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TOWARDS EFFECTIVE INTER-ORGANIZATIONAL COLLABORATION IN  
TRANS-BORDER SUPPLY CHAINS

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## **Towards Effective Inter-organizational Collaboration in Trans-Border Supply Chains**

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### ***Abstract***

If Canada's trans-border supply chains are to optimally contribute to the nation's economic performance, collaboration among key organizations is essential. This paper focuses on two categories of collaboration: (a) among governmental departments that have jurisdiction over or interest in Canada's trans-border supply chain environment and (b) between those departments and the environment's commercial organizations (e.g., freight carriers, manufacturers, customs brokers, and international freight forwarders). The central theme in this paper is that effective collaboration requires clear understanding by all parties of the goals of the other parties as well as the obligations that collaborators must meet in order for those goals to be achieved cost-effectively. This means that an integral component of those obligations is a determined focus on the business costs incurred by collaborators and on ways to eliminate unnecessary costs. This and the paper's other insights to guide collaboration initiatives are grounded in findings from a set of ongoing research projects for which the author is the principal investigator.

## 1. Introduction

A dominant motivation for this paper is that, based on the opinions of firms involved in trans-border supply chains that traverse Canada's borders, many of problems that inhibit these firm's performance remain unresolved. Table 1 illustrates the opinions with a sample of recent trade article headlines expressing concerns directed at government departments having regulatory jurisdiction over Canada's borders. A common thread in these articles is a call for the various parties to have the inter-organizational dialogue that facilitates joint (multi-organization) efforts to resolve the cited problems. In studying the concept of inter-organizational collaboration (or partnership) as a possible solution initiative, this paper does not claim to be addressing a concept that is novel to either academics or practitioners. The fact is that there is an extensive literature on the concept. As an example, a recent book by Lambert (2008) provides references to a wide range of influential research work on supply chain partnerships. However, there is need for clearer understanding of the nature and potential of this familiar concept in the specific context Canada's trans-border supply chain environment. This paper aims to address that need by presenting insights from an ongoing three-year research project on relationships among organizations with roles or interests in that environment.

By considering collaboration issues such as the collaboration processes, its enablers, challenges, and potential outcomes, the research project's ultimate goal is deeper understanding of how to maximize the effectiveness of these relationships. The project addresses relationships that involve: (i) companies operating supply chains that traverse Canada's borders (i.e., sometimes referred to as the trade community), (ii) trans-border trucking firms, (iii) customs brokers and freight forwarders, (iv) Customs, and (vi) other government departments (OGDs) that have regulatory authority in that environment. The subset of the project's insights presented in this paper focus on three specific areas of possible inter-organizational collaboration:

- I. Multi-national collaboration among customs administrations to develop mutual recognition arrangements
- II. Collaboration between Canada's customs administration (the Canada Border Services Agency – CBSA) and Canada's trade community with a view to minimizing the risks of trans-border supply chains being conduits for or targets of harm to national security

### III. Collaboration between the CBSA and trans-border trucking firms to raise the efficiency of truck traffic movement through border checkpoint operations

In order, these three areas are discussed in the paper's next three sections. The discussions elucidate (a) the gains that can result from each particular area of collaboration and (b) the role of an unwavering focus on cost reduction as a vital aspect of commitments that collaborators must meet in order to realize those gains. Those discussions will be followed by the paper's concluding section. The conclusions summarize the paper's major insights by highlighting the major matters on which collaborators must focus in order to reap the rewards of collaboration.

Table 1: Articles Citing Trade Community's Concerns About Customs/Canada-US Borders

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| <ol style="list-style-type: none"> <li>1. <b>"Canadian Border Crossings: From Bad to Worse?"</b>: April 17, 2009</li> <li>2. <b>"Border U.S. Regulatory Barriers Mean Increased Costs for Canadian Industry and Its Customers"</b>: April 15, 2009</li> <li>3. <b>"Stuck at the Border"</b>: April 6, 2009</li> <li>4. <b>"Overlapping Security Hurting Truckers At U.S. Border, Canadian Officials Say"</b>: March 3, 2008</li> <li>5. <b>"Border Bottlenecks, Regulations Top Concerns for Ontario Shippers, Carriers"</b>: November 5, 2007.</li> <li>6. <b>"We need harmony in U.S. border security"</b>: May 23, 2007.</li> <li>7. <b>"Panel: U.S.-Canada Trade Profitable, but Difficult "</b>: April 16, 2007.</li> <li>8. <b>"Smart border vision blurred"</b>: March 2007.</li> <li>9. <b>"Security bottlenecks snarl U.S.-Canada trade"</b>: March 5, 2007</li> <li>10. <b>"FAST needs to become more transparent"</b>: February 2007</li> <li>11. <b>"Border security is border absurdity"</b>: October 2006.</li> <li>12. <b>"Border boondoggle"</b>: November 2006.</li> </ol> |
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## 2. Multi-national collaboration among customs administrations

