

Myths, Reality and Wishful Thinking
A Layman's Review of the Literature on Transportation and Economic
Development
Debra Ward

Introduction

"Beware of sweeping generalizations about transport and the economy" SACTRA 1999

"Transportation investment is always a means to a greater goal and not simply an end in itself" Eberts 2002

The genesis of this paper is a project I undertook with the Atlantic Canada Opportunities Agency (ACOA) in 2005 to identify and evaluate studies that demonstrate the link between transportation and economic development. We thought, naively, that this would be relatively straight-forward. After all, business (and society, for that matter) can't survive without efficient, safe transportation infrastructure. However, finding reliable studies that demonstrated exactly how transport affects development, and what actions enhance its impact, proved elusive at best, and non-existent at worst.

While we expect the occasional disconnect between what research implies and what laymen infer, there is evidence that this gap is counterproductive. Communities of all sizes, in all regions demand more and better infrastructure: roads, airports, ports. At times, the cost is justified by the promise of opportunities down the road (so to speak). Unfortunately, poor understanding of the links between transportation and development lead to poorly conceived and executed strategies and investments. This, in turn, leads to unfulfilled expectations, wasted money and a view that there are much better ways of enhancing economic opportunity than through improved transportation infrastructure.

Nevertheless, it is safe to say that, even if we are not able to define the connection with certitude, transportation is inexorably linked to the economics of

Debra Ward

a community or region, in ways both subtle and overt. However, the literature is inadequate as a tool to determine how (and if) we can manipulate or exploit transportation infrastructure to produce measurable and positive impacts on an economy.

In this paper, I will review the highlights of my findings and what they suggest in terms of future approaches.

Methodology

As there are literally hundreds, if not thousands, of papers on the subject of development and transportation, the first task was to develop a set of criteria to include only relevant reports in the literature view. These included:

- Most recent studies (1999 or later)
- Canadian studies as a priority
- Established authors, provenance and methodologies

Documents were sourced by direct contact with key members of the transportation and government communities in Canada and elsewhere, web searches, and library research. Hundreds of documents were found in the initial phase of this project. Using the established criteria, the list was whittled down to a more manageable seventy relevant, current documents.

Some of these include extensive literature reviews. They proved extremely valuable not only in their conclusions, but in their analysis of seminal work done in the 1980s and early 1990s. This is especially true of the works of Aschauer (1989) and Munnell (1990) whose theories of large productivity returns on transportation investment affected policy planning to a large degree, and whose findings, despite their influence, have come under fire in recent years.

Of the studies used, 21 were extremely pertinent to the review, and are used extensively. As stated earlier, the available research on transportation and economic development (although there are variations of terms and definitions) is vast. Quantity is no guarantee of quality, unfortunately. Even within the “best of the best” used in this review, at times the studies

Debra Ward

contradict each other, are controversial in approach or conclusions, lack data and only occasionally use comparable terms.

In order to put some rigor into our examination of this mass of data, we used the following guiding “principles”:

- The plural of anecdote is NOT evidence
- Absence of proof is NOT proof of absence
- *Post hoc* might be a crock

There is one additional (and large) caveat that must be noted. I am most definitely NOT an economist. This proved to be both an asset and a liability as I worked my way through the literature. On one hand, I had no sacred cows to defend, but on the other hand, there were times that I was interpreting highly complex and specialized information and may have misinterpreted some of it. I ask your indulgence, and apologise in advance for any errors.

As this paper is a distillation of a considerably more complex document produced for ACOA, some simplification was necessary. Therefore, it focuses on three areas that I believe might be of greatest interest to this group: Transportation and the Global Economy; Transportation and Redistribution and, lastly, How We Examine the Issue. The paper ends with a brief section of conclusions. Please contact the author for any clarifications required.

