Submission of
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To
The *Canada Transportation Act* Review Committee
On
Research and Innovation for Transport

29 December 2014

ABSTRACT: My submission addresses a current deficiency of transport policy in the limited promotion of research and development (R&D). I draw on practice in other industrial sectors and in Canadian transport, the conclusions of previous policy reviews, the examples of other countries and the evolving perspectives on R&D for innovation strategy. I argue that the funds provided to transport research and the frameworks in which they are administered are inadequate to the needs of our society for knowledge creation and the education and training of future generations. Short comings in R&D are related, in part, to continuing inadequacy of data availability.

CONCLUSIONS:

- Transport has not been identified as a strategic sector of the Canadian economy warranting a targeted research program as are other sectors and as is found elsewhere.
- In Canada, the level of funding for transport research has been reduced, certainly for policy-related (non-technological) research. This is contrary to the recommendation of the Panel in 2001. It is contrary to the pattern in other countries. (A consequence may be that the Committee finds itself handicapped by a lack of research results relevant to the issues it faces.)
- The need for research in the national interest transcends internal political divides.
- Research has two vital roles in the economy; informing government policies and providing a base for innovation.
- The government recognises that innovation may take many forms and requires implementation by businesses, yet it focuses on technology.
- An essential part of innovation strategy is for business and research capabilities to meet, cross-fertilise and lead to innovation.
- The number and size of university transport programs has decreased in terms of faculty and graduate students.
- The framework for the support of research is a vital element of program design to deliver an alignment of research with national social, economic, environmental and political interests and at the same time support the development of research institutions.
- Data are an essential base for research, yet Canada lags other countries, for example the U.S., in the provision of data.

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RECOMMENDATIONS: It is easier to recognise the need for more research support than it is to outline a process for its allocation. I submit the following for the Committee's consideration.

- Transport should be a sector for designated research programs.
- The level of funding for transport research should be increased in a material way.
- The funding program should include allocations to the social sciences and humanities as well as to science and technology.
- The range of subjects eligible for support should include all modes and all geographies.
- The framework for funding take into account the following:
    - The identification of priority areas within transport for research to serve the national social, economic, environmental and political interests should be the responsibility of a lead group involving representatives from business, universities and government.
    - As a final part of the lead group stage, consideration should be given to a process by which the development of broad areas of research might be identified with regional hubs composed of multi-institution knowledge and expertise. For example, Gateway Logistics might warrant a hub with various actors in three or four locations. The hubs would interact in their research.
    - Funds should be awarded based on evaluation of the short-term or long-term relevance of research proposals to the identified priority areas.
    - Preference should be given to proposals that involve more than one university and involve industry partners.
    - Evaluation of proposals can probably be performed through established SSHRC and NSERC processes but with reviewers and criteria appropriate to the priority areas.

CONTENTS

> *The current crisis in transport is really made up of two components, one old and one new. First, we have the old concern with rail transport pricing. …. The new element in our current crisis is the capacity problem. Now, capacity hits us in two main areas at the moment. One is in the urban and in the inter-urban area (which is largely, but not exclusively, passenger) and the other is in the export [rail] area.*
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> F.W. Anderson, Banquet Speech, Queens University, 1974, mimeographed.

Introduction

I am making this submission as an individual. I have had some discussion about facts with individuals in the public and private sectors but the views expressed are entirely my own.

I have chosen to focus my submission on research and development (R&D) for transport because I fear that R&D may get limited attention in presentations to and in the deliberations of the Committee. I consider the current status of R&D an important issue to be addressed by the Committee.

In view of my uncertainty concerning the ready availability to others of submissions to the Committee (a matter of concern to me), I am distributing this submission to a limited number of individuals in universities, companies and organisations.

My submission in the context of the responsibilities of Transport Canada

To deliver a transportation system consistent with the declaration of National Transportation Policy (NTP) (*Canada Transportation Act*, Section 5) the Government of Canada must do more than just regulate transport services. It must execute four responsibilities: monitoring, operational, regulatory and promotional. The monitoring function is to gather information about the performance of the transport system so that timely decisions can be made about whether and what governmental interventions may be appropriate. The operational function is to provide those services that cannot be provided with desired effectiveness through the private sector. The services provided include those of numerous crown corporations and shared governance organisations such as the port and airport authorities. The regulatory function is to provide oversight and to regulate the safety, environmental and economic aspects of transport services. The promotional function is to advance desired but unremunerative services through subsidies (for example, VIA rail) and to advance services through support for research and development (R&D). Research is fundamental for the government to be able to monitor the performance of transport infrastructure and services and to identify appropriate operational, regulatory and promotional initiatives.

