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Transportation: Emerging Realities



Les Transports: réalités en puissance VOLUME 2

**Canadian Transportation Research Forum
Proceedings of the 32nd Annual Conference
Toronto, Ontario May 25-28, 1997**

**Le Groupe de Recherches sur les Transports au Canada
Actes de la 32ième conférence annuelle
Toronto, Ontario 25 au 28 mai, 1997**

PERFORMANCE EVALUATION BY NORTH AMERICAN CARRIERS: PRELIMINARY THOUGHTS

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Abstract

Performance evaluation in the U.S. transport system is well underway according to the trade press; its use by Canadian firms is less well known. This paper will report some of the preliminary findings of the **second** phase of a three phase research study now under way to examine the assessment of carrier performance by users and suppliers of North American transportation services. Phase I examined the approaches of cargo suppliers (manufacturers) to the evaluation of their transport suppliers' performance, in order to understand the business practices taking place. Detailed case studies of user companies is the part of Phase I which remains to be completed. Phase II will examine similar elements from the viewpoints of carriers and logistics service firms. This paper focuses on the preliminary findings of the **carrier** component of Phase II and is intended to stimulate debate on the entire topic of buyer-seller relationships and the current realities of selling transport services.

Introduction

In Phase I, it was surprising to find very few differences between Canadian and American companies in terms of their evaluation of transport companies. It was also noteworthy that few differences existed between firms shipping high value goods and those shipping low value goods. However, there were significant differences between companies operating according to Just-in-Time (JIT) requirements and non-JIT companies in their use of quality programs and of formal carrier performance monitoring. From Phase I findings, it was concluded that firms involved in JIT processes are more likely to engage in carrier monitoring than those not involved. Phase I also found that, although ~~QSD~~ has been touted as a vehicle for streamlining vendor selection processes, even manufacturers with JIT systems have not wholeheartedly adopted it nor believe it to be a good proxy for carrier performance evaluation. Many transport buyers have developed their own in-house quality programs. Formal carrier

performance monitoring generally does not take place in smaller manufacturing concerns. Although audit was the most preferred method of supplier evaluation, and third party audits are generally available to smaller firms, third party audits were not widely used. This paper will examine the view of carriers with respect to the monitoring of their own performance and how they review that performance with the buyers of their services.

Literature Review

In the last half decade or so, the market for transport services has changed dramatically. Deregulation, time-based competition and the resultant focus by many buyers on JIT strategies have resulted in the buyer-seller (shipper-carrier) relationship for many companies being a partnership. This trend is reinforced by the implementation of global production and distribution systems by many transport buyers. Time-defined or other forms of contractual relationships (including strategic alliances) govern an increasing number of buyer-seller relationships. There is a move away from price-oriented transaction-specific carrier selection and towards alliances and negotiated transport service contracts (Brooks, 1995a; Gibson *et al*, 1993; Crum and Allen, 1991; Kleinsorge *et al*, 1991). Lieb and Millen (1988, 1990) noted that JIT implementation leads to changes in criteria by which carriers are selected and in the number of carriers used. Phillips (1991) concluded that more innovative contractual arrangements will continue to develop. Bowersox and Daugherty (1995, p. 77) noted that "firms can be expected to place greater emphasis in the future on monitoring and measuring performance." Therefore, this research investigates the processes of carrier performance monitoring and accompanying performance measures (or metrics) used.

Transport performance literature generally takes either a macro- or microeconomic viewpoint. The work of the Transport Studies Group of the University of Westminster (two undated studies) focuses at the industry level. Likewise, Data Envelopment Analysis (DEA) has been used to track the efficiency of carriers' performance over time (Kleinsorge *et al*, (1991, 1992). These are not, however, appropriate for firms seeking to conduct a self-assessment of their performance in order to implement a strategy of continuous improvement. There have also been a number of articles on performance measurement from the perspective of the purchasing manager, often drawing conclusions about the types and effectiveness of those systems in place (e.g., Dumond, 1991). This work has generally not focused specifically on the purchase of transport services.

However, both the trade and academic press remain unclear as to how widely adopted either logistics management or supply chain management has been in Canada. There is a well-established and growing body of literature in the logistics performance field; metrics such as order fill ratios, order cycle times and the like are commonly used to measure performance. It is the author's view that carrier performance evaluation is one tool used by supply chain or logistics managers to acquire, secure or maintain competitive advantage and that these management fields are much larger in scope than that of transport performance evaluation. This research is narrowly focused on transport performance measurement at the firm level.