A multi-country mutual recognition arrangement (MRA) means that Customs in each country accepts the other countries' trade security standards as consistent with its own standards. An example of this is the USA's acceptance of Canada's Partners-in-Protection (PIP) program standards as being consistent with those of the Free and Secure Trade (FAST) program. MRAs have a clear and sound rationale: a company that has its supply chain security validated by one country in an MRA should be freed from the burden of separate validations by other countries that are part of the same MRA. This means that in a single validation cycle (say, every three

years), a company's costs to have its supply chain security audited by Customs will reduce if there is an MRA among countries spanned by the company's trans-border operations. For an individual country's Customs administration, the costs to validate supply chains that traverse its borders are lower because validation responsibilities are shared with other countries. The administration's costs to conduct border checkpoint operations involving inspection of individual shipments will also fall.

One of the reasons this occurs relates to the expectation that the lower validation cost incurred by the trade community will encourage more companies to become validated. The promised reward for becoming validated is faster processing at border checkpoints (through simplified checks of shipment documents and lower probabilities of the companies' shipments getting selected for time consuming physical inspections). The result is a drop in shipment inspection costs incurred by Customs for validated companies. The Custom's administration's aggregate inspection costs for un-validated companies can also fall because there would be fewer of those companies (and shipments).

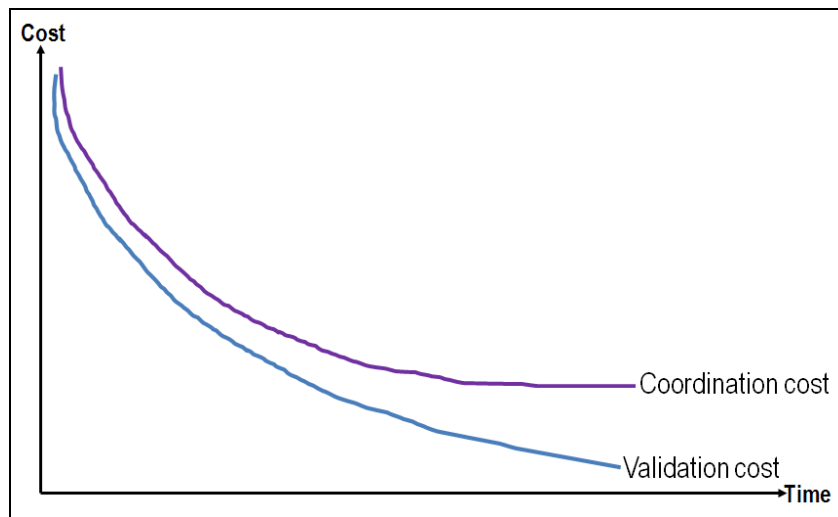
Despite the undeniable potential benefits, one cannot be oblivious to the fact that, like any partnership among peers, MRAs incur the administrative cost of coordinating the partnership activities. Coordination costs are incurred because of the ever present challenges of executing those activities. As observed by, for example, Gulati and Singh (1998), these costs are incurred for items such as decomposing tasks among members, communication, and joint decision making related to the accomplishment of set objectives. Other authors have noted coordination cost items such as "setting up a relationship" and search costs (Bakos and Brynjolfsson, 1997); costs of administrative structures to facilitate communication and authority for performing tasks and costs of the technology to support task performance (Kim, 2000). The aggregate of these coordination costs is likely to increase with the number of partner organizations because the network becomes more complex to coordinate.