Transportation and the Global Economy

GENERAL FINDING: While surface transport may be reasonably ubiquitous in Canada, international trade/foreign investment, supra-national supply chains and technological advances are changing how Canada’s domestic and international transportation networks are configured.

AIR: A number of studies support a view that air transportation is becoming increasingly important to global trade, the “new economy”¹ and to

¹ While there are a number of ways of defining the term, this paper uses the following definition: An economy in which information technology plays a significant role and that enables producers of both the tangible (computers, shoes, etc.) and intangible (services, ideas, etc.) to compete efficiently in global markets.(source: Pearson Prentice Hall)

Debra Ward

inward foreign investment. The most important air-related attributes were generally identified as speed, reliability and competitive (or cost-efficient) pricing. A study by the Corporation of London (2002) found that almost 70% of business in London consider air services to be critical for business travel by their staff; 50% for travel by their clients. Neither new information/communications technology nor alternate forms of transport are seen as likely to reduce the dependence on air travel, and the volume of air travel is only likely to increase.² In some instances, the availability of air service can be important in promoting the perceived accessibility of an area (*McQuaid, et al, 2004*).

Further, according to McQuaid, foreign investors and markets are influenced by air service. *Button and Taylor 2000* reveals a number of interesting attitudes of businesses towards air service, pointing out how business focuses on certain attributes: non-stop, direct, international, access, etc. This might explain the relative difficulty small spoke airports around the world have in increasing passenger load factors. If the service does not appreciably add to the speed and reliability of moving people and goods in time and cost efficient ways, there are few benefits to business. They further suggest that international air service is particularly important for “new economy” sectors, because their workers fly about 1.6 times more frequently than traditional industries. They stated:

*“The overall conclusion is that, within limits, the more international air transportation is likely to stimulate further growth in the new economy.”*³

In a study on trade in the post-FTA era⁴, the Atlantic Provinces Economic Council (APEC) found:

² The Future Development of Air Transport in the South East, Department of Planning and Transportation, Corporation of London, 2002

³ International Air Transport and Economic Development, Button, K., Taylor, S. (2000)

Debra Ward

“The distance to major markets, and the associated transportation costs may be an important factor in the relative profitability and competitiveness of the region’s value-added exports”

...distance remains one of the most important impediments to trade...improved air transportation links (i.e. direct flights) would help facilitate business travel to some of the emerging markets...and would also support the export of high value light weight products which are increasingly transported by air.

Another Canadian study, the *Periphery in the Knowledge Economy*, (Polèse and Shermer, et al 2002) also supported these views on air service, finding that the need for face-to-face meetings is increasing. The advent of IT options, rather than decreasing this need, seems to be creating new demand.

OTHER MODES AND TECHNOLOGIES: While air service may seem to be the most obvious transportation need for the “new economy” and global trade, more traditional modes such as road and marine are undergoing transformation as well.

Lakshmanan & Anderson (2002)⁵ eloquently defined these changes as being “enabling and space-shrinking technologies” that are “fundamentally transforming the space-time relationships between all parts of the world”.

Attributes of these technologies include:

- Management and coordination of globally distributed sets of diverse economic activity;

⁴ Atlantic Canada’s International Trade in the Post-FTA Era, APEC 2001

⁵ Evolution of Transport Institutions that Facilitate International Trade, 2002

Debra Ward

- Increased division of labour in the production processes as the component activities are disaggregated and spatially relocated, resulting in different stages of production being carried out in many countries.