A review of the literature points to two areas of research relevant to this project—carrier selection criteria and carrier performance measures. Generally, most research has been focused on the former, and predominantly based on shipper surveys. The criteria by which shippers choose carriers have been studied for over two decades and these studies were broadly reviewed, from the shipper point of view, in the paper prepared on Phase I (Brooks, 1995b). The reason for research emphasis and interest in carrier selection criteria usually stems from the relative importance individual carriers place on the findings of the research; understanding of shippers' selection criteria can be used by a carrier to adjust or redirect business strategies and tactics. Knowledge of the standard of service desired better enables the firm to meet the customer's expectations and secure the continuance of the business. However, if selection criteria are a moving target over time and vary significantly between segments of the market for a single mode, as found by Brooks (1995a), this type of research only provides a snapshot, albeit one that can be used to develop the variables examined in bench-marking a firm's performance in a planned program of continuous improvement.

The NEVEM Working Group (1989) present a process for evaluating logistics performance, noting that logistics objectives have to be set (delivery or throughput time, delivery reliability and inventory level) and that, as these are inherently contradictory, tradeoffs will need to be determined as part of the optimization process. Furthermore, they note that a system of performance indicators must allow for problem analysis and assignment of responsibility for the problem. What is not clear from their work is the extent to which it has been put into practice or whether it is at all suitable for smaller firms.

As for specific literature on carrier performance metrics, however, there has been limited work done, predominantly with a modal focus. As an example, Tyworth and Wu (1993) examined the value of standards conformance in the area of on-time shipments by less-than-truckload carriers.

Some in the industry argue that the relationship marketing literature should be explored. They note that the marketing of transport services has always been a traditional "relationship"-marketed service because of customer reliance on carrier sales representatives and the intangibility of the service. O'Neal (1989) concludes that relationship marketing is more likely to be effective under the following conditions: a long time-frame, high supplier switching costs, high perceived risk, substantial investment and intangibility of the service. Although the last obviously applies to all transportation purchases, for a significant volume of these purchases the time-frame is short, switching costs are low, risk is low for low value goods, and there is minimal investment. These factors move closer to the effective relationship marketing end of the spectrum when JIT operations are introduced, goods have a higher value, and delay has significant consequences. There is no doubt that some carriers practice relationship marketing but it serves as only one use of the information flow resulting from a performance assessment effort on the part of a carrier, and not necessarily the driver of performance measurement and monitoring.

In sum, future research into carrier performance must focus on: (1) the performance measures used to evaluate carrier performance, and (2) the processes used for collecting and evaluating such data so that cost-effective means may be found for smaller firms to take advantage of such practices. The research reported in this paper begins to scrape the surface of what needs to be undertaken with respect to both. The paper identifies the incidence of performance evaluation on the part of carriers as well as reports on the broad performance measures in use.

Methodology

In the overall research program, three groups—buyers, carriers and logistical service firms—are being contacted in two countries, Canada and the U.S.A. In Phase II a random quota sampling approach targets 240 firms in each of four groups: Canadian carriers, U.S. carriers, Canadian logistical service firms and U.S. logistical service firms, all to be contacted by mail with a questionnaire.

The target of 240 Canadian carriers was not met because there were not sufficient unrelated firms found. (Continued random sampling only yielded duplicate records, e.g., another branch office of the same company.) This paper reviews the approach taken with carriers (all modes), as logistical service firms have not yet been contacted. However, it was interesting to discover that 53% of the carrier respondents indicated that they act as logistical service firms! The response results are shown in Exhibit 1, while Exhibit 2 illustrates the modal spread of the respondents.

The response rate is within acceptable limits. Although it is intended that a number of research hypotheses be tested, the carrier subset is too small to draw definitive conclusions about the differences between Canadian and U.S. carriers and between those with monitoring programs or not at this point in the Phase II research. The findings reported here are largely descriptive—defining the incidence of and practices in carrier performance monitoring.

Exhibit 1: Response Experience

	Canada (1)	U.S.A. (1)
Questionnaires Mailed	215	240
Usable Questionnaires Returned	55	38
Questionnaires Returned but Deleted From Analysis (2)	31	
Other Returns (3)	24	42
Replied, Refusing to Participate (4)	31	18
Non-respondents	102	141

- Notes: (1) One questionnaire mailed to a Canadian firm was returned by its U.S. parent. One questionnaire mailed to a U.S. firm was returned by its Canadian parent.
- (2) Three of these were deleted as a review of the responses proved they were agents for ports or carriers without operating influence. One was deleted because two questionnaires were returned by one company.
- (3) Address Unknown, Moved with Expired Forwarding Order or No Longer Active as a Business.
- (4) A number of companies refused because of company policy, insufficient volume to be interested, or they did not believe the study was relevant to their business.