I am making this submission out of concern that regulatory and, perhaps, operational issues will dominate presentations to and discussion before and within the Committee to the detriment or absence of R&D considerations. This is notwithstanding that R&D has been recognised explicitly as important to government policy in previous reviews, especially the Royal Commission on Transportation, 1959-61, and the Canada Transportation Act Review Panel, 2001. Consideration of R&D is also highly relevant today in light of the importance of innovation to the competitiveness of the economy, a prominent concern of the government.

In making this submission, data on government expenditures in transport are not available However, I am confident in the correctness of my general argument. I trust to the wisdom of the Review Committee to apply resources to advance investigation of the case for more and different promotion of R&D and, in its report, to account for its conclusions on R&D policy.

The R&D experience in Canada

The Government of Canada provides support for R&D in various ways. These include the following general programs:[1]

- The Social Sciences and Humanities Research Council (SSHRC) for university-based research and graduate training in the social sciences and humanities;
- The Natural Sciences and Engineering Research Council (NSERC) for university-based research and graduate training in science and engineering;
- The National Research Council (NRC) for scientific and technological research in collaboration with corporations and universities.

SSHRC and NSERC support open topics in their fields. Non-university based support for the research is encouraged but not mandatory. NRC is focused on issues facing businesses and identifies twelve areas of R&D, one of which is automotive and surface transportation which focuses on materials and engineering.

A large number of other R&D programmes exist, throughout government, designed primarily to stimulate and support the development of science and technology. Documenting the list is beyond my resources and my purpose. The government has advanced its program of support in its report, *Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation*.[2]

I choose to give examples of three programs supporting R&D. They are:

- Networks of Centres of Excellence (NCE) of Industry Canada manages four programs intended to advance solutions and outputs through research partnerships involving the public and private sectors, within Canada and internationally.[3] The orientation of the Centres supported currently is science and technology.
- The government has research centres focused on particular industries. For example, the Science and Technology Branch of Agriculture and Agri-Food Canada (AAFC) has twenty research centres across the country.[4] In addition, it provides industry with support in various areas of research and innovation. Natural Resources Canada has five regional forestry research centres and the Canadian Wood Fibre Centre which is a virtual centre with employees distributed across the country.[5] It also has an active mining program. I note the government's support for transport below.

[1] The websites for the examples of general programmes given here are: http://www.sshrc-crsh.gc.ca/ ; www.nserc-crsng.gc.ca ; http://www.nrc-cnrc.gc.ca/eng/index.html
[2] See: http://www.ic.gc.ca/eic/site/icgc.nsf/eng/07473.html
[3] see: http://www.nce-rce.gc.ca/Programs-Programmes/Index_eng.asp
[4] See: http://www.agr.gc.ca/eng/science-and-innovation/research-centres/?id=1181591790641#
[5] See: https://cfs.nrcan.gc.ca/centres

- Through Industry Canada, support for R&D is given to particular companies, for example, a $300 million repayable contribution provided recently to Pratt & Whitney Canada through Industry Canada's Strategic Aerospace and Defence Initiative (SADI).[1] Many companies are supported through SADI.

The incidence of government support for R&D varies across industries. I suspect that the variance is influenced by the structure of industries and by the culture of government departments. For example, in the case of Agriculture Canada "research and science has always been at the heart of the Department's mission."[2] The Department of Agriculture received its broad legislative authority, including agricultural research, in 1868. Included in its research mandate today is the operation of 20 research centres across the country. The founding of Transport Canada on the other hand goes back to the operational (and funding) responsibilities of the Railway Branch of the Department of Public Works, later amalgamated with canals in the Department of Railways and Canals in 1879, and then, in 1935, amalgamated with the government's interests in maritime and aviation in the Department of Transport. The traditional concerns of Transport have been with regulatory and operational matters. Limited attention has been given to R&D.

Perspectives on R&D in inquiries into Canadian transport policy

Inquiries into transport policy are creatures of their time. Recognising this helps to identify lessons from the past for today and to search for solutions today that are appropriate to shaping the future not just responding to the present. Lessons from the past start, predictably, with the Royal Commission on Transportation, 1961, the MacPherson Commission (MacPherson).

