



INTRODUCTION TO ISSUES AT THE CTRF 2013 CONFERENCE

Canada has always been an important trading nation. In this trading world, Canada is faced against giants such as US, EU, China, CIS, Australia and Brazil that are fiercely competitive. These countries are dismantling regulatory and other barriers to internal and external trade, investing in infrastructure and building gateways and portals to various parts of the world to ensure that the flow of trade is not only efficient but costs are as low as possible. Are we doing enough to maintain our position in this competitive world? And even though Canada is blest with an initial endowment of resources, are we maintaining our absolute and comparative advantages in what we produce and manufacture? Are we keeping up with other countries and devoting sufficient resources to remain as an important trading nation in the world, especially as our future growth and prosperity depends on our exports and imports?

In this competitive struggle to remain among the top trading countries, transportation plays a key role. It is one component in the supply chain, but is it competitive? Are various modes of transport competitive within each mode and between modes? Does our transportation system compare favourably with other trading nations? Do supporting factors (infrastructure, gateways, etc) exist to keep it competitive? To examine what we have done, what we are doing and what we are planning to do, the 2013 CTRF Conference will focus on the *North American Competitiveness in Global Trade: the Role of Transportation*.

Organization of the Proceedings and An Overview of Individual Papers

The papers in this proceedings will be organized under twelve sessions. The summaries presented hereafter provide an overview of the individual papers.

How Competitive is Canada's Freight System? National competitiveness reports rank Canada's competitiveness against other countries by systematically aggregating multiple factors that underlie the performance of all economic sectors in a country. A country's ability to successfully compete depends on its linkages with other countries. The World Bank Logistics Performance Index (LPI) is supplemented by a snapshot of selected performance indicators in nearly 130 countries, including expanded information on the time, cost, and reliability of import and export supply chains, infrastructure quality and performance of core services. The LPI is used in this paper to identify at a national level, how competitive Canada is with respect to transportation and logistics capabilities. This comparison is made with selected peer countries that compete with Canada in major markets.

Multi-Objective Speed Optimization for Heavy Good Vehicles in Interrupted Transportation Networks – Deployment of Intelligent transportation Systems (ITS) helps improve the performance of the transportation system. This study tries to deploy an optimization method that enhances network performance by providing recommended speed for Heavy Good Vehicles (HGVs) as the targeted group. The optimization will try to provide real-time recommended HGVs speed based on fuel economy in order to make the balance between time and cost criteria. By distribution and translating of the wait time into recommended HGV travel speed, the cost factors will be affected. The outcome model will try to minimize terminal queue length for HGVs by temporal approach and speed calibration.

The Productivity Performance of the Canadian Airline Industry – The intent of the study is to use financial and operational data to compute aggregate input and output quantity indices for the airline industry in Canada for the years 1988 to 2010. These indices are combined to form partial productivity and total factor

productivity estimates. Preliminary results show that labour productivity for the industry has grown, energy productivity has also improved, and capital productivity has been subpar and highly variable. The total factor productivity of this sector has increased at a much faster rate than the inputs used. The author then compares the estimates with those of other agencies.

Factors influencing airline passenger fares in Canada – There have been many changes in the Canadian passenger airline industry since 1987: hub-and-spoke networks, the use of computer reservation systems, discount fares, reward programs, etc. This study investigates factors that have influenced base airfares from 1983 to 2010. Using a panel data approach, the authors find that market structure, measured by share and by concentration, is associated with variations in airfares. Although each market structure factor has a relatively small impact, together they help to explain some of the variation in base airfares. There appears to be no substantial “hub airport” effect in the Canada airline industry.

Cost of Taking Off: An Empirical Study on the Determinants of Air Fares in Canada – Canadians are, on average, paying more to fly an equivalent distance than passengers in other countries. Currently the majority of research on the determinants of air fares has focused on the European and American markets. To see how the Canadian market compares to the research currently available, this paper uses future posted air fares to examine the impact from a variety of market characteristics on Canadian air fares. The characteristics are broken down into three subcategories: route (distance, and length of flight), competition (number of competitors, number of flights, etc) and city (population, airport services, etc). The paper looks at the industry as a whole as well as exploring the differences between four airlines.

