into the same decision space. These steps include making costs and benefits explicit, apportioning them to users, and then aggregating users to specific decision levels that ensure minimal spatial spillovers. Within those appropriate spatial units, issues of equity and efficiency can be managed provided the decision process is moderately open, transparent, and democratic.

For example, for transport decisions related to national defense or other national level priorities it would seem that the appropriate forum might be a national executive or legislative assembly when the costs and benefits fall to the nation as a whole. In that case most externalities, but not all (e.g., global warming), are contained in the national space. At the other end of the spectrum, individuals should make transport decisions based on the full costs generated and the benefits received from their mobility actions within the framework of local and national constraints related to social or civic agreements on equity, efficiency, and the environment. Implications for both of these decision spectrums are that all direct and indirect costs and benefits and all positive and negative externalities can be evaluated accurately and targeted back to individual users of the transportation system, and then aggregated to the appropriate decision level. As indicated by Green, Jones and Delucchi all this is predicated on establishment of appropriate cost and benefit estimates of transportation.

Hoehn and Randall and Brucker, Winne, Verbake and Winkelness all agree such an idealized situation does not exist anywhere and it appears unlikely to develop quickly. In fact, in the real world most transportation institutions and their associated decision frameworks are artifacts of evolution. As such they reflect particular modes of transportation and their management practices from past periods. They also reflect past patterns of transport technology utilization and land use relationships. For example, in the United States such technology and land use relationships at different spatial scales would range from ceding of undeveloped land to railroads as a subsidy, for their spanning the US territorial space in the 1800s, to the development of transit lines in cities to sell new tracts of suburban land and housing on the urban periphery in the early twentieth century.

In theory the government provision of local roads would seem like a reasonable public good when roads are viewed as having high initial costs, need public decision making for the taking of land for right-of-ways, require high maintenance costs, and are a multiuse public facility. Further, to have government regulation of rail and bus operators seems reasonable when their monopoly positions might lead to exploitation of users or when full open entry might lead to destructive competition. As Ostrum notes government seems the correct response to the management of social equity considerations such as mobility of the elderly, the disabled or the poor. However, in pursuit of these goals the regulatory arm of the government at various levels has instituted transportation policy decisions that according to Winston have led to an inefficient and inequitable distribution of costs and benefits, particularly at the urban and metropolitan levels in the United States. These inequalities and inefficiencies have continued in spite of the regulation and deregulation of transport modes such as trucking, air transport, and rail in the United States and Europe, and of maritime flows worldwide as well as automobile regulation everywhere.

2. Background

In looking at sustainable institutions it must be remembered that their “sustainability” is the result of how well they address three elements of consideration: political, economic and functional. Each of these has in its own right multiple layers. The political consideration of an institution relates to its legitimacy or acceptable source of authority, its use of explicit and socially acceptable rules for decision making, and its recognition and response to the social and cultural values of the civil society within which it operates (e.g., equity or environmental considerations). Without these political elements an institution may operate effectively for a short period of time but it will not be sustainable over the long run. Winston and Shirley make clear that the economic considerations of an institution relate to its resource allocation decision process, which must be efficient, effective, and transparent but must also reflect standardized assessment procedures for projects including present value estimation and cost–benefit analysis (CBA). Finally, the institution must explicitly match its processes to its responsibility and support the functioning of what it is intended to manage.

In the private sector, with minimal spillovers or externalities and where marginal private costs and benefits match marginal social costs and benefits, we can allow the market through the expression of prices to relate supply and demand, by constraining consumption to reflect costs of production and the utility of the product or service. This works in the social context of a given income distribution that we do not wish particularly to modify, or at least modify using these inputs and outputs. Politically this is acceptable because the decision rules are clear, the sociocultural context is stable, prices openly express or reflect output demand (preferences), and the legitimacy comes from its operational transparency derived from a sum of individual decisions. Economically it is a relatively efficient system of having specific things produced to meet specific demands by using price signals for production and consumption, and functionally it operates with minimal external influence by maximizing the distributed information in the system.