The MacPherson Commission: Macpherson appreciates the need to consider current policy issues from the perspective of a dynamic industry in a changing setting. This leads to the conclusion that an independent research process is needed so that consideration of evolving issues would be possible before "general dissatisfaction with conditions makes it imperative to undertake a special [inquiry]"[3] While MacPherson anticipates that research would draw on resources within and outside of government, its focus on public policy issues leads to the argument for an agency, a Transportation Advisory Council, separate from a regulatory agency. Research is seen as necessary to inform government "in the interests of developing adequate and efficient transportation services."[4]

MacPherson also recognises the importance of data as the basis for knowledge and research. A special review of federal transportation statistics was conducted.[5] MacPherson concludes:

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[1] See: https://www.ic.gc.ca/eic/site/ito-oti.nsf/eng/00780.html

[2] Suzanne Vinet, Deputy Minister, Agriculture and Agri-Food Canada, Message from the Deputy Minister in, *The Innovators Rooted in Science: The History of Research Branch from 1986 to 2011*, Editors: Y. Martel, J-M Deschênes and N. Corbeil, Accessed on-line at: http://publications.gc.ca/collections/collection_2014/aac-aafc/A72-120-2013-eng.pdf

[3] *Royal Commission on Transportation*, (Ottawa: Queens Printer, 1966) Vol. II, p.83

[4] Op.cit., p.81

[5] D. Eldon, "Review of federal Transportation Statistics", in *Royal Commission on Transportation*, (Ottawa: Queens Printer, 1962), Vol. III, pp.409-565.

> …the Government of Canada should devise a programme to meet the statistical needs of a foreseeable future in which public attention will centre on competition in transport and competition in world markets.[1]

Royal Commission on National Passenger Transportation, 1992: The Commission tasked to inquire into and report upon a national integrated intercity passenger transportation system meet the needs of Canada and Canadians in the 21st century concentrated on developing a policy framework which it applied to each mode. While recognising a research role for government it did not dwell on this but it gave detailed attention to the need for greater data availability.[2]

National Transportation Act Review Commission, 1993:[3] This Commission addresses itself to specific policy issues and makes 56 recommendations. It does not address research in its two volume report but does acknowledge the challenge of "adapting to the future."[4] It recognises the need for a more proactive approach to knowledge about changes in transport and the economy affecting the effectiveness and efficiency of existing laws and regulatory procedures. I interpret this as 'research'.

Report of the Canada Transportation Act Review Panel, 2001:[5] The panel's report devotes a chapter to public policy development in which it sees data and research as critical. The basic premise is stated as follows:

> The Panel sees policy development as a continuous process ... The Panel believes two key supporting ingredients, data and research, need improvement given the fundamental role they can play in the development of sound public policies.[6]

The Panel makes six recommendations concerning data availability. The current review will likely hear appeals for the availability of data as in the past. However, new calls for data will likely arise from shipper concerns that the transport system faces new issues associated with high capacity utilisation. More data may be needed but the issues are not so new.

Concerning research, the Panel notes, "Ultimately, good policy decisions will depend in part on the understanding that research can provide."[7] The Panel notes that investment in the knowledge knowledge base is critical but leaves the mechanism for its implementation open with the simple recommendation that "the government increase its support for transportation research."[8] The panel gives particular attention to the weakened state of university-based research capabilities.

Concluding comments on the inquiries: Each of the inquiries recognises that government programmes must evolve in response to changing conditions which may "require considerable

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[1] Op. cit., p. 411
[2] Directions: Final Report of the Royal Commission on National Passenger Transportation, 1992, Vol. I, pp. 338-442
[3] National Transportation Act Review Commission, *Competition in Transportation: Policy and Legislation in Review*, (Ottawa: Minister of Supply and Services Canada, 1993)
[4] Op. cit., Vol. I, pp. 200-203.
[5] Report of the Canada Transportation Act Review Panel, *Vision and Balance*, (Ottawa: Minister of Public Works and Government Services Canada, 2001)
[6] Op. cit., p 287.
[7] Op. cit., p. 295.
[8] Op. cit., p. 296.

re-thinking of time-hallowed concepts."[1] Insights into the changing conditions and into their implications for government programs and regulations are recognised as dependent on research with interests and perspectives broader than derived from government departments alone. The range and quality of research is dependent on the availability of statistical data.

While Statistics Canada has addressed the need for transport statistics, there is considerable dissatisfaction among the research community and increasingly shippers. MacPherson anticipates, "A deficiency in statistical collection which is particularly noticeable concerns the important dimension of speed of service."[2] Service levels and levels of capacity utilisation are among current dimensions of transport on which more data are desired by corporate and academic researchers.

