

1. INTRODUCTION

The purpose of this project is manifold. The first purpose of the project is to publicize among relevant regional, provincial and federal transportation planning authorities the findings of the carrier choice survey of the Quebec City-Windsor Corridor. The second purpose of the project is to create a reference document for freight planners, which offers information on sources of freight data in Canada and methods to analyse freight movements for improved logistics management.

The third purpose of the project is to design and execute a survey of freight/transport planners to determine the state of freight planning practice in Canada. The survey is likely to help identify current capabilities and capacities in freight planning across various jurisdictions (federal, provincial, and municipal) and among other stakeholders (air and seaport operators). Analysis and results from this survey allow us to develop benchmarks for current freight planning practices and may assist in devising strategies to improve freight planning and logistics management in Canada.

1.1. BACKGROUND

Transportation research has primarily focused on urban passenger transportation issues (e.g. commuting time, pollution, etc.) and solutions to these problems. It is only relatively recently that the contribution of freight transportation to transportation problems more generally has begun to be recognized. That freight transportation is increasing dramatically and is expected to increase into the foreseeable future has become a cause of concern in terms of its effect on entire transportation systems.

This is not to say that freight traffic has been ignored by transportation and statistical authorities. In fact, a great deal of effort in many jurisdictions has been focused on trying to develop better information about freight transportation in Canada. These data collection efforts fall into two main categories. The first category includes surveys that collect information on freight operating fleets. The best example of this is the Canadian Vehicle Survey that collects information relating to the characteristics of the operating fleet as well as its use.

The second category of data collection considers what freight is moving and where. This is particularly true at the federal and provincial levels. The aggregated results from the freight surveys along with aggregated information from the *Railway Carloading Survey* provide information on land-

based freight transportation used in Transport Canada's annual report Transportation in Canada. Provincial governments have also invested in collecting freight data through their participation in National Roadside Surveys.

While both of these categories of freight information are required for transport planning, these initiatives focus on the end result of freight transportation – namely what is being moved where and by what mode of transportation. Lacking from these initiatives are attempts to understand the behavioural underpinnings of these transportation outcomes.

Using passenger transportation as an analogy, this would amount to undertaking data collection that included only information on passenger flows – the number of people driving or taking public transit, etc. – without trying to understand the factors that contribute to passenger transportation demand. This, however, would be unheard of in passenger transportation analysis, since understanding the behavioural underpinnings of passenger demand has been fundamental to passenger transportation research since its beginnings.

Therefore this project strives to link the behavioural underpinnings of freight transportation decision makers (shippers and carriers) and freight transportation flows and to disseminate this information to regional, provincial and federal transportation planners. Understanding these underpinnings is crucial to understanding future freight transportation flows, how they will integrate with passenger flows, and what this implies for transportation infrastructure.

1.2. METHODOLOGY

Being able to understand and disseminate information about the behavioural underpinnings of freight transportation demand requires at least three stages. The collection of data that are able to provide insight into these underpinnings; appropriate analysis of the data; and a method by which to communicate the findings.

One of the main reasons that the link between behavioural underpinnings has until recently been relatively unexplored is the difficulty in obtaining the necessary information. Understanding the behavioural underpinnings of freight transportation demand amounts to understanding shipper preferences for transportation services. Understanding these preferences requires understanding

how shippers make their choices of carriers. This type of information is normally collected through surveys.

The problem, however, is that it can be difficult to get this information. The primary reason for this is that the transportation industry is very competitive. Moreover, freight data are generally private and companies can be reluctant to provide information to researchers that they think might compromise their competitive position. As a result, asking shippers about decisions they actually make (or asking them about their Revealed Preferences) can be very difficult.

One method by which these challenges have been overcome is through the use of Stated Choice (or Stated Preference) methods. Whereas revealed preference techniques ask respondents about their actual choices, Stated Choice techniques involve asking respondents to choose between hypothetical (albeit realistic) alternatives, designed to simulate the actual choice environment. The benefit of the Stated Choice approach is that it can overcome some of the drawbacks of revealed preference techniques.