Exhibit 2: Respondents By Mode

Mode (1)	Canada	U.S.A.
Truck	39	33
Ocean	22	17
Intermodal	13	17
Rail	14	12
Air	14	9
Other	3	1
Total (2)	55	38

- Notes: (1) Those companies also supporting third party logistical services totalled 53% of respondents.
 (2) The totals do not add as more than one mode could be checked. Respondents checked an average of 2.07 modes.

Findings—Performance Evaluation Practices

Transport supplier evaluation

A total of 93 questionnaires were analyzed—55 from Canadian companies and 38 from American companies. Both geographic groups overwhelmingly (in excess of 85% of firms) supported the notion that transport carriers should formally monitor their own performance independent of whether their customers request such monitoring. A significant percentage of the carriers believed monitoring should be done by the purchaser of the transport services; this point of view was expressed by 36% and 42% of Canadian and American firms respectively. Less than 10% of respondents were of the opinion that performance evaluation should be conducted by a third party audit, either at the customer's or carrier's discretion. The derogation of third audit by carriers is not surprising given its lack of favour with users as well (Brooks, 1995b). Some carriers expressed the view that carriers benefit from performance monitoring through continuous improvement, and one observed that "all service suppliers should be confident enough to publish their standards, allowing competitors and customers to monitor service success." It was added that "If it cannot be measured, it cannot be managed."

As seen in Phase I, more than one method of evaluation is perceived as useful for evaluating carrier performance. When questioned about the use and type of formal program to evaluate its own performance, 80 of the 93 firms indicated they have a formal evaluation program in place (89% and

82% for Canadian and American firms respectively). Three-quarters of the firms with formal monitoring programs have developed their own in-house program. Contracted third party audits were seldom used, while spot monitoring and customer programs were each used by one-third of respondents. Other suggestions included service failure reports (completed by the sales department), satellite tracking and customer service surveys.

Of those users monitoring carrier performance, Phase I found that two-thirds used audits and a similar percentage used process reviews. Therefore, it was decided to ask carriers who monitored their own performance about their customers' practices. The number of users who continuously monitor carrier performance was estimated by the carriers to be 37%. Carriers estimated the percentage of customers using spot monitoring at 44% (for both Canadian and American customers). Carriers did not believe that many of their customers used third party audits to monitor performance, with only 9% of firms estimated to be using this technique. Only one Canadian firm believed that none of its customers monitored its performance. It is noteworthy that some firms did not feel comfortable providing, or could not provide, a percentage estimate of their customers' behaviour. (Sixteen companies did not answer the question or provided only partial answers.)

The question posed to the survey participants with formal monitoring programs was "how often should your performance be reviewed with your customers?" The overwhelming responses were customer-focused—as often as the customer warrants because it depends on the customer. (See Exhibit 3.) Of those recommending periodic reviews, quarterly reviews are the most favoured with monthly reviews preferred by 22% of respondents. Annual review received little support, although some respondents thought that all customers should receive feedback at least annually.

In contrast, all carriers were asked how frequently users seek to review their performance. Most notably, carriers believed that reviews are primarily sought by transport buyers when there is a problem with performance (37%) or when sales staff are meeting the customer (20%). Monthly reviews were also indicated (22%). (See Exhibit 3.) While there was little consensus on what is an appropriate time-frame for conducting periodic regular reviews, and it appeared that many carriers believed shippers seek reviews only when performance is not acceptable, monthly reviews were mentioned by one out of five respondents.

Exhibit 3: Performance Review Timing

Frequency with which (1)	Carriers should review performance with customers (Q7)	Customers seek a review (Q9)
As often as the customer warrants	59%	NA
Review performance only when there is a problem	NA	37%
Monthly	22%	22%
Only when they are meeting with the carrier's sales personnel	NA	20%
Quarterly	33%	16%
Other (2)	8%	18%
Annually	4%	13%

Note: (1) Totals do not equal 100% as many respondents checked more than one.

(2) Other included different timing alternatives.

NA=Not asked. The wording of the two questions was not entirely similar given the different focus of the questions.