Some developments of R&D in Canadian transport since 1960

Canadian transport policy was shaped by the MacPherson Commission as reflected in the *National Transportation Act*, 1967. Research was advanced but not through the independent Transportation Advisory Council as recommended by the Commission. The Transport Development Centre (TDC) was established in Montreal with an engineering focus; the Research Branch was established in the Canadian Transport Commission (CTC) with a focus on transport economics and policy. Subsequently, the Transport University Program was established, managed by the Research Branch. Support for university research in transport economics and policy commenced in the late 1960s through grants on the basis of applications from university researchers. It changed to a program of research funding to selected universities about 1970 and then to funding approved projects at those universities.[3] There was also a program to support graduate students through fellowships.

I do not recall the year that the research role within the CTC was terminated. The shift of a research/investigatory role to Transport Canada has resulted in a focus on topics of immediate interest from a governmental perspective, often that of a particular branch of government. The TDC has been maintained, now in Ottawa. I do not have data on the level of funding nor the topics of research for either Transport Canada or TDC but there is wide acceptance that the amounts are very modest and on topics very particular to current priorities in government.

There is no doubt that the funding to universities enabled the establishment of programs at some universities, for example, Manitoba, and the broadening of programs at others, for example, UBC. Some faculty were drawn to the universities by the knowledge of on-going support. Some faculty came to transport studies initially through fellowship support available; otherwise, they might have gone into other fields, such as finance.

The university support program was ended in 1986. The result has undoubtedly been a decline in university programs measured by the number of faculty and graduate students doing research on transport topics and by the amount of research published. As faculty with an interest in transport

[1] *Royal Commission on Transportation*, p.83.
[2] *Op. cit.*, p. 87.
[3] I recall that the universities were Dalhousie University, the University of Montreal, Queens University, University of Manitoba, and the University of British Columbia (UBC).

retire, they are not being replaced. Bright students and faculty can no longer be attracted to pursue transport-related research by an on-going funding program. The decline cannot be accounted for by the necessity of treating transport as a part of the wider supply chain processes. If anything, issues associated with the structure and performance of transport have become more complex and pressing as their ramifications have become more profound within supply chains.

Developments in Transport Research in the U.S. and the Netherlands

Before considering the future direction of transport research in Canada, it is appropriate to examine developments in other countries. Limited resources preclude an extensive review but I believe that two examples support my belief that support for transport research elsewhere has increased. Other countries have increase transport-related funding because better research informs government policies. It is also because research contributes to innovation in transport and logistics to the benefit of national productivity and competitiveness.

Developments in Transport Research in the U.S.: The report of the Canada Transportation Act Review Panel notes that in Canada the targeted university research funding was terminated in 1986. In contrast, in the U.S. in 1987, the University Transportation Centers Program was established with funding through a competitive process of a centre in each of 10 federal regions.[1] The *Transportation Equity Act for the 21st Century*, 1998, authorised US$194.8 million over the years 1998-2003 for grants to establish and operate 10 regional university transportation centres and up to 23 other centres.[2] Subsequently, the number of centres (over 60) and the level of funding both increased. University programs are significant even in the context of the large governmental and other research programs.

In 2010, state departments of transportation, through the National Cooperative Highway Research Program asked the Transportation Research Board (TRB) to consider how experience elsewhere might be used to improve surface transportation research in the U.S.[3] The Committee on National Research Frameworks found that the U.S. lacked a strategic framework for transportation research of the type that was found in other countries. It concluded that such a framework and greater funding were needed.

> …the U.S. lacks a cohesive national framework linking surface transportation research to societal goals. It relies instead on a fragmented and ad hoc array of diverse and largely uncoordinated research initiatives, often with no clear linkage to overall social, economic and environmental goals. ….
> Development of a new national research framework and subsequent activities associated with its implementation will require substantial funding over a period of years.[4]

[1] Committee on National Research Frameworks: Application to Transportation, *Framing Surface Transportation Research for the Nation's Future*, Washington D.C., Transportation Research Board, Special Report 313, 2014, p. 56.
[2] CTA Review Panel, op. cit., p. 295.
[3] Committee, op. cit. pp. vii-viii.
[4] Op. cit., pp. 114 and 124.

The contrast of the funding for transportation research in the U.S. with that in Canada is profound, even allowing for the respective size of the countries. Canada benefits from some of the programs funded in the U.S., notably the Cooperative Research Programs of the TRB, a division of the National Research Council.

