Seven Supply Chain Beliefs Tested: Results of a Study of Shippers

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Introduction

As a trade and consumer dependent economy, the ability to transport products domestically and internationally is of vital importance to Canada. This ability is affected by conditions internal and external to the transportation industry. For example, transportation equipment availability is an internal factor, and border crossing and customs restrictions are external factors.

Using the results of a recent study of Manitoba shippers, this paper explores seven commonly held beliefs about transportation.

Methodology

The underlying study[3] for this report considered four groupings of shippers in Manitoba: primary industries, manufacturers, retailers and wholesalers. The study focused on four broad areas:

- Barriers and issues affecting the ability of shippers to move Manitoba-based goods to market;
- Barriers and issues affecting Manitoba industries that import goods from other markets;
- Changes in trade patterns; and
- Critical factors affecting current and projected inbound and outbound movements.

To gather the views of shippers in each sector on these issues, two research tools were used. The first was a survey sent to shippers who agreed to participate in the study. The second, using a standardized

interview framework, was in-person interviews with larger shippers in the province.

The population included 3,505 firms: 45 considered to be in primary industries, 871 manufacturers, 1,060 wholesalers, and 1,529 retailers. Prior to mail out, these firms were contacted by telephone regarding their willingness to participate. A total of 910 firms; including 197 manufacturers, 397 retailers, and 313 wholesalers; agreed to participate. As well, three primary industry firms were contacted, and all three firms agreed to complete a survey.

Participants mailed their completed surveys back to the University of Manitoba Transport Institute for review, coding, data entry, and analysis. In total, 94 firms returned surveys, representing 2.7 percent of the overall population. The effective response rate to the mail survey was 10.3 percent (94/910). The researchers speculate that length of the questionnaire (15 pages) contributed to this relatively low response rate to a survey of pre-qualified recipients.

To better ensure representative results from the data, weighting was undertaken to restore the distribution of a sample to reflect that of the target population. In essence, weighting survey data involves relating what has been collected in terms of total surveys against the desired number of survey responses from the total sample. This produces an "actual:desired" ratio that compensates for disproportionate response rates. The results presented in this paper are based on the weighted data.

In addition to the mail survey, 50 of the largest shippers in Manitoba, based on sales revenue and number of employees, were invited for interviews. Nineteen of these firms agreed to in-person interviews. This data added depth to the results of the mail survey.

Profile of the Database

The results reflect 24 manufacturing firms. Goods produced by these firms include, paper, printing, plastics and rubber, food, chemicals, wood products, fabricated metal, machinery and transportation

equipment. There were 42 retailers in the sample ranging from food and beverage stores to home furniture stores. The wholesaler group consisted of firms selling building materials, machinery and equipment, personal and household goods, farm products, food, beverage and tobacco, motor vehicle parts, and miscellaneous products. Table 1 shows the distribution of firms in the data set.

Table 1 – Industrial Distribution of Sample (Weighted)

Type of Firm	Total		Winnipeg		Rural	
	No.[i]	%	No.	%	No.	%
Manufacturer	24	25.4	16	66.7	8	33.3
Retailer	42	44.7	20	47.6	21	52.4
Wholesaler	29	29.9	21	72.4	8	27.6
Total	95	100.0	57	60.6	37	39.4

[i]This column adds up to 95 due to data weighting and rounding.

Two-thirds of the manufacturers, 72 percent of the wholesalers, and nearly half of the retailers were located in Winnipeg. In terms of firm size, the sample reflected a mix of small, medium and large firms (see Table 2).

Table 2 – Size of Firms

Sales revenue ($000)	No.	%	Employees in Manitoba	No.	%
0 to 500	31	33	1 to 5	45	47.9
501 to 8,000	31	33	6 to 30	30	31.9
Over 8,000	21	22	31 or more	18	19.1
Don't know	11	12	Don't know	1	1.1
Total	94	100.0	Total	94	100.0

With sales revenue as an indicator of size, more than half the sample was small and medium-sized firms ($\leq$ $8 mil.). Using number of full time employees as an indicator of size, the majority of the sample was small and medium-sized firms ($\leq$ 30 employees).