Cargo Airships versus All-weather Roads: A Cost Comparison – The high cost of living in remote northern communities is well documented. Airships may be able to reduce the cost of living for residents of remote communities by providing year-round cargo transportation services at lower cost. More frequent service would also reduce the need to store large inventories and eliminate stock-out costs, while providing residents with items that would otherwise be unavailable until the ice roads reopen. This article evaluates whether or not a new generation of airships can provide improved transportation services to customers in Northern Ontario. Financial models can be used to determine the break-even volumes that are required for airship operations at varying haul distances. Direct operating costs can be calculated together with Fixed Costs of the airship operation.

Ferries and the Economy of South West Nova Scotia – Ferries have served South West Nova Scotia for over 200 years and have become embedded in the regional economy. While the Yarmouth link with the New England States was an important tourism connection, the Digby to Saint John route has always been a major trade link between the region, the USA, central Canada and world markets. This paper briefly reviews the history of the two services, but will focus on the role of the Digby service and trade links that it facilitates for the fresh fish and seafood, mink and aquaculture businesses in the region.

Assessing the Impacts of a Major Highway Infrastructure Project: The Windsor–Essex Parkway – Simulation modeling in transportation has been extensively used to forecast the impacts of major infrastructure transportation projects. This paper reports on a study aimed at forecasting and simulating the impacts of one such infrastructure, the Windsor-Essex Parkway. The simulation results were based on predicting growth in population, employment and travel demand for the period 2006–2031. The simulation results suggest that the new infrastructure will improve the performance and level of service of the transportation system when a balanced cross-border scenario is involved.

Innovations in Travel Demand Forecasting for Land-Based Ports of Entry – This paper addresses demand forecasting methodologies and is a precursor to the level of service (LOS) framework paper presented at this conference. Average annual daily traffic projections (AADT and AADTT) are inadequate for determining peaking patterns and assessing future infrastructure requirements at port of entry (POEs). A new approach for forecasting vehicle demand at POEs was required to more effectively assess demand-capacity issues. Using historical arrival data, custom expansion factors were developed for forecast algorithms that replicated POE peaking characteristics and converted annual forecasts for vehicle categories to meaningful hourly arrival rates.

A Level of Service Framework for Evaluating Land-Based Port of Entry Performance – In response to methodology gaps (to assess delay and congestion implications of port improvement scenarios), a Level of

Service (LOS) framework and analysis was developed for the Pembina–Emerson POE (ports of entry) Study (2012). Combining the LOS framework (a policy-level approach) with 30th highest hour design (an engineering infrastructure design approach) provides transportation policy makers, planners and engineers with greater flexibility to assess infrastructure design and phasing considerations as well as outputs that support benefit/cost analysis for a proposed port improvement concept.

Freight Corridors and Gateways: Development Approach and Evaluation Criteria Comparison in North America and the European Union – Freight transportation at the regional level is a key element to improve economic competitiveness. The European Union (EU) recognized that for the common European market to function smoothly, an integrated free movement transportation system was needed and developed the Trans-European Transport Network (TEN-T). Canada has a fully developed framework for gateways and corridors, under the National Policy Framework for Strategic Gateways and Trade Corridors (National Gateway Framework), which acts as an overarching policy framework. Mexico and US are developing their own. The paper analyzes the overall approach that these various programs used, and identify methodologies and tools used to categorize and prioritize corridors and projects within corridors.

Determining Motor Carrier Accountability for Crashes in the United States – States report crashes of large trucks and buses each year to the Federal Motor Carrier Safety Administration (FMCSA) of the US Department of Transportation. These crashes are entered into the records of motor carriers responsible for the operation of the trucks or buses. All crashes currently count equally against motor carriers in safety ratings that FMCSA assigns to carriers. FMCSA conducted a test to see if “accountability” could be determined for all crashes based on coding of the police accident reports (PARs). If successful, FMCSA could weight crashes so motor carriers with accountable crashes would receive higher unsafe scores. The major part of the test involved comparing the coding. Coding for the crashes from just the PARs agreed with the coding from the Large Truck Crash Causation Study (LTCCS) in 93 percent of the crashes.

Truck-Only lanes on Urban Arterials: A Value of Time Approach – This study evaluates the applicability of truck-only lanes (TOL) in improving mobility on arterial roads. Overall demand and truck proportions were then systematically varied and generalized-cost user equilibrium assignment was performed for each demand scenario. It was concluded that implementing a TOL when truck proportions are not sufficiently high, results in significantly higher travel costs than if all lanes are left as mixed-use lanes. Further, while truck times improve slightly with the implementation of a TOL, auto travel times increase significantly. Overall, their analysis concludes that TOL on arterial roadways appear to be marginally economically justifiable.