Developments in Transport Research in the Netherlands: In the EU, most research activities, programmes and policies take place at regional and national levels**.** However, substantial funding and leadership is provided on an EU scale, as exemplified by the current Horizon 2020 initiative.[1]

> In the transport sector, the Commission will strive for a balanced approach in implementing the programme that takes into account the specifics of each mode (rail, road, waterborne and air transport) while remaining holistic; an approach which reconciles competitiveness with sustainability and which invests both in technology and in relevant socio-economic research.
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> The four main priorities for transport research under Horizon 2020 are:
> 1. Making transport more sustainable: resource-efficient transport that respects the environment.
> 2. Making transport and transport systems seamless: better mobility, less congestion, greater safety and security.
> 3. Keeping transport competitive: the European transport industry as a global leader.
> 4. Making transport research responsive: socio-economic research and forward-looking activities for policy-making.
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> The work carried out in the framework of the Strategic Transport Technology Plan (STTP) will contribute to focusing the transport European research and innovation activities through Horizon 2020.

The Horizon 2020 program strives to achieve its goals through a competitive proposal process addressed to a significant number of particular topics. The Horizon 2020 program is additive to national programs. I comment here on the Dutch program.

There are two features of the national research initiatives in the Netherlands which are noteworthy. First, they are framed in a 'triple helix' structure of government, corporations and the research community. This is also referred to as the 'golden triangle'. Second, the research programs are targeted to sectors of the economy, one of which is logistics, including transport.

In accounting for the acceptance of the success of the triple helix approach in the Netherlands, Liesbeth Staps, the International Liaison Officer of Dutch Institute for Advanced Logistics states that although there are formal processes guiding collaboration in the Netherlands, "it is a process that is perhaps more in our culture." (e-mail communication) The role of collaboration is evident in the strategies of the Port of Rotterdam Authority which works together with businesses, universities and other partners in research and innovation.

[1] European Commission, *Horizon 2020*, Transport Research and Innovation in Horizon 2020 at: http://ec.europa.eu/transport/themes/research/horizon2020_en.htm

The importance attached to logistics is derived from the efficiency of logistics services being essential for the country to realise the benefits of its location in competition with other gateways. Efficient logistics is also essential for Canada for somewhat different reasons, namely the size of the country, the transport intensity of our natural resources, as well as the competitive conditions faced by our products and gateways.

The contrast between the research environment in Vancouver and Rotterdam is striking. In Vancouver, the universities engage in research seen as having little relevance to the port community. The port community does not see the merit of reaching out to the universities. The contrast led me to outline the Dutch strategy in an appendix to a report prepared for Transport Canada. I reproduce this as Appendix A.

Concluding comments on research developments in the U.S. and the Netherlands: Three attributes of the programs in the U.S. and the Netherlands are relevant to the Canadian situation. They are:

- The framework by which priorities and programs of research are structured;
- The level of funding;
- The recognition of research strategies specific to transport (or, in the Netherlands, logistics).

An important feature of overall research programs in the U.S. and EU is the coverage of all transport including issues related to urban conditions. I presume that political jurisdictional issues play a role in funding and the conduct of research in the U.S. and EU, but the scope of support for research is across all modes and geographies. The need for research in the national interest transcends internal political divides.

Research and Innovation for Transport in the Twenty-First Century

In considering the relevance of transport research today its potential contribution to innovation is more likely to be noted than its necessity for good policy development. Why is this?

The reality of competition in transport and competition in world markets, anticipated by MacPherson, requires new approaches in transport policy and management. The first decade of this century has witnessed exceptional levels of demand uncertainty at the same time of heightened competitive pressures, especially during periods of weak demand. A result is that corporations and governments have had similar concerns about productivity and growth. This has led to a concern for innovation at all levels not seen in previous decades.[1] Three aspects of the search for innovation are considered here because of their relevance to the Review. They are: the diverse forms of innovation; the role of collaboration for innovation in transport and logistics; and the continuing challenge of innovation in Canadian transport policy.

The diverse forms of innovation: It has long been recognised that innovation can take many forms. Schumpeter, first writing over 100 years ago, recognised four general sources of

[1] T.D. Heaver, "Increased Collaborative Relationships in International Logistics: Canadian and other national and corporate examples," *Maritime Policy & Management*, available on line January 2014, journal issue forthcoming.

innovation. They are new goods, new methods of production, new markets or sources of supply, and change in organisation structures.[1] Technological innovations may play a role in each category as have computer technologies and the internet. However, innovation can be found in changed practices, for example, innovation through new collaborative relationships has been important in international logistics.

The broad base for innovation is recognised in the government's "Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation 2014."[2] The report quotes an OECD report as follows:

> Innovation is the "implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations."[3]

The role of collaboration in innovation: The importance of collaboration across sectors is recognised in Canada and elsewhere. Industry Canada states:

> To be successful in innovation, every partner in the federal science, technology and innovation (ST&I) enterprise has a role to play: businesses that embrace innovation-based strategies; post-secondary and research institutions that attract and nurture highly qualified and skilled talent; researchers who push the frontiers of knowledge; and governments that provide the support and environment in which discovery and innovation will thrive.[4]

Collaboration may take many forms. Dialogue among individuals in different types of organisation can stimulate a vibrant research environment, help identify research needs and lead to new research strategies and methods. The resources of separate organisations may be more effective when working together.