Another study by Lakshmanan and Anderson (2002)⁶ considered, among other factors, the relative strengths of various economic models. It suggests that one must consider the improvements to transportation systems *as they affect gains from trade*. This occurs when aggregate efficiency is enhanced because of the availability of cheaper or better transportation, which in turn promotes interregional and international specialization and trade. They maintain that

“...reduced transportation costs can lead to a host of economic transformation that yield aggregate economic benefits”

New Zealand’s survey, *Generating Growth (2003)* showed similar results. The largest constraint to business growth was deemed to be the “availability/cost/timeliness of transport”. Their most common issues (which are mirrored in a number of other studies) are:

- Availability of the right type of transport services;
- Reliability, speed or frequency of freight services to meet customer requirements (commercial cost of congestion);
- The cost of freight and business travel and;
- The social cost of consumer congestion

OECD 2002 supports the contention that transportation matters to businesses more than its cost percentages in national accounts would suggest. It attributes this to several issues, including

⁶ Transportation Infrastructure, Freight Services Sector and Economic Growth

- National accounts significantly underestimate the total costs of transport such as owner-operated transport vehicle; employee travel and the value of staff travel-time.
- There are wide variations in measured transport costs between different sectors and even greater variations between individual firms

Transportation and Redistribution

GENERAL FINDING: Transportation improvements often lead to a “pull” to larger centres from smaller ones, and redistribution, rather than growth. However, this might be balanced by freer inter-regional and intra-industry trade, and the strategic use of periphery regions by certain businesses.

One of the thorniest issues for public policy makers is the redistributive effects of new transportation infrastructure, particularly on rural communities. Many studies demonstrate that new infrastructure tends to redistribute existing business activity, often to more central metropolitan areas: churning the economy rather than building it.

It is these conclusions which give weight to the view expressed by a number of researchers (*e.g. Gillen 2000, OECD 2002, European Conference of Ministers of Transport 2001, et al*) that transportation policy and investments make little difference in employment, as without these actions, employment would be absorbed elsewhere in the economy. Given these results, it is only natural that public policy planners question if there are more effective ways of investing in small or rural communities to achieve results. However, as with most other issues relating to transportation and development, the answers are neither simple nor simplistic.

Consider the more subtle effects of improved transportation infrastructure. A number of studies (*SACTRA 1999, Polèse and Shermer, et al 2002*) point out that transport costs, like tariff walls, can be considered a type of monopoly protection, depending on the remoteness of a location and its

Debra Ward

existing transportation links. The better (i.e. more efficient) the transportation system is, the lower the costs, and the more access to competitive markets. While this same transportation system may move business and labour to other centres, its positive impact in opening the market to larger opportunity cannot be ignored.

Polèse and Shermer, et al 2002 is an extremely useful document in this regard. Even with the pronounced shift to urban centres, the authors conclude that populations will continue to be distributed among cities and rural communities of various sizes, although the smallest cities and rural areas continue to lose population shares. Their logic is as follows:

- Primary activities (farming, fishing, forestry) may decline, but will not disappear;
- Rural populations need service centres (e.g. retail, professional services, education, health, although their location will depend on local geography and the size and density of the local population.
- Cities will develop far from major markets if the transport cost is high enough to warrant the location of manufacturing near the resource (e.g. trees are most costly to transport than planks, processed fish less costly than fresh, etc.)
- Medium and smaller-sized cities will develop because agglomeration also entails costs: higher wages and land prices, congestion and “other inconveniences associated with large cities”.

This view is supported by *Lakshmanan and Anderson 2002*, who found:

“Greenfield production sites located at the periphery of metropolitan areas or in rural areas have been sought by many producers to economize on land costs...It may seem contradictory to argue that transportation infrastructure promotes productivity on one hand by allowing firms to cluster together in cities and on the other by allowing firms to spread out into the periphery. But this must be viewed in light of the fact that different firms

Debra Ward

*benefit from different locations... The spatial analogue to this argument is that earl- stage firms do best in urban core locations while late-stage firms do best in the periphery. **The main point is that a transportation system that provides sufficient capacity and connectivity benefits firms by expanding the range of locations from which they can choose.***

These examples give rise to the view of “infrastructure regions” which can be determined by economic linkages (shared patterns of consumption, production and distribution; fiscal boundaries (who pays and who benefits from infrastructure); or administrative boundaries (who governs). *Mattoon, 2004.*

However, not every peripheral region would necessarily benefit. *Polèse and Shermer, 2002* notes that for some of the regions it has studied, distance will remain a major obstacle to job creation. There is little leeway for government to modify the impact of distance, and its relative costs, short of massive subsidies. As we have seen from this literature review, even an extraordinary measure such as this would be unlikely to affect great change, without other “winning” factors in place.