A natural and accurate view of these costs is that they shrink the *net* benefits of an MRA. Still, a potential limitation of this view is that it can lead to premature rejection of an MRA because a snapshot cost-benefit analysis deems it to be not cost-effective. That is, the analysis could show the net benefit (equal to total reduction in validation and shipment inspection costs minus

coordination cost) to be negative. However, a verdict based on a snapshot analysis that uses known current costs ignores the learning (or experience) concept as a source of cost reductions *over time*. The concept, which is well studied in manufacturing operations, posits that through experience-based understanding of its value chain (e.g., from design through to final delivery of a product), an organization's personnel will detect and deploy initiatives to reduce the chain's operating cost. Examples of these learned cost-reduction initiatives include improved efficiency in work methods, input procurement processes, and facility layout (Nahmias, 2009). One of the concept's crucial tenets is that the most valuable learning about a value chain –learning that leads to innovative efficiency improvements– may only be attained through immersion in the workings of that chain.

Applied to MRA collaboration, the expectation is that the over the life of the MRA, an individual Customs administration's immersion in the activities of MRA will provide the experience to facilitate lower cost. The resulting cost reductions will apply to **both** coordination cost –i.e., the cost of administrative (support) activities along the lines of those discussed in Gulati and Singh (1998) and Kim (2000)– and supply chain validation cost. With respect to coordination cost, there is growing consensus in the research literature that although larger inter-organizational networks are costlier to coordinate, especially during the early stages of network formation, eventually, they can decrease as a network evolves over the long-term. A detailed discussion of this consensus is in Chathoth et al. (2005). Figure 1 is a conceptual depiction of how validation costs and coordination costs might fall over time as experience is gained. The very nature of an MRA as a *network* (of Customs administrations) enables two beneficial outcomes. First, there may be scale economies that allow coordination cost per MRA member to fall even as the network grows (because an X% increase in membership will yield a less than X% increase in total coordination cost). Second, learning about improved supply chain validation practices is not merely intra-organizational; i.e., not just an individual Customs administration using its past experience in conducting supply chain validation to come up with more cost-effective validation methods. Learning will also be across organizations: adopting improved practices from other Customs administrations. This is consistent with organizational learning theory's view that networks provide channels for transferring knowledge about practices and competencies both within and across organizations. See, for example, a review of the inter-organizational learning literature by Beeby and Booth (2000).

Figure 1: Hypothesized trajectory of cost over the life of an MRA



A natural question from all this is how to ensure that MRAs are effective in knowledge transfer. Here, only some general guidelines are provided since it is beyond the scope of this paper to adequately cover the specifics. The guidelines surround two notions that are prominent in the literature: interpersonal synergies and social trust. Both notions are deemed as essential for effective learning and strength in inter-organizational relationships; see, e.g., Fawcett, *et al.* (2007) and Handfield and Nichols (2002). These notions appear to be at play in the Canada-USA MRA. One of the bases for this statement is a joint presentation by senior Canadian and US Customs officials during the 2009 IE Canada conference on “Emerging Issues in Customs and Trade Compliance”. The following paraphrased quote from the presentation suggests the presence of interpersonal synergies and social trust: *“He is not just my professional counterpart but also a friend; he is a straight shooter so I take him at his word when he makes commitments”*. Thus, strengthening the foundation of apparent interpersonal synergies and social trust is an obvious priority.

However, for the Canada-US MRA to be held up as a benchmark, the relationship's foundation must translate into a particular metric of success: cost efficient attainment of Customs most important goal: minimize the risks of trans-border supply chains being conduits for or targets of harm to national security. Consequently, strengthening of interpersonal synergies and social

trust must be accompanied by reliable assessment of whether success is being realized. This means that one of the obligations of an MRA's participants is developing mechanisms to track and analyze the metric. Such mechanisms provide participants with knowledge or reasonable predictions of the costs of security validations and MRA coordination; i.e., provide actual numbers for costs trajectories such as those in Figure 1. This sort of rigorous attention to cost-efficient goal realization engenders clear-minded and objective discussion among MRA partners about any proposed initiative that are in harmony with security priorities.

### **3. Collaboration between the CBSA and Canada's trade community**

There is clear evidence that Canada has erected formal institutional structures for engagement between Customs and the trade community. On the Customs side, these include high-level structures such as the Security and Prosperity Partnership (SPP) of North America. At the more operational level, prominent examples are the Border Commercial Consultative Committee (BCCC) and the eManifest Stakeholder Partnership Network. On the trade community's side, the formal mechanisms are probably best exemplified by the Canadian Association of Importers and Exporters (CAIE or