In spite of recognition of the necessary conditions for innovation, it is accepted that in general Canada lags behind in the OECD context. Seizing Canada's Moment recognises:

> … the innovative performance of Canada's firms and the productivity growth continue to lag behind competing nations. The ability to leverage Canada's strengths and address the challenges the country faces will be critical to continually seek new and better solutions for enhancing the standard of living and prosperity of all Canadians.

Collaboration is important in transport in another sense because services involve complex networks and relationships within and across logistics chains. This accounts, in part, for the regulatory and operational issues that exist and for the failures of services to operate smoothly together as evident in congestion and strikes at ports. Particularly in a network business such as

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[1] Schumpeter, J. A. 1961. *The Economic Theory of Economic Development*, Translated by R. Opie. (New York: Oxford University Press). (English translation of second edition, 1926, of Theorie der wirtschaftlichen Entwicklung; was first published 1934.)

[2] Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation 2014., accessed at http://www.ic.gc.ca/eic/site/icgc.nsf/eng/07478.html

[3] Known as the Oslo Manual, the report, *The Measurement of Scientific and Technological Activities: Proposed Guidelines for Collecting and Interpreting Technological Innovation Data*, can be found at: http://www.oecd.org/science/inno/2367580.pdf

[4] Seizing Canada's Moment, op.cit.

transport, the development of technology is only a part of the innovation challenge. Significant other challenges lie in the need for new relationships and processes. This is especially true in international logistics.

The continuing challenge of innovation in Canadian transport policy: The government's Science and Technology Strategy of 2007 started on-going initiatives to promote greater innovation. One of the components of the program was an Expert Panel which concluded in part:

> Because *Canada's productivity problem is actually a business innovation problem*, [emphasis in original] the discussion about what to do to improve productivity in Canada needs to focus on the factors that encourage, or discourage, the adoption of innovation-based business strategies. This is a complex challenge because the mix of relevant factors varies from sector to sector and requires a much broader conception of innovation than the conventional R&D centred view which, while important, is too limiting. … Public policy in respect of innovation therefore needs to be informed by a deep understanding of the factors that influence business decision makers, sector by sector, …[1]

Consistent with the sector approach, Transport Canada sponsored workshops devoted to Innovation in Transportation. They led to the recognition that identifying strategies that create an innovation culture may be more important than identifying particular products. It was easier to recognise barriers to innovation than tangible solutions. The interdependent nature of many stakeholders in transportation systems was recognised as associated with barriers limiting effective collaboration, especially among stakeholders at ports. Strong interest was expressed by firms for increased collaborative relationships in international logistics in order to improve the reliability of individual operations and the port gateways as systems.[2]

Government programs supporting research and innovation have continued to evolve but without a sector approach applied to transport or logistics as distinct from particular technologies. The 2014 strategy, yet to be unfolded in detailed programs, is aligned with earlier principles to promote excellence, focus on priorities, foster partnerships and enhances accountability and retains the pillars of people and knowledge while broadening the entrepreneurial pillar to encompass innovation. It recognises, explicitly, the importance of access to global markets. However, it treats gateways as one way routes not recognising the importance of efficient access to foreign suppliers for Canadian industries and consumers. It does not recognise the general potential for innovation in logistics to enhance business performance and the well being of Canadians.

Concluding comments on current needs for R&D and innovation in transport: The need for research in transport as a part of transport policy has expanded from its contributions to the monitoring and promotional roles of government to its role in advancing innovation in the

[1] Expert Panel on Business Innovation. Innovation and Business Strategy: Why Canada Falls Short. (Ottawa, ON: The Council of Canadian Academies), 2009, p. 11.

[2] Innovation in Transportation: Summary Report of Workshop held March 5, 2010, Vancouver, BC: Western Transportation Advisory Council.

economy. In this, universities and other research institutions play two important roles, the advancement of knowledge and the education and training of future generations.

Collaboration is an important part of innovation processes. It is accepted that relationships across businesses and research institutions are beneficial. Collaboration is also important in transport and logistics between firms in a logistics chain because services involve complex networks and relationships within and across logistics chains. The importance of these logistics relationships is one of the reasons that sector specific research initiatives are important in transport and logistics. Yet, the experience in Canada has been reduced support for non-technological transport research.