The firms that agreed to in-person interviews are profiled by industry type in Table 3. Most of these firms were medium to large sized.

Table 3 – Interview Firms by Industry Type

Type of Firm	Number
Food processing	4
Forestry	2
Aerospace	2
Pharmaceutical	2
Clothing	2
Wholesale	2
Vehicle manufacturing	1
Farm equipment manufacturing	1
Misc. machinery manufacturing	1
Mining	1
Furniture manufacturing	1
Total	19

Seven Supply Chain Beliefs

The seven beliefs tested using data from the survey are as follows:

- Delays at the Canada/U.S. border are a problem;
- Knowledge of U.S. border regulations is adequate;
- Transportation/logistics service has improved;
- Shippers use supply chain intermediaries extensively;
- There is a container shortage;

- Shippers are primarily concerned with rates; and
- Supply chain risk is rising.

The remainder of this analysis will discuss each belief, and provide an assessment based on the outcome of the Manitoba shipper study.

Delays at the Border between Canada and the U.S. are a Problem

Several studies have suggested border delays are an issue. In its 2004 survey of exporters, the Fraser Institute found that "most sectors reported increased problems with border delays, perhaps because of ongoing efforts to strengthen security"[4]. A study by Leger Marketing for Fedex Canada suggested that most exporters have shipments held up at the Canada U.S. border.[5]

In this study, two questions for inbound and outbound shipments addressed this issue. While the first asked about importance of "border security clearance speed," the second asked about the quality or competence of border security speed. Respondents were asked to rate border crossing speed very important (4), somewhat important (3), not very important (2), not important at all (1), or not applicable. Respondents were asked to rate quality or competence excellent (5), good (4), average (3), poor (2), or very poor (1).

The average importance rating of border crossing speed, for the 44 cases in which it was applicable, was 3.15; indicating it was somewhat important to respondents. The average quality or competence rating of border crossing speed was 3.64, a rating between average and good. For inbound flows and outbound flows, average ratings were similar, at 3.66 and 3.62, respectively.

A specific question about the border was not included in the in-person interviews. However an opportunity was provided to describe "how well the transportation system is serving your business, and what problems you are finding?" Only two of the 19 interviewees suggested the border was an issue in response to this question. Other interviewees suggested that it may have been a problem when the

bulk of the new U.S. regulations came into effect; however, once everyone in their chain understood the rules they adapted and goods tend to flow smoothly today.

Knowledge of U.S. Border Regulations is Adequate

On the survey respondents were asked to rate their familiarity with various U.S. border programs as excellent (5), very good (4), average (3), poor (2), or very poor (1). The programs were:

- OHAN: Advanced Electronic Presentation of Cargo: One-hour advance notice;
- PAPS: Advanced Electronic Presentation of Cargo: Selectivity Pre Arrival Processing System;
- FAST: Free and Secure Trade Program;
- CAFES: Customs Automated Forms Entry System;
- C-TPAT: Customs Trade Partnership Against Terrorism;
- NCAP: Advanced Electronic Presentation of Cargo: National Customs Automation System; and
- BRASS: Border Release and Advance Screening Program.

About 30 respondents provided information related to this question. Average ratings ranged from 2.56 for OHAN to 1.75 for BRASS. Overall ratings were between very poor and average. Manufacturers' ratings were higher than the overall mean, ranging from 3.25 for OHAN to 1.75 for BRASS. Overall the knowledge of these programs is quite weak.

These programs were not covered in the in-person interviews.

Shipping Service has Improved

The survey asked for an overall assessment of transportation service; using a range of excellent (5), good (4), average (3), poor (2) or very poor (1); in 2000 versus 2005, for inbound and outbound goods. With respect to inbound movements, 64 percent of respondents rated service as either good or excellent in 2005 versus 57 percent in 2000. Similarly, for outbound shipments, transportation improved, with 64

percent providing an overall assessment of good or excellent in 2005 versus 52 percent in 2000.