The responding firms that used a formal program to evaluate transport performance were then asked to report the method(s) employed to evaluate such performance. The majority of respondents, 91% (consistent for both geographic groups), indicated the use of a service performance measurement for performance evaluation. Customer complaint levels were used for evaluating performance by 57% (49% and 71% for Canadian and American firms respectively) while process review was the third most popular method of evaluation, with 55% of respondents using this method (49% and 65%, Canadian and American respectively). Alternative methods of performance evaluation, such as analyzing claims ratios or sales growth, satellite tracking, customer surveys, and so on, were suggested by 20% of firms, while performance measurement by third party audit was used by a mere 14% of responding carriers.

When responding carriers were asked if they employed a formal system for reporting to their customers on service performance, 39% of Canadian and 52% of American carriers responded affirmatively about using a report card system, while 43% of Canadian and 35% of American firms did not employ any type of formal reporting system. Of those carriers using a report card system, only a few did so for all customers; report cards tended to be used for key customers (56%) or for those requesting them (35%). The form of "report cards" may be as varied as EDI or other computer-generated

transit time or delivery time reports to peer audits to daily conference calls with key customers. The open-ended part of the question generated as wide a variety of responses as there were respondents, but indicated significant ability on the part of many carriers to develop a custom solution for the customer demanding specific information. Less than 20% of either Canadian or American carriers indicated a formal reporting system other than the report card approach.

For those firms using a report card system for performance assessment, 82% of Canadian and 100% of American carriers used the system as a method of evaluating and/or measuring process improvement. Only slightly fewer used the system as part of a sales strategy to clients or to provide a formal feedback mechanism. A report card as a tool for general discussion ranked fourth while one used to document bonuses, penalties, service-related guarantees or items (including rates) for negotiation ranked fifth and sixth.

Perhaps most interesting is the reporting of formal carrier performance monitoring by company size and how that differs between users and carriers. In the study of *users* (Brooks, 1995b), it was clear that formal monitoring was more likely to be undertaken by large rather than small companies. In that study, none of the companies reporting sales of under \$5 million conducted formal monitoring of carrier performance; only seven users with sales under \$25 million undertook any type of formal performance monitoring with inspection as the prime method. As can be seen in Exhibit 4, even small *carrier* companies participated in formal monitoring, although their use of report cards (29% use them) as a method is less than that of the group as a whole. A review of these small carrier companies showed 81% had in-house performance evaluation programs with 43% conducting spot monitoring. The widespread use of performance evaluation in support of improvement in operations was noteworthy.

Exhibit 4: Monitoring Activity By Size of Firm

Number of employees	Total number of companies	With formal monitoring	With report cards
Less than 100 employees	39	29	10
100 to 499 employees	16	14	10
500 to 999 employees	13	13	11
1000 to 3000 employees	7	7	6
	9		

More than 3000	18	17	11
No Answer	0	0	0
Total	93	80	48

Annual sales	Total number of companies	With formal monitoring	With report mards
Less than \$25 million (1)	28	21	7
\$25-99 million	33	28	19
\$100-249 million	7	7	6
\$250-999 million	9	9	7
\$1 billion or more	13	12	8
No answer	3	3	1
Total	93	80	48

Quality program activities and perceptions

Traffic Management's survey of its readers in 1992 (reported in the May 1993 issue) indicated that 7 out of 10 manufacturing companies had a quality program. This high percentage was not supported in Phase I where only 44% of respondents indicated participation in this type of program (Brooks, 1995b). Of the 93 responding carriers in Phase II, 51% indicated their company currently participates in a formal "quality" program or process. This was true of both Canadian and American subgroups. Only 6% indicated that they participated in such programs in the past but had discontinued the practice, while 43% responded that they never participated in a quality program at any time. Reasons for discontinuance were varied but similar to those noted by users: lack of internal support, too busy with other activities, or dissatisfaction with results.

Carriers from all modes were represented in the users of quality programs. Of those companies that participated in a formal quality program or process, by far the two most popular types of programs indicated are in-house systems (representing 58% of the group), and ISO 9000 quality assurance (indicated by 40% of the group). More American firms currently use in-house programs than Canadian carriers. Other quality systems are used but not in substantial numbers: Malcolm Baldrige by 12% of this group, contracted third party audits by 6%, customer or industry association designed programs by another 8%, and other programs, such as TQM,

Philip S. Crosby Quality College, statewide quality awards, and so on, by 12%. Some carriers had more than one quality program in place.