How We Examine the Issue

GENERAL FINDING: Because of the limitations (and at times, controversy) surrounding many studies, policy planners have only a partial picture of the links (or lack of them) between transportation and development. New, clearer and more definitive measurement tools are needed, and new models are being considered in a number of countries.

Many, if not most of the studies reviewed comment on the limitations of the models or data used. (*SACTRA 1999, OECD 2002, Lakshmanan, et al 2002, Waters, 2000, Weiss 2000, Gillen 2000, Llewellyn-Davies, et al, 2004 etc.*) Some of these reviews are quite critical. Five significant “flaws” were common to many.

Debra Ward

The first is that the standard tool of reductionism used in models may exclude essential variables. For example, SACTRA points out the weaknesses of percentage rate of change in real GDP as the unit in which to measure economic growth in the context of transport appraisal:

The second issue, which is related, is concerned with the quality of ex-ante and ex-post case studies. Ex-ante studies are vulnerable to overstating potential impacts, and one analysis even described some of them as “promotional” in nature (*Llewellyn-Davis, et al*). While ex-post studies should provide a complete after-the-fact analysis, there are relatively few that can be used to draw generalized conclusions.

SACTRA 1999 characterizes ex-ante studies deficiencies:

- Little of what is done can be described as standard practice;
- The estimates that are made are often best characterised as 'the best that can be done with the data available and the current state of knowledge';
- Little attention is paid, in most cases, to double-counting with other aspects of the appraisal and to phenomena such as the two-way road effects; and
- These benefits are usually only brought into play when the promoter wishes to use them in *favour* of the project, never in the reverse case.

The third concern deals with the quality of data used (both availability and accuracy), and the large differences in the definitions of common terms (e.g. economic growth, development, region, transportation improvement, etc.) Poor or poorly employed data and confusion over terms can easily lead to ineffectual conclusions.

The fourth deals with the concern that results depended more on the type of analysis used than the data themselves. A Canadian study stated that “**Our**

Debra Ward

*review shows that the estimates results are largely dependent upon econometric formulation”.*⁷

It also appears that we are coming out of a “pendulum period” over the last decade or so, with an initial swing to optimistic models which proved to overestimate transportation impacts followed by a swing to more pessimistic studies that may have underestimated the impacts.

More recent analyses, using somewhat more robust tools, suggest that an analytical equilibrium may have been reached, with impacts measured somewhere between the two extremes.

For example, a recent Canadian study (*Harchaoui, Tarkhani 2003*), used an econometric model which measured multifactor productivity growth, and **pegged the average marginal benefits of public capital at 0.17 across all 37 industries examined in Canada, from a low of 0.003 for fishing and trapping to a high of 0.42 for transportation.** The authors note:

*“These results stands (sic) in contrast to those reported by Wylie (1996) for Canada and the proponents of large contributions to infrastructure in the United States. Furthermore, our results also differ from the results reported by those who deny any role for public capital in enhancing the growth rate of productivity. Our analysis suggests a middle course.”*⁸

This study (and others) may represent an alternate way of examining infrastructure and economic development impacts, using both micro and macro analyses. There are a number of approaches under consideration that hold

⁷ A review of studies on the relationship between transport infrastructure investment and economic growth, 2001, Canada Transportation Act Review Panel

⁸ Public capital and its contribution to the productivity performance of the Canadian business sector, Statistics Canada, November 2003

Debra Ward

promise. These models tend to be more dynamic, and encompass a broader range of variables into their equations. Most optimistically, they may provide improved correlations with real world outcomes.