It appears the driver of these improved service levels has been the trucking industry. When asked to rate service levels from excellent (5) to very poor (1), the mean for truck inbound shipments was 3.77; while the mean for truck outbound shipments was 3.88 (or "good"). Comparatively service levels for rail were below "average," at 2.65 and 2.77, respectively. This supports the proposition that trucking "has proven it can deliver dependable and timely service at a cost effective price[6]"

The in-person interviews confirmed this difference. Rail service and infrastructure was mentioned as a service issue by nine in-person interviewees. Air transport service was mentioned by two people, while port congestion at Vancouver was mentioned by only one. Conversely, there were few negative comments related to trucking, except the mention of fuel surcharges.

The issue of rail service is inconsistent with the experience found in several recent US studies. A Bear Stearns report in 2006 suggested that "service on U.S. railroads has improved markedly from a year ago[7]". In the context of Canadian railroads, an older study suggested that CN was the highest ranking railroad in the North Amercia[8].

Firms Use Supply Chain Intermediaries Extensively

Use of supply chain intermediaries has been growing. A consortium of groups,[9] in conjunction with the Logistics Institute at the Georgia Institute of Technology, has been monitoring trends in third-party logistics since 1995. With reference to trends over the last 11 years the Institute notes:

> "While for the first six years of the study about 72% of survey respondents described themselves as users of 3PL services, this percentage has increased to 78% to 80% in the last four years"…

> Annually the most prevalent 3PL services outsourced are transportation (inbound and outbound) and warehousing. In the past ten years, however, many services have been outsourced, including customs clearance and brokerage, freight forwarding, cross-docking/shipment consolidation, and order fulfillment and distribution[10]"

The mail survey focused on the types of intermediary service used. The in-person interviews also considered this topic, specifically with respect to freight forwarders and third party logistics providers[11].

Table 4 shows the types of intermediary service used, and the percent of firms reporting they used a specific service. The most prevalent intermediary service used was on-line shipment tracking, followed by freight forwarders for inbound shipments. Third party logistics was the third most commonly cited intermediary service used, followed by freight forwarders on outbound shipments.

Table 4 – Use of Intermediary Services

Intermediary Services	Number	Percent
Tracking shipments	43	45.7
Freight forwarder: Inbound	34	36.2
Third-party logistics (3PL)	33	35.1
Freight forwarder: Outbound	18	19.1
Internet shipment initiation	15	16.0
Third-party warehousing	10	10.6
Internet shipment payment	9	9.6
Reverse logistics service	6	6.4

Twelve of the 19 larger firms in the in-person interview group used either a freight forwarder or a 3PL company. Based on the in-person interviews, it appears use of intermediaries is highly situational. Such situations include dealing with international markets; certain types of

inbound shipments; and for certain corporate purposes, e.g. focusing on core competencies of the firm and shedding non-core activities.

There is a Container Shortage

There has been mixed commentary on the availability of containers in Canada. A study by DDC Consulting, prepared for Saskatchewan Industry and Resources, reported there was an "empty container shortage[12]". More recently, the Chairman of the Standing Senate Committee on Transport and Communications indicated "there is apparently a shortage of available empty containers in Canada[13]". Conversely, some members of the freight industry have suggested there is not a problem with container availability. The President of Kleysen Transport made the following comments at the 8th Annual Fields on Wheels Conference: "I do not think there is any shortage of containers in Canada[14]"

This issue was considered in both the mail survey and in-person interviews. The results suggest that container shortages are not a widespread concern amongst shippers.

In the survey, shippers were asked to rate importance and service performance in terms of container availability for inbound and outbound shipments.

A four-point scale of very important (4), somewhat important (3), not very important (2), and not important at all (1) was used. The mean importance rating of container availability was 2.47, right between somewhat important and not very important.

Regarding quality or competence in making containers available, respondents were asked to rate the system as excellent (5), good (4), average (3), poor (2) or very poor (1). Twenty-one firms provided a rating, with the average rating 2.85, slightly below average. No firms reported availability as excellent or very poor.