A Structural Equation Model of Commercial Vehicle Ownership – This research develops a vehicle ownership model of small/medium sized companies using a structural equation modelling approach. The model was developed using a shipper-based survey of establishments in the Greater Toronto and Hamilton area. The survey data included establishment attributes, freight supply and demand information and land use attributes. Ownership of three vehicle types were simultaneously estimated. The most important variables to predict vehicle fleet ownership are the industrial classification, the annual values of the provided services and the inbound/outbound shipments, and the land use type of the census tract where the establishments are located.

Implications for Traffic Sign Management Given Proposed Minimum Retroreflectivity Guidelines for Canada – In cooperation with the New Brunswick Department of Transportation and Infrastructure (NBDTI), the UNB Transportation Group conducted a study to estimate the total number in the population of traffic signs that fail to meet the minimum standards of retro-reflectivity (a key determinant of the effectiveness of road signs) and to estimate the cost of replacing those signs. Analysis revealed factors having statistically significant influence on retro-reflectivity include sign age, location (District), road class (where sign was inventoried) and the visual condition rating given in the field. The implication is that a sign management strategy needs to be adopted to ensure deficient signs get replaced and a better understanding of deterioration and life expectancy is gained.

Prediction of Inter-Provincial Trade Flow Traffic to Support Multi-Criteria Pavement Management – Allocation of resources for maintenance and rehabilitation of highways is typically done on the sole basis of condition without looking at other factors. Condition is then used as a proxy for performance and based on historical observations of freight traffic. This traditional approach neglects any relationship between

passenger cars and highway infrastructure and the dynamic nature of land development and traffic growth. This study integrates spatial regional economics, land use development and socio-economic characteristics to transportation. It develops a multi-criteria pavement management system for a regional road network in Atlantic Canada. It also makes other predictions.

Marine Carriers' Business Model and Development in the Canadian Arctic – It has been shown that the growth of seaborne goods in the Canadian Arctic is mainly related to community resupply. Relatively less attention is paid to organising this market niche. This seafight's particularity is that it is performed with almost no port infrastructures. To improve it, two development models have been proposed: light infrastructures to support unloading at anchorage and construction of deep-water ports. The impact of both models on marine carriers is then examined. Results suggest that light infrastructures are best suited to actual.

Containerization of Bulk Products: The Case of Grain in Canada – The movement of both domestic and international freight in containers has grown rapidly in recent years. Many more types of freight are now containerized. This paper contends that the volume of Canadian product presently moving in a bulk mode that is "convertible" to a containerized mode is very limited. In demonstrating this point, five primary areas of influence will be examined and discussed: railway efficiency; container line efficiency; port property utilization; country and port terminal asset investments and what the impact of converting large volumes would have on the overall logistics system.

Containerization of Grain – Theory and Practice – The potential forces that would lead toward the containerization of grain were set forth in 1998. It is useful to re-examine whether or not the theory set forth 15 years ago has been observed in practice, and where the trends are leading. The first part of the paper sets out the logistical concepts that supported the hypothesis that grain would experience a modal shift from bulk transport to intermodal ISO containers. This is followed by a brief description of the changes in technology, demand and regulation that are propelling the containerization of grain. The penultimate section examines the evidence that a tipping point is approaching. The paper concludes with a review of the challenges that face the status quo and the opportunities for farmers to improve their margins in the grain market.

Understanding "Reasonableness" in Rail Level-of-Service Disputes – This paper reports on work undertaken for the Canadian Transportation Agency, to identify and synthesize the various factors and supporting information considered by the Agency in rendering decisions in rail level-of-service (LOS) disputes (sections 113-115 of the *Canada Transportation Act*). In rendering its decisions in this matter, the Agency applies the long-accepted criterion of "reasonableness" as established by the Supreme Court of Canada. This paper elucidates how "reasonableness" has been applied in the context of rail LOS disputes based on past cases.