Conclusions

There is still a great deal that we do not understand about how to use transportation planning and investment to influence economic development, or indeed, if this is possible. Nevertheless, there is a pervasive, if unproven, view that transportation levers economic opportunity: a view that will not disappear for lack of evidence.

It is true that better tools that capture more real-world impacts are being developed. However, these tools must also be understood by laymen who will ultimately decide how to best spend limited tax dollars: politicians, bureaucrats and others.

New, multi-disciplined approaches to transportation and development are also needed. It is not sufficient to build transportation infrastructure based on the “hope” that new opportunities will emerge. Planning must be rigorous, defensible and have clearly understood and measurable inputs and outputs. Initiatives such as the Pacific Gateway in British Columbia hold much promise. Essentially, this is a multiple stakeholder, multi-government strategy involving all modes and a number of key industries, geared to providing the right mix, number and type of transportation services to ensure Canada’s position as the primary portal to and from Asia and other Pacific nations.

Selected Bibliography

- Air Service Trends at Small Communities Since October 2000*, General Accounting Office (2002)
- Air Transportation and the Economy in Atlantic Canada*, Canadian Transportation Research Forum (CTRF), Grant, R., Ward, D. (2004)
- Assessing Canada’s Infrastructure Needs: A Review of Key Studies, Research and Analysis*, Infrastructure Canada, (2004)
- Atlantic Canada’s Exports, with a Focus on SMEs and Rural Regions*, Desjardins, P-M, The Canadian Institute for Research on Regional Development (2003)
- Atlantic Canada’s International Trade in the Post-FTA Era*, Atlantic Canada Economic Council, (2001)

Debra Ward

Canada's Transportation Infrastructure Challenge, Conference Board of Canada, (2005)

Causal Links Between Transportation and Economic Development, Problem Statement, Transportation Research Board Committee on Transportation and Economic Development

Criteria for Infrastructure Investment Building the Future, Issues in Public Infrastructure in Canada, C.D. Howe Institute, Vining, A.R., Weimer, D.L. (2001)

Decentralization: Regional Competition and Cross-Border Labor Mobility, Centre for Employment Studies, Khoshyaran, M., (2004)

E-Commerce and Transport Demand: Setting an Agenda for Transatlantic Research, Sustainable Transport in Europe and Links and Liaisons with America (STELLA), Schintler, L.A., Button, K.

Economic Growth from Transport Improvements, U.S. Federal Highways Administration, Weiss, M (1999)

Economic Impact of Investment in a Major Commercial Transportation System for the Greater Vancouver Region, Greater Vancouver Gateway Council, Delcan Economic Development Research Group (2003)

Elusive link between transportation infrastructure and economic growth: testing for causality between provincial infrastructure capital and economic activity, Canadian Transportation Research Forum (CTRF), Waters, W. (2000)

Enhancing Knowledge about Public Infrastructure, Perspectives in the Federal Family, Research and Analysis, Infrastructure Canada (2004)

Ensuring Productive Investment in Transportation Infrastructure, Reason Public Policy Institute, Lewis, D (1993)

Evolution of Transportation Institutes that Facilitate World Trade, Sustainable Transport in Europe and Links and Liaisons with America (STELLA), Lakshmanan, T.R.; Anderson, W.P. (2002)

Highway Benefit-Cost Analysis: A Review of the Evidence, Transport Canada, G. Blanchard, (1994)

Generating Growth: Infrastructure, Growth and Innovation Advisory Board, New Zealand, Infometrics (2003)

How Can Canada Prosper in Tomorrow's World?, Conference Board of Canada (2004)

How Do Freight Transportation Improvements Affect Economic Development? Overview of Linkages, Transportation and Economic Development, Ostira, S ICF Consulting; Comeau, P. HLB Decision-Economics (2002)

Impact of Transportation Infrastructure on Regional Development, Organisation for Economic Co-operation and Development, (2002)