Transportation does *not* fall into this category! It is for the most part funded publicly not privately, based on publicly estimated demand and willingness to pay. It has natural monopoly characteristics with high costs of infrastructure reproduction and maintenance. It has multiple and competing users whose use level affects other potential users. It utilizes rules to override private ownership rights for right-of-ways and access considerations which Johnson and Libecap, Newberry and Santos, and Evans indicate that at least in the United States, it generates complex multi-jurisdictional and political decision-making characteristics. It can have major positive externalities, from national space consolidation and national market integration to local redistribution of land values, but as Hamilton, and Ring, Klauer, Watzgold and Manssons note it also can have major negative externalities in terms of noise, pollution, local and ecological disruption, and its impacts on global warming. It is a mixed benefit public good that the public sector supplies, regulates and/or rigorously supports, and often allocates without the explicit price signals that would suggest the amount needed at specific costs. Downs suggests that the public as consumers wish very large amounts of this output at low, below market, or no cost, and the political decision system within which these decisions are made represents a struggle of reallocating national costs and benefits and associate revenues to local demands for specific mobility services.

This is the perfect recipe for market failure in the face of multiple expressions of externalities and of government failure across the conflicting interests of national, local, and intermediate constituents with no clear enunciation of the associated costs and benefits of producing or conserving this mixed benefit public good.

Now this is not true for all modes of transportation and for all purposes of its use, but it is a good picture of the predicament of most industrially developed economies with democratic governments and concerns for issues of equity that are often reflected in terms of accessibility to resources.

What can be said about the institutional aspect of transport sustainability in this context? The first is to recognize that there is no single simple answer, and those who suggest that there is are intellectual charlatans. The second is to appreciate that the answer will differ by mode, by transport fabric (highways, airports, rail lines, etc.), and by user, and hence as Black, Mann, Black and Xie note the balance will occur between all of these for a specific society and a specific location. Third, the results that combine these modal demands and specific mixes within different socially specific goals will have geographically specific institutional solutions, but these solutions must reflect the sociopolitical structure within which these institutional solutions are developed (e.g., New York City vs. Singapore).

An evolutionary perspective on the development of institutions in modern societies for building, supporting, financing, and operating transport systems reflects the fact that these institutions developed slowly in an environment of rapid growth in demand for mobility that accompanied the Industrial Revolution. This unprecedented growth in demand has meant that the first goals of these new institutions was concentrated on meeting these mass mobility objectives, at first rapidly and later in the most efficient way possible but in a mode-specific context. Only later, as these transport modes became large, complex interdependent systems, did safety become increasingly

important. By the mid-twentieth century in Europe and the United States, safety became a dominant objective, as civil engineering in support of mass transportation specialized and was pushed to its limits in new environments and with growing requirements for speed and load levels. Button notes that during the 1960s and 1970s societal rather than user-oriented engineering goals became increasingly important as environmental quality and equity motivated and then dominated transportation decisions. Stough and Rietveld indicate that recently these objectives have focused on national competitiveness, market integration, economic development, and technological leadership as part of a national and multi-national intra-regional (NAFTA, EU, OPEC) agenda. These broadening objectives have expanded not only the range of actors in the transportation field but its interdependence in society, and transportation institutions have been required to incorporate not only international commerce, tariffs, trade, and defense, but also environment, energy, urban development, human resource redistribution, and social welfare issues. The result is that transportation institutions are being forced to accommodate not only the traditional objectives but also a wider range of social goals during a period of rapid change in transportation technology. The consequences are institutional stresses on sustainability that have not been seen before.

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Bibliography

Ahmad Y., El Seraph S., and Lutz E. (1989). Environmental accounting for sustainable development. *UNEP World Bank Symposium*, World Bank Technical Paper No. 189. Washington, DC: World Bank.

Black W., Munn D., Black R., and Xie B. (1995). *Modal Choices: An Approach to Comparing the Costs of Transportation Alternatives*. Bloomington, IN: Transportation Research Center, Indiana University.

Boarnet M.G. (1998). Spillovers and the Location Effects of Public Infrastructure, *Journal of Regional Science* 36(3), 381–400.

Boarnet M.G. and Haughwout A. F. (2000). Do highways matter? Evidence and policy implications of highways' influence on metropolitan development. *Discussion Paper*. Washington, DC: Brookings Institution.

Brewer A.M., Button K.J., and D.A. Henscher (eds.) (2001). *Handbook of Logistics and Supply Chain Management*, Vol. 2: Transport Services. Oxford, UK: Pergamon.