The in-person interview included specific questions related to the availability of containers for inbound and outbound movements.

Eleven firms reported using containers. Within this group, seven reported no problems associated with accessing containers. Of the remainder a general unavailability of containers was not the specific issue. Some firms suggested it was tough to get containers but they were available when needed. Others emphasized that the problem is mainly with refrigeration equipped containers. Another suggested it was a seasonal phenomenon.

Shippers are Mainly Concerned with Rates

Logistics costs have been rising in North America. In the United States logistics costs in 2005 were 9.5% of nominal GDP. This is a turnaround from the 8.6% to 8.8% range enjoyed since 2001[15]. A primary driver has been rising transportation costs due to "soaring fuel prices, a driver shortage and diminishing competition[16]". With these higher prices, it is expected that shippers would be increasingly focusing on transportation rates.

Shippers were asked to rate transportation rates from very important (4) to not important at all (1). For inbound and outbound shipments combined, the mean rating was 3.78, near the "very important" rating. This was the second highest rating, with only transportation company reliability scoring higher, at 3.81 for inbound shipments and 3.96 for outbound shipments.

Regarding "performance" on rates, the average rating was 3.35 for inbound shipments and 3.52 for outbound shipments, based on the excellent (5) to very poor (1) scale. Performance on freight rates was between average (3) and good (4).

In the in-person interviews 13 firms commented on rate levels or transportation costs. Five firms indicated that rates or cost was the lead factor in terms of system performance. For the other firms, service and reliability were more important considerations, with cost a secondary issue.

Supply Chain Risk is Rising

Risk has become an increasingly important issue, as supply chains have grown in length and lean manufacturing has taken hold[17]. The former increases risk related to transportation and geopolitics. The latter creates risk since there is less buffer stock in the system in event of failures in the supply chain.

This study also considered supply chain risk. Respondents to the survey were asked the following question with respect to inbound and outbound shipments:

> *Compared with five years ago, would you say the chance of inbound (outbound) shipments arriving as expected (on time and with products in the expected condition) is:*
>
> **Greater**, that is **more likely to arrive as expected** than 5 years ago___
> **Lower,** that is **less likely to arrive as expected** than 5 years ago ____
> **No different** than it was 5 years ago ____
> Company was not in business 5 years ago ____

A rating of 1 was assigned to firms that responded 'greater', a rating of -1 was assigned to those firms that responded 'lower', and a rating of 0 was applied to firms which responded 'no different.'

For inbound shipments, respondents indicated there was no overall change. For outbound shipments, the indication was that there was a greater chance of the shipments arriving on time and in the expected condition.

As shown in Table 5, the results differ by firm size. For small firms ($500,000 in output or less) and medium-size firms (over $500,000 to $8,000,000 or less), the weighted average is negative; indicating there is a lower chance of shipments arriving on time and in the expected condition. Large firms, with sales of more than $8,000,000, on average indicated that the likelihood was greater for both inbound and outbound shipments[18].

Table 5 – Inbound and Outbound Delivery Risk and Size of Firm

Sales revenue ($000)	Inbound		Outbound	
	Number of firms	Average weight	Number of firms	Average weight
0 to 500	26	-.115	18	-.056
501 to 8,000	24	-.125	26	-.082
Over 8,000	20	.300	20	.175

Summary and Conclusions

Based on a 2006 survey of shippers in Manitoba, this paper assessed seven commonly held beliefs about supply chains and transportation. This final section summarizes the findings, and then suggests several areas for future research.

First, delays at the American border appear to be less of an issue for Manitoba shippers than the literature suggests. Still, there is room for further improvement in terms of dwell time at the border. Second, shippers' knowledge about new American border crossing regulations is limited, despite educational opportunities and government outreach on the topic. Shippers were most knowledgeable about the one-hour advance notice (OHAN) rules; least knowledgeable about the border release and advance screening (BRASS) program.