Railroads, Adaptability, Competition and the Shuttle Train (or Food, Crude and the Railroads) – Adaptability is not a term used to describe railroads and their infrastructure. But, the last 20 years has seen change in how railroads ship two commodities: grain and oil. Grain has been one of the backbone commodities of most North American Railroads. Recent adaptations in the practice of hauling grain have resulted in marked changes to the rail environment. There are new "prairie skyscrapers" replacing traditional grain elevators on the Great Plains. This has rewritten the railroad map and operational procedure. Officials noted that the efficiencies gained in shipping of grain could translate to the shipping of oil. Not surprisingly, oil terminals have sprung up rapidly.

The Disclosure of Rail Carrier Costing Information – Canadian rail carriers, and their advocacy groups, claim that Canadian rail freight rates are among the lowest in the world – providing little evidence. In Canada, cost transparency is sorely lacking. A proper assessment of Canadian carrier competitiveness requires disclosure of cost inputs and their relationship to a carrier's total costs (variable and constant). Access to accurate rail carrier costing data is critical to large segments of Canadian traffic, including traffic that is subject to the carriers' maximum revenue entitlement for the movement of western grain, as well as traffic that is subject to interswitching, a competitive line rate, or final offer arbitration. Keeping this information confidential serves to preserve or enhance market power, particularly among captive shippers where the information is the most relevant.

Some Observations on Illegal U-Turn Activity – Motor vehicle accidents have a financial cost together with human cost and can contribute to congestion. At areas where accidents have taken place, preventive measures in the form of prohibiting certain actions can be implemented. Despite this, drivers can be seen to continue the conduct of prohibited actions. Assuming that drivers have reasons for their behaviour, observations were taken at an intersection where U-turns were not allowed. These observations were made on different days and in different traffic situations. This provides the author for reason of some of the observed behaviour.

Micro-Simulation of GAP Acceptance by Turning Vehicles at a Signalized Intersection in a University Campus – Vehicle turnings at intersections raises concern because of numerous accidents. Micro-simulation of vehicle's turning behavior at a signalized intersection is complicated because of the complex interrelationship among the characteristics of drivers, pedestrians and cyclists. This study estimates left and right-turning vehicle's critical gap acceptance at one intersection in the George Williams Campus of Concordia University (Montreal) by a stochastic distribution model. This study also develops a three-layered Back-Propagation Neural Networks (BPN) model.

Sequential Toll Implementation to Guide Network Flow Evolution under Bounded Rationality – Travelers are perfectly rational but do not always choose the shortest paths if the travel time saving offered by switching to the shortest path is not big enough, which gives rise to a boundedly rational user equilibrium (BRUE) traffic assignment, which is not always a unique solution. As a consequence of this nonuniqueness, target flow pattern is difficult to estimate together with any network design or planning strategies. In this paper, based on two assumptions on travelers' route choice behaviors which are consistent with boundedly rational user equilibrium (BRUE), they design toll sequence operations which can induce the network flow pattern to evolve towards the traditional Wardrop user equilibrium flow pattern. This solves the nonuniqueness problem of BRUE and re-establishes the effectiveness of link tolls in realizing any target link flow pattern.

Allocating Carbon Emissions from Oceangoing Vessels – In the context of the Asia-Pacific Gateway Initiative, Transport Canada has launched a new research initiative called the Carbon Footprint Project. This project seeks to measure the GHG emissions intensity of the Asia-Pacific gateway for inbound container movements from Asia to west coast Canadian ports. This paper discusses the allocation of emissions from ocean-going vessels on the above routes. It has three sections: the context of the project; the allocation problem; and solution to the allocation problem. The paper concludes with a brief discussion of the project implementation strategy.

The St Lawrence Seaway: An Efficient but Rarely Used Route – Given the straight line nature of a route (Rotterdam-Anwerp-US Midwest) and other cost effective factors one expects a large volume of international commerce to flow along the Seaway between Europe and the Midwest. Surprisingly, almost no international commerce flows along this route. Instead, commerce between Europe and the Midwest utilizes US East Coast Ports combined with overland rail/truck movements. Rail and truck are higher cost, higher emissions producing, and lower fuel efficiency modes of transport. They are less "green" and often require an additional handling. The paper discusses factors that contribute to the St Lawrence Seaway being virtually shunned. Why do shippers avoid the shortest route?

Climate Change, Adaptation and Institutions: A Case Study of the Port of San Diego – Scientific evidence has pushed the issue of climate change to the forefront of the international agenda, due to the threat it poses to human development, including ports. However, the seriousness of such impacts, and the means to adapt to such challenges, is still ambiguous. There is little investigation on how ports would be affected, and effective ways to tackle such challenges. Using institutional theory and the Climate Mitigation and Adaptation Plan (CMAP) adopted by the port of San Diego, the authors investigate whether climate change has triggered a paradigm shift in the process of port planning, and how the institutional systems affect such an evolutionary process. The contribution of this paper lies in explaining how and why ports develop adaptive plans to challenges posed by exogenous conditions.

Étude Multimodale sur le Transport des Marchandises au Québec en Appui aux Plans Territoriaux de Mobilité Durable – En août 2011, le ministère des Transports du Québec a entrepris la réalisation d'une étude multimodale sur le transport des marchandises afin de supporter ses unités territoriales dans l'élaboration de Plans territoriaux de mobilité durable. Cette étude a permis de brosser un portrait

multimodal intéressant du transport des marchandises au Québec qui comprenait un aperçu des volumes de marchandises transportés sur les réseaux de transport interurbains, du niveau de sollicitation des infrastructures ainsi que des principales problématiques qui touchent les mouvements de marchandises. L'étude prévisionnelle sur les mouvements de biens à l'échelle nationale réalisée dans la cadre de la Porte continentale et du Corridor de commerce Ontario-Québec a été utilisée afin d'estimer la demande future et d'établir le portrait du transport multimodal des marchandises pour 2026. L'évaluation des potentiels d'intermodalité représente cependant l'élément clé de cette étude puisqu'elle repose sur une méthodologie quantitative qui tente d'identifier les potentiels d'intermodalité inexploités en analysant les déplacements de camions selon le type et le volume de marchandises, la distance parcourue, l'origine et la destination, permettant ainsi de déterminer quels sont les mouvements routiers qui pourraient bénéficier de solutions intermodales.

Crude Oil by Rail: Part I and Part II – Potential for the Movement of Alberta Oil Sands Crude Oil and Related Products by Canadian Railways – There is very significant current interest in the enormous potential in Canada from the future development of energy sources such as the Alberta oil sands and shale oil and gas reserves. The energy and related products from these sources are traditionally transported predominantly by pipeline. While the controversies of building new pipelines get resolved, there is a potential for the movement of selected energy and related products by Canadian railways. This paper will provide a broad overview of these issues together with the railways current volume and its future capacity.

Online Vehicle Auctions: eBay, AutoTrader, Craigslist and Beyond – According to the *Atlanta Journal-Constitution* (2 January 2013), 60 percent of all auto (including light trucks) sales in the State of Georgia are private sales. Many of these transactions are facilitated or executed by online vehicle auction sites such as eBay Motors which began as an online auction site with some vehicles listed for sale at fixed or “buy-it-now” pricing. AutoTrader.com and eBayMotors.com combined forces to create an Internet site for consumer and dealer transactions and to make the automobile market more efficient. The paper will portray the major participants in online vehicle sales. Some of these Internet sites cater to specific buyers. For the individual desiring to sell their vehicles to the highest bidder, eBay has almost no competition.

Vehicle Type Choice and Demographic Relationships: An Application to the Windsor Region, Ontario, Canada – The factors that influence vehicle type choice have been of interest to market researchers and transport policy makers. This study examines demographic variables to determine what factors are most influential in vehicle type choice. Using the Windsor–Essex area in Ontario, as a case study, consumer behavior for the choice of small and large domestic and imported vehicles is analyzed. The results suggest that age, education, income, ethnicity, gender and profession influence the type of chosen vehicle. Fuel economy plays a very important role in choice of imported vs. domestic vehicles.

Obesity and Urban Transport – Obesity is of growing concern in terms of its impact on health care and other social costs. A growing literature is exploring the economic theory of obesity and testing empirical hypotheses. Canadian evidence demonstrates that obesity rates are correlated with: daily fruit and vegetable consumption, socio-economic status, marital status, leisure time physical activity, transit ridership and active transport share of commuting and urban sprawl. Of particular interest to transportation policy are the well-documented causal and consequential relationships between obesity and transportation policy variables (e.g. price of gasoline, transport infrastructure, transit ridership and active transport, time spent in a private vehicle, fuel economy and Greenhouse Gas emissions). The paper presents a set of facts that characterize Canadian society.