Brucker K., Winne N., Verbake A., and Winkelness W. (1996). The limits of social cost–benefit analysis for the appraisal of public investment in transport infrastructure. *Proceedings of the 7th World Conference on Transport Research*, Vol. 3 (ed. D. Hensler, J. King, and E. Oum), pp. 163–174. Oxford, UK: Pergamon.

Brundtland Commission (World Commission on Environment and Development) (1987). *Our Common*

Future. New York: Oxford University Press.

Button K. (2000). Transport policy. *The European Union: Economics and Policies* (ed. A.M. El-Agra), Englewood Cliffs: Prentice Hall, Chap. 13, 195-220.

Button K., Haynes K., and Stough R. (1999). *Flying into the Future*. Cheltenham, UK: Edward Elgar.

Downs A. (1992). *Stuck in Traffic*. Washington, DC: The Brookings Institution.

Eberle N.D. and Hayden F.G. (1991). Critique of contingent valuation and travel cost methods for valuing natural resources and ecosystems. *Journal of Economic Issues* **25**(3), 649–687.

Evans D. (1994). Policy and pork: the use of pork barrel projects to build policy coalitions in the House of Representatives. *American Journal of Political Science* **38**, 894–917.

Françoise J., Acre H.M., Reinert K., and Flynn J.E. (1976). Commercial policy and domestic carrying trade. *Canadian Journal of Economics* **81**, 181–198.

Gomez-Ibanez J.A. and Meyer J.R. (1993). *Going Private: The International Experiment with Transport Privatization*. Washington, DC: Brookings Institution.

Green D., Jones D., and Delucchi M.A. (eds.) (1997). *The Full Costs and Benefits of Transportation*. Berlin-Heidelberg: Springer.

Hamilton K. (1997). Green adjustments to GDP. *Resource Policy* **20**(3), 155–168

Haynes K.E. (1997a). Intermodalism. *Journal of Transport Geography* **5**(1), 21–22.

Haynes K.E. (1997b). Infrastructure. *Journal of Transport Geography* **5**(1), 23–24.

Haynes K.E., Avieira C., Burhans S., and Pandit N. (1995). Fundamentals of infrastructure financing with respect to ITS. *Built Environment* **21**(4), 246–254.

Haynes K.E. and Button K. (2001). Transportation systems and economic development. *Handbook in Transport Systems and Traffic Control* (ed. K. Button and D. Hansher), pp. 174-192 . Oxford, UK: Pergamon.

Haynes K.E. and Li Q. (1993). Policy Analysis and uncertainty: lessons from the IVHS transportation development process. *Computers, Environment and Urban Systems* **17**, 1–14.

Henderson J.M. and Quandt R. E. (1971). *Microeconomics Theory*. New York: McGraw Hill.

Hoehn J.P. and Randall A. (1989). Too many proposals pass the benefit–cost test. *American Economic Review* **79**(3), 544–551.

Johnson R and Libecap G. (2000). Political processes and the common pool problem: the Federal Highway Trust Fund. *Working Paper, Department of Economics*. Tucson, AZ: University of Arizona.

Lakshmanan, T.R. and W. Anderson (1999) *International Trade and Transportation – Draft Report* Washington D.C., World Bank.

Lakshmanan T. R., Subramanian, W. Anderson and Lautier (2001). *Integration of Transport and Trade Facilitation, Selected Regional Case Studies*. Washington, DC: World Bank.

Lockwood S. (1995). Public private partnerships in US highway finance: ISTEA and beyond. *Transportation Quarterly* **49**(1), 30-42.

Mansson B.A. (1999). Stakeholder approaches to intertemporal valuation. *Regional Sustainability: Applied Ecological Economics Bridging the Gap Between Natural and Social Sciences* (ed. I. Ring, B. Klauer, F. Watzold, and B.A. Manssons), pp. 36–48. New York: Physica-Verlez.

Martin F. (1994). Sustainability, the discount rate and intergenerational effects within a regional framework. *Annals of Regional Science* **28**, 107–123.

Nadir I. and Mamuneas T. (1994). *Contribution of Highway Capital to Industry and National Productivity Growth*. Washington, DC: Federal Highway Administration, Office of Policy Development, US Department of Transportation.