Third, shippers perceive motor carriers to be out-performing railroads in terms of transportation service levels. Apparently, the railroads still struggle to offer truck-like service in terms of delivery speed and reliability. Fourth, use of logistics intermediaries is situational, with greater usage by large shippers compared to small shippers. Future research is needed to explain this effect. Are the small shippers unattractive customers for third-party logistics (3PL) providers?

Fifth, contrary to popular opinion in certain supply chain circles, the availability of containers is not generally a major concern for shippers in Manitoba. The container shortage is situational (seasonal for some shippers; equipment-specific for others), and it appears to be relevant for only a minority of shippers. Sixth, driven by rising fuel prices, freight rates are an important issue for shippers. However, rates still take a back seat to service, in the opinion of most shippers. Seventh, and finally, while shipment risk (i.e. likelihood of late delivery and/or problems with delivery) has decreased for large firms over the last five years; it has increased for small and medium sized firms.

There are a variety of issues of interest to shippers, and the logistics providers that serve them, in need of future research. For instance, anecdotal evidence suggests the cost of crossing the American border has increased dramatically during the last five years. Several relevant research questions are: What is the cost of moving freight across the border today, compared to five years ago? What is the impact of any cost increases on small versus large shippers? What can be done to control or reduce these costs, while maintaining service levels? What is the role of 3PL providers in facilitating efficient flows of freight across the border?

Endnotes

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[3] The Transport Institute receives ongoing funding from Manitoba Infrastructure and Transportation, including support for this study. The contents and accuracy of this document are solely those of the authors and do not reflect the views of Government of Manitoba or its affiliated agencies.

[4] McMahon, Fred and Curtis, Matthew. October 2004. *Growing Concerns about Protectionist Sentiment in the United States.* The Fraser Institute, Fraser Alert.

[5] Today's Trucking. September 29 2005. *Not Thinking FAST: Nearly 40 percent of Canadian exporters don't know what the program is*

[6] Smyrlis, Lou. March 2006. *Fuel Surcharges: Is there a better way?* Canadian Transportation and Logistics. Page 4.

[7] Traffic World. August 23, 2006. *Rail Service Better.* Page 1.

[8] Gallagher, John. February 17 2003. *Service Over Speed.* Traffic World. Page 1.

[9] The consortium involved in these annual third party logistics studies have included Capgemini Consulting, the Georgia Institute of Technology, SAP, DHL, Ryder, Exel, Fedex, University of Tennessee (Knoxville). The studies are available at the Logistics Institute at the Georgia Institute of Technology website.

[10] Logistics Institute, Georgia Institute of Technology. Annual 3PL Study: 11-Year Retrospective. http://3plstudy.com/?p=11-year-retrospective. Retrieved January 3, 2007.

[11] Third party logistics is often used as a catch all phrase for all the types of third party service that are outsourced, such as freight forwarding etc. It also refers to a specific type of service firm that provides third party logistics services for the firm, e.g. transportation and warehousing. The latter was the focus of this study.

[12] DDC Consulting Services Inc. 2004. *Assessment of Overseas Container Service Issues and Opportunities for Saskatchewan Exporters*. Prepared for Saskatchewan Industry and Resources. Page 5.

[13] Proceedings of the Standing Senate Committee on Transport and Communications. Issue 4- Evidence, October 17, 2006, Page 2.

[14] Prentice, Barry, Earl, Paul and Fiorucci, D. (editors). 2003. 8th Annual Fields on Wheels Conference. University of Manitoba Transport Institute. Page 78.

[15] Wilson, Rosalyn. July, 2006. *17th Annual State of Logistics Report*. Council of Supply Chain Management Professionals, Page 24.

[16] Cooke, James A. July 2006. *Cost Under Pressure*. Logistics Management (2002). Page 35.

[17] Refer to Bartholomew, Douglas October 2006. *Supply Chains at Risk*. Industry Week. Pages 55-60.

[18] The totals in table 5 do not equal those of the entire sample of 94 firms since some firms did not provide values of output.