Debra Ward

Importance of Intermodal Connectivity and Bottleneck Elimination Prentice, B, (2003)

Importance of Transport in Business' Location Decisions, Napier University, McQuaid, R.W.; Greig, M.; Smyth, A; Cooper, J. (2004)

Infrastructure and State Economic Development, Statistics Canada, Mattoon, Richard, (2004)

International Air Transportation and Economic Development, Button, Ken; Taylor, S

Intermodal Transport in Canada Monteiro, J. and Robertson, G. (2003)

International Travel, Statistics Canada catalogue no. 66-201 (2003)

Linkages between Infrastructure and Economic Growth, Ministry of Economic Development, New Zealand, O'Fallon, C. (2003)

Moving Forward: A Guide on the Importance of Transportation in Canada, WESTAC (1999)

Myths and Taboos in Transport Policy, School of Public Policy, George Mason University, Button, K.

New Directions for Understanding Transportation and Land Use University of California Transportation Center Giuliano, G. (1989)

New Ways of Viewing the Relationship between Transport and Development, discussion paper, Colonna, P.; Fonzone, A

Practices for Assessing Economic Development Impacts of Transport Investments Weisbrod, G. (2001)

Periphery in the Knowledge Economy, Canadian Institute for Research on Regional Development, Polèse, M., Shermer, R, et al (2002)

Prepared for Emerging Challenges: New Insights on the Economy and Society, presentation, Statistics Canada, Mattoon, Richard H. (2004)

Primer on Transportation Investment and Economic Development, Transportation Association of Canada (1994)

Profile of Foreign Firms in Atlantic Canada, Atlantic Provinces Economic Council (APEC) (2003)

Public capital and its contribution to the productivity of the Canadian business sector, H, Harchaoui, T.M; Tarkhani, F., Statistics Canada (2003)

Public Capital, Productivity and the Linkages to the Economy: Transportation Infrastructure, Gillen, David (2000)

Public Infrastructure in Canada: Where do we stand?, Statistic Canada, Harchaoui, T.M.; Tarkhani, F.; Warren, P. (2003)

Regional Spatial Strategies: Planning Policy Statement 11, Office of the Deputy Prime Minister, United Kingdom

Review of Studies on the Relationship between Transportation Infrastructure Investments and Economic Growth, Canada Transport Act Review, Jiang,

Debra Ward

Bangqiao, (2001)
State of Infrastructure in Canada: Implications for Planning and Policy,
 Infrastructure Canada (2003)
*Sub-regional development approach – Transport, international trade and
 investment modeled in space*, Brunner, H-P; Allan, P
Survivability of Short-haul Small market Air Transportation, Canadian
 Transportation Research Forum (CTRF), Brander, J; Cook, B. (2004)
*Ten Keys to Using Transportation Investments to Promote Economic
 Development* Forkenbrock, D, 2002
*Trade and Transportation: the Impact of the 1995 Transborder Air Services
 Accord*, Baldwin, G, Pustay, M.W., Statistics Canada, (2002)
Transport and Economic Development, Conclusions of Round Table 119,
 European Conference of Ministers of Transport, Committee of Deputies
 (2001)
Transport and the economy: full report, Standing Advisory Committee on
 Trunk Road Appraisal (SACTRA 1999)
Transportation and City Competitiveness, Bartlett School of Planning,
 University College, London, Banister, D., Hall, Sir Peter (2004)

Transportation and Economic Development Conference Papers (various),
 Transportation Research Board (2002)
Transportation in Canada 2003 Annual Report, Transport Canada
*Transportation Infrastructure, Freight Services Sector and Economic
 Growth*, Lakshmanan, T.R.; Anderson, W.P. (2002)
Understanding the Impact of Transportation on Economic Development,
 Committee on Transportation and Economic Development, Transportation
 Research Board, Eberts, R (2000)

Debra Ward