Newbery D. and Santos G. (1999). Road taxes, road user charges and earmarking. *Fiscal Studies* **20**, 103–

132.

Nijkamp P., Schaeffer H., and Spronk J. (1989). Multiple futures and multiple discount rates in multiple criteria analysis. *Project Appraisal* **4**(1), 2–8.

Ostrum E.A. (1993). A communitarian approach to local governance. *National Civic Review* **2**(3), 17-24.

Peace D.W. and Atkinson G. (1993). Capital theory and the measurement of sustainable development: an indicator of weak sustainability. *Ecological Economics* **8**, 103–108.

Peltzman S. (1992). Voters as fiscal conservatives. *Quarterly Journal of Economics* **107**, 327–361.

Prize C. (1989). Equity, consistency, efficiency and new rules for discounting. *Project Appraisal* **4**(2), 58–65.

Rauschnayer F. (1999). Decisions in the context of sustainable development. *Regional Sustainability: Applied Ecological Economics Bridging the Gap Between Natural and Social Sciences* (ed. I. Ring, B. Klauer, F. Watzold, and B.A. Manssons), pp. 19–35. New York: Physica-Verlez.

Ring I, Klauer B., Watzold F., and Manssons B.A. (eds.) *Regional Sustainability: Applied Ecological Economics Bridging the Gap Between Natural and Social Sciences*. New York: Physica-Verlez.

Schnelling T.C. (1992). Some economics of global warming. *American Economics Review* **82**(1), 1–14.

Serageldin I. (1996). Sustainability as opportunity and the problem of social capital. *Brown Journal of World Affairs* **3**(2), 187–203.

Sowinski L.L. (2000). Is there a perfect logistics product in the market? *World Trade* (Feb.), 32–36.

Stough R. and Rietveld P. (1997). Institutional issues in transport systems. *Journal of Transport Geography* **5**(3), 207–214.

Winston C. (2000). Government Failure in Urban Transportation. *Fiscal Studios* **21**(4), 403–425.

Winston C. and Shirley C. (1998). *Alternative Route: Toward Efficient Urban Transportation*. Washington, DC: Brookings Institution.

Winston C. and Crandell R.W. (1994). Explaining regulatory policy. *Brookings Papers on Economic Activity*, pp. 1–49. Washington, DC: Brookings Institution.

Biographical Sketch

Dr. Kingsley E. Haynes is University Professor of Public Policy and Dean of the School of Public Policy at George Mason University in Fairfax, Virginia. He holds his B.A. from Western Michigan University in Kalamazoo, Michigan where he majored in History, Geography, and Political Science and minored in French. He graduated with an honors degree in History. He holds his master's degree in Geography from Rutgers University in New Brunswick, NJ, and his Ph.D. in Geography and Environmental Engineering from the Johns Hopkins University in Baltimore, MD. He was subsequently on the faculty at McGill University in Montreal, the University of Texas in Austin, Indiana University in Bloomington and Boston University, before joining George Mason. Besides playing a central role in building the Lyndon B. Johnson School of Public Affairs at Texas and the School of Public and Environmental Affairs at Indiana, he was Dean of the Graduate School at George Mason and the founding Dean of Mason's School of Public Policy.

Haynes was the first director of the Urban Studies Center at McGill and the Joint Center for West Texas Environmental Studies at the University of Texas, as well as the inaugural Director of Indiana University's Regional Economic Development Institute. He has worked overseas on air transport projects in Brazil, regional development programming in Malaysia, water resource and environmental management projects in Egypt, Sudan, and Jordan, and evaluation programs in Kuwait and Saudi Arabia. In North America he has worked on coastal zone management projects in Texas, and environmental projects in the Yellowstone and Ohio River Basin, and transportation projects in the US Northeast Corridor; Quebec, Canada; the US Southwest, and the US Midwest.

He is the past President of the 70-nation Regional Science Association International and was recently elected to the National Academy of Public Administration in 2002 and awarded the Ullman Prize for his

work in transportation geography (2003). He has led over \$30 million in research grants and contracts and is co-author or editor of six books and five monographs, and 20 book chapters as well as over 100 journal articles and 50 professional reports.

In recent years his research has focused on soft and hard infrastructure in regional economic development and the role of state and local development policy. His teaching is concerned with leadership in professional public policy education.

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