In particular, the fact that respondents make choices between alternatives for which information has been provided means that the respondent does not have to reveal any information of a competitive nature that might discourage participation in the survey.

It goes without saying that the development of Stated Preference datasets, however, is quite onerous. Luckily, this project will take advantage of the fact that such a dataset has recently been developed, and is now available to be used to understand the behavioural underpinnings of freight transportation demand. In fact, this dataset was developed by the proponents of this project.

The dataset to be used in this project comes from a Stated Preference survey of shippers in the Quebec City to Windsor Corridor. This survey was partially funded by Transport Canada, Quebec Ministry of Transportation, Railway Association of Canada, and McGill University. The survey obtained responses from close to 400 shippers (manufacturers, wholesalers, retailers and third party logistics companies (3PLs)) in this important corridor about their choice of carriers. It produced a very rich data set with over 7,000 shipper choices of carriers. The dataset includes a great deal of information on the shippers themselves, the characteristics of the carriers chosen, as well as shipment types for which these choices were made. Of particular importance, the survey was designed explicitly to understand shipper preferences for the use of rail for the transport of their

shipments. As a result, this project analysed this dataset and is now disseminating results of this analysis in a format that can be readily used by transportation planners.

The analysis of the data ranges from the relatively straightforward to the somewhat more analytically complicated. It includes basic analyses of the results including the number of respondents, the number of responses, as well as the number of responses of different types (shipments going by truck or by rail). It further includes an analysis of the types of shipments that were considered, the overall sample population and how the realized sample compared with the population.

The analysis includes the number rail vs. road shipments tabulated across different response subsets, i.e. by shipment type (high value vs. low value shipments, fragile vs. non-fragile, etc.), as well as by shipper type (e.g. 3PL vs. manufacturer). The idea is to understand the effect that these different factors have on carrier choice, and in particular on the likelihood that rail is chosen as a shipping option. Apart from providing information on the factors that affect carrier choice, these cross-tabulations could be used from a planning perspective to develop estimates for the proportion of shipments likely to be shipped by different modes.

We also present a more involved econometric discrete choice analysis. This analysis involves the development of a series of econometric models that predict freight mode share for intercity and interregional freight movements. This analysis should be seen as an extension and more refined version of the results presented in the cross-tabulation analyses. As with the cross-tabulations, the idea is to produce models that could be used by transportation planners to estimate freight mode share between cities and regions of the country. The overall purpose of this is to allow planners to estimate infrastructure requirements for future transportation demand.

The most important aspect of this project is the dissemination stage. This dataset and the resulting analysis are only useful to the extent that they are actually used by planners and decision makers. As a result, all of this analysis has been made to be accessible, easily interpreted and its resulting models easily applied.

1.2.1. SURVEY OF FREIGHT PLANNING STATUS QUO IN CANADA

The survey of freight planning status quo solicited the following information from the planning authorities:

1. Across various jurisdictions (i.e., federal, provincial, municipal, regional, and municipal) and other stakeholders (air- and seaport operators) what are the planning mandates enjoyed by the planners vis-à-vis freight and logistics?
2. What is the status quo of freight planning from an operational point of view across various jurisdictions and stakeholders?
3. What is the nature and scope of the short- and long-term decision-making stipulated in the freight planning mandates across various jurisdictions and stakeholders?
4. Given the mandates, what is the capacity (human resources, data, expertise, software, funding) to fulfill the freight planning mandates across various jurisdictions and stakeholders?

The results from this survey are discussed in detail in Chapter 2.

1.3. STRATEGY

The results of the project are being disseminated in three different forms: through the publication of a Freight and Logistics Management Manual, through workshops, and over the internet through a project web page.

1.3.1. THE FREIGHT AND LOGISTICS MANAGEMENT MANUAL

The manual includes five distinct sections. The first section documents the status quo in freight planning and logistics management in Canada. We present results from a survey of freight planning authorities across Canada. The survey was conducted in fall 2007.