Respondents were next asked if their customers required them to participate in such programs, and/or what percentage of customers did so. No carrier responded that all its customers required participation in such programs, while only one American firm indicated that more than 75% of customers require it to do so. Of those currently using a quality program, 25% indicated they do not know what percentage of customers demand participation in a quality program while 35% estimated that it is less than 25% of their customers. The remainder were split evenly between the two categories: 50-74% or 25-49% of their customers require quality programs.

Carriers' attitudes are not as derogatory of ISO 9000 as were those expressed by users. Generally, responses were positive but indicated that many users inquired about ISO 9000 status but did not require certification to conduct business with the carrier. One carrier noted that if the service performance is solid, customers will use them without formal certification. Another carrier observed that European trades seek ISO 9000 but it is not important for Asian business. A number of carriers reported that they focus on those quality processes important to their key customers while others recorded find that customers did not demand a particular quality process.

Other Findings

Companies were also asked about their use of EDI systems with major customers. Half of the respondents stated that they used EDI systems for all customers who wished to participate, while another 21% indicated they only used EDI systems with major customers. The remainder replied that they did not offer EDI capability.

*Exhibit 5: Most Commonly Identified Service Elements
for Monitoring*

Service Element	Canada	U.S.A.	All
On-time delivery	57%	65%	60%
Accurate billing	49%	61%	54%
On-time pick-up	47%	52%	49%
Loss/damage experience	49%	45%	48%
Accurate documentation	41%	42%	41%
Equipment cleanliness	33%	39%	35%
Right equipment supplied	31%	32%	31%
Cycle time	16%	26%	20%

Note: By those companies participating in carrier performance monitoring programs. In no particular order, other service points included telephone accessibility/ease of contact, quality of telephone response/telephone etiquette, response time for booking or confirmation, call-back times, accounts receivable payment history, timely quotations, actual versus advertised transit times, wait time, driver appearance/attitude, and equipment delays. Those reported only once have not been listed.

Findings—Performance Measures

There was remarkable consistency between Canadian and U.S. carriers on the key service points that should be included in an effective monitoring system. On-time delivery is clearly critical, as is accurate billing. However, as can be seen from Exhibit 5, a wide range of metrics are used to measure performance. In addition, 16 firms (8 Canadian and 8 American carriers) identified more than 10 **additional** service points that should be included in an effective monitoring system.

But what specifically is measured by carriers? Only 6 carriers provided "report cards" for detailed review. One of those was not an analytic report card as it did not measure discrepancies in any manner but reported to the buying company the usual shipment information, including pick-up date, due date and undelivered shipments. A second report card rated document accuracy of the carrier's subcontracting or interlining partners as well as the general service provided. The former was rated subjectively on a weekly basis and the results were plotted (in a graph) over a period of time; the latter was a descriptive report to be signed by both carriers. The third, fourth and fifth report cards were customer satisfaction surveys, relying on the customer to evaluate the carrier's performance on subjective factors. Only the sixth was a detailed report of its own performance across a very large number of measures in four categories—customer satisfaction, safety and compliance, operational efficiency and employee satisfaction. Each of these categories was weighted and, within each, specific factors were assigned weights. The specific factors were measurable and included, for example, percent of documents handled on time, percent of documents with billing errors, booking desk availability, cargo shipped as booked, percent of claims processed within 30 days, number of hazmat violations, and so on. It appeared from the structure of the report, however, that it was

intended only for internal use and not for distribution to customers as a report card.

Conclusions

On the basis of the survey of users of transport services, Phase I concluded that many of the carrier performance measurement systems used by manufacturers do not appear to be that well established scientifically, and remain the purview of large companies. The results of the carrier survey are not similar. Carrier participation in systems monitoring own performance is high and the size of firms undertaking performance evaluation is quite diverse (Exhibit 4).

In Phase I, manufacturers often relied on subjective evaluation. The number of manufacturers employing quantifiable objective metrics was small and the metrics used appeared to be very company-specific. This was also true of the carrier respondents supplying report cards for review. The reliance of carriers on customer surveys, based on subjective evaluation was noticeable.

The carrier performance evaluation systems used by manufacturers appear to have caught the imagination of the trade press while it appears that carriers, on the other hand, recognize the importance of such evaluation for long-term survival and quietly incorporate it into their business processes.

Acknowledgments

The author would like to thank student research assistants Patty Hope (MBA '96), Robert Hollis (MBA '97) and Stephen McSweeney (MBA '97) for their assistance in managing the logistics of the research data collection and analysis.

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