Conclusions and recommendations

I respectfully submit that the foregoing supports the following conclusions:

- Transport has not been identified as a strategic sector of the Canadian economy warranting a targeted research program as are other sectors and as is found elsewhere.
- In Canada, the level of funding for transport research has been reduced, certainly for policy-related (non-technological) research. This is contrary to the recommendation of the Panel in 2001. It is contrary to the pattern in other countries. (A consequence may be that the Committee finds itself handicapped by a lack of research results relevant to the issues it faces.)
- The need for research in the national interest transcends internal political divides.
- Research has two vital roles in the economy; informing government policies and providing a base for innovation.
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- Data are an essential base for research, yet Canada lags other countries, for example the U.S., in the provision of data.

Recommendations: It is easier to recognise the need for more research support than it is to outline a process for its allocation. I submit the following for the Committee's consideration.

- Transport should be a sector for designated research programs.
- The level of funding for transport research should be increased in a material way.
- The funding program should include allocations to the social sciences and humanities as well as to science and technology.
- The range of subjects eligible for support should include all modes and all geographies.
- The framework for funding take into account the following:
    - The identification of priority areas within transport for research to serve the national social, economic, environmental and political interests should be the

responsibility of a lead group involving representatives from business, universities and government.

- As a final part of the lead group stage, consideration should be given to a process by which the development of broad areas of research might be identified with regional hubs composed of multi-institution knowledge and expertise. For example, Gateway Logistics might warrant a hub with various actors in three or four locations. The hubs would interact in their research.
- Funds should be awarded based on evaluation of the short-term or long-term relevance of research proposals to the identified priority areas.
- Preference should be given to proposals that involve more than one university and involve industry partners.
- Evaluation of proposals can probably be performed through established SSHRC and NSERC processes but with reviewers and criteria appropriate to the priority areas.

Appendix A

Lessons for innovation in Canada from the Dutch model

This Appendix includes a brief review of the Dutch approach to research in logistics. It was prepared earlier this year for the benefit of Transport Canada following a review of relationships among participants in the Vancouver gateway.

I found that collaboration among the parties is active but that there is a lack of an ongoing resolve or mechanisms to solve problems by identifying both individual interests and system wide efficiency opportunities. When change is in the wind currently, firms think first, ‘What is this going to cost me?’ They do not think, ‘How can system efficiency be increased and how can we all benefit?’

I suggested new approaches to promote leading-edge gateway logistics innovation and to promote system-based studies of difficult logistics issues. My premise is that the findings or simply studies with a system-based view could lead stakeholders to adopt new approaches and to achieve better outcomes.

The first approach is to establish a Centre of Excellence in Gateway Logistics which would be relevant for global issues but have obvious relevance for Vancouver. The second approach is to follow the strategies followed in the Netherlands, particularly, in Rotterdam, where research is a prominent strategy to advance innovation in logistics. It raises the question of whether enough is being spent on R & D for innovation in the Vancouver gateway.

The following description of the Dutch approach to research and innovation was prepared in response to a request for more information. It provides an overview of the Dutch research

strategy. It also includes information on research in the port of Rotterdam, on the role of the Port of Rotterdam Authority and on the commitment of the universities to port and maritime research.

Introduction to the Dutch approach to innovation in logistics.

> Innovation in the Netherlands is the cornerstone for our economy and society. Looking to the future, we want to reinforce economic prosperity and welfare for the benefit of future generations. This is why we are constantly working to strengthen the Netherlands' powers of innovation and promote our knowledge economy. (Innovation in the Netherlands)

Predictably, the government of the Netherlands has selected logistics as one of nine core sectors for its targeted innovation strategy. The Dutch prime minister pointed out recently that implementation of the strategy is guided by a 'triple helix' structure of government, corporations and the research community (Rutte 2014). This approach is referred to in documents as the 'golden triangle'. The government's main role is not as a grant office, but as a network partner and enabling force advancing "Smart Logistics", although it plays an important role in funding organisations.

The programs are also expected to benefit from international collaboration on the basis that "new knowledge and its applications have little regard for national borders, and the feasibility of many projects depends on their scale. What's more, experience shows that international cooperation nearly always benefits everyone concerned..." (Rutte 2014). It was in this spirit of international cooperation that a Dutch delegation, including a representative from Dinalog, the Dutch Institute for Advanced Logistics, attended the Cargo Logistics Canada conference in Vancouver in January 2014.

Development of action plans for sectors relies on "a 'top team' composed of an innovative SME (small medium sized enterprise) entrepreneur, a scientist, a civil servant and a standard bearer for the sector. The top teams talk to businesses and scientists in order to map out the various opportunities and challenges." (Government of the Netherlands)

The top-sector policy for logistics has led to a National Innovation Program for Logistics. In 2009, funding was established for Dinalog.

> It functions as the nucleus within the network of companies, knowledge institutes, support organisations and government. Dinalog implements the National Innovation Programme in Logistics by facilitating R&D and demonstration projects, supporting the Human Capital agenda and disseminating this expertise to the industry…. This programme ensures the cohesion and focus in the chain of fundamental research, applied research and valorisation. This involves collaboration between governments, intermediary organisations and educational and research institutions such as universities, innovation and expertise platforms, sector organisations, companies involved in R&D projects and demonstration and pilot projects. (Dinalog) [1]

[1] An example of a research programme focused on multimodal transport with a container terminal can be viewed at: http://www.dinalog.nl/en/projects/r_d_projects/ultimate__efficient_multimodal/

The Dutch initiative is national. It is being undertaken in a country in which logistics services are important contributors to GDP. There are many universities with specialisations in logistics and supply chain management. Also a number of universities collaborate in the TRAIL research school in the field of transport, infrastructure and logistics and in the BETA research school in the field of operations management and logistics. However, the subject of Mr. Rutte's speech was "Innovation: a mind set and a must." As a mind set it is scalable, as evident in Rotterdam.

In its annual report 2013, the Port of Rotterdam (the Port) identifies nine core tasks, five of which relate to cooperation with partners. One of these is "Stimulating the exchange of knowledge and innovation". (Port of Rotterdam 2013) The Port has a long standing commitment to research as one base for innovation. The 2009 Annual Report states "There is no innovation without research." Its innovation strategy is introduced as follows:

> 'Together we will make Rotterdam the smartest port in the world' remains the motto of our innovation strategy. The challenges in respect of space, accessibility and sustainability are wide-ranging and demand cooperation and unconventional solutions. We are also investing, together with businesses, universities and other partners, in research and innovation as well as focusing on the modernisation of operational activities. (Port of Rotterdam 2009)

The commitment of the Port and the commitment and expertise of the universities is reflected in programmes with a number of universities but, particularly, Erasmus University and Delft University of Technology. At Erasmus, the Smart Port programme, commenced in 2010, is founded on five Port Professors across faculties. (Erasmus University 2010) Under the programme the university "…has bundled its maritime and port-related research and education in Erasmus Smart Port Rotterdam, an interfaculty centre of excellence." (Erasmus University 2014)[1] At this time, I have no details on the block finding provide to the university and the contract research undertaken. In 2012, the Port entered into a new five-year collaboration agreement with the Delft University of Technology, involving the Port Research Centre (PRC). As of December 2012 the PRC programme with the Port comprised fourteen research projects, of which six are doctorate projects.

The Port's relationship with universities is only one aspect of its commitment to innovation. In the 2013 Annual Report it states: "In 2012 we further institutionalised developments in innovation internally and externally through the establishment of an Innovation Board and the Rotterdam Mainport Innovation Forum…. The Innovation Board follows ideas from concept development, via project definition to realisation." The Forum was set up in conjunction with Deltalinqs, the industry funded organisation, "in order to actively involve the business sector in innovations. This Rotterdam Mainport Innovation Forum has four goals: facilitate exchange of knowledge, offer innovative entrepreneurs a network, break through barriers, and find applications from university research." A study of the strategic value of the port of Rotterdam concluded:

[1] It happens that this web site gives news of a recently completed PhD on "Strikes in the port of Rotterdam 1889-2010. The PowerPoint presetnation is available at http://www.erim.eur.nl/research/centres/smart-port/news/detail/3415-lunchlecture-evert-smit-the-syndicalistic-undercurrent/

> Impressive figures, [3.7% of GDP and 145,000 direct and indirect jobs created] but the importance for the Netherlands is considerably higher by taking into account the strategic importance of the [P]port of Rotterdam. For the Netherlands, being a high income country, a strategic contribution through innovation and more advanced business networks and management is the most important source for maintaining and improving its international competitiveness. (Van Den Bosch)

In a communication with me, Liesbeth Staps, the International Liaison Officer of Dinalog states that although there are formal processes guiding collaboration in the Netherlands, "it is a process that is perhaps more in our culture." (email communication) The culture is not the same in Canada or in Vancouver. The culture in all the players here needs to change before new relationships and possibly organisation structures can be established to advance innovation in gateway logistics and to promote system-based studies of difficult logistics issues.

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