The second section includes a description of current sources of freight data in Canada. The purpose of this section is to familiarize planners with currently available data, as well as the different approaches that freight planning authorities have used in developing and collecting data.

The section also focuses on the limitations with data relative to the needs for planners in understanding the underlying behavioural factors influencing overall freight transportation demand.

The third section of the manual focuses on the underlying behavioural factors affecting freight demand. This includes a description and review of research on the underlying behavioural factors, and in particular, literature investigating freight mode choice. It includes information on analytical techniques used to estimate freight mode choice, ranging from methods such as cross-tabulation to discrete choice econometric methods. It further discusses the uses of the different techniques, as well as their advantages and disadvantages. Emphasis is given to techniques used in discrete choice methods.

The fourth section is intended to serve as a guide for how to apply discrete choice methods applicable to freight transportation modeling. It begins with a description of the relative merits of stated and revealed preference data. It continues with a description of the different stages required in the development and analysis of stated and revealed preference surveys.

The fifth section presents the analysis of the survey of shippers and carriers in the Quebec City - Windsor corridor. As a result, the purpose of the previous sections is to provide enough information for readers to understand and be able to apply the results of the survey. The analysis of results from the shippers and carriers survey will help planners understand the demand for freight transportation and methods to analyze the freight demand for efficient planning of transport infrastructure to facilitate smooth movement of goods across terminals and along the trade routes.

1.3.2. FREIGHT PLANNING WORKSHOPS

The project team is holding workshops for wide distribution of the manual and training of transportation planners and infrastructure specialists. This outreach component will take the form of one-day workshops. The purpose of the workshops is to publicize the existence of the manual, but also to educate planners about the contents of the manual and the results of the survey. Naturally, the idea is that the manual can be used by planners for their future planning decisions.

The workshops are aimed at freight transportation planners and infrastructure specialists from large urban regions, provinces and the federal government. The reason for the focus on these

stakeholders is the fact that the survey considers primarily intercity and interregional freight, combined with the fact that the most acute freight transportation infrastructure challenges are found in large urban centres.

As such, six workshops are planned to take place during April and May 2008. Workshops will be held in Vancouver, Calgary, Toronto, Ottawa, Montreal, and Halifax.

Planners from regional planning authorities (e.g. the Greater Vancouver Regional District), provincial ministries of transportation and relevant regional representatives of the federal government have been invited to the workshops.

1.3.2.1. WORKSHOP SCHEDULE

<i>City</i>	<i>Date</i>
Vancouver	Tuesday April 22, 2008
Calgary	Friday April 25, 2008
Toronto	Tuesday April 29, 2008
Montreal	Tuesday May 6, 2008
Ottawa	Thursday May 8, 2008
Halifax	Tuesday, May 27, 2008

1.3.3. WEBSITE

In order to ensure ready access to the manual, as well as to publicize the importance of behavioural underpinnings of freight transportation demand, a website has been created for the project (<http://logistics.regionomics.com>). The website contains the following information. First, it provides a description of the project, what its goals were and how the entire project was undertaken. It includes a description and listing of the workshops. Second, it contains a synopsis of the workshops, which includes a description of the main lessons learned from the workshops. In particular, it will include a report on the issues that planners felt they needed to know the most about, as well as how the manual itself could be improved. Finally, it will include a revised version of the manual incorporating suggested changes received from the participants of the workshops.

1.4. PROJECT TEAM

The project team included the following individuals:

Name	Title	Association
Murtaza Haider, Ph.D.	Lead investigator	Regionomics Inc./Ryerson University
Dr. Gordon Ewing	Co-investigator	McGill University
Dr. Zachary Patterson	Co-investigator	EPFL, Lausanne
Amira Sadek	Research Associate	Regionomics Inc.
Lindsay Lalonde	Research Associate	Regionomics Inc./Ryerson University
Derick Spenard	Research Associate	Ryerson University
Christopher Livett	Research Associate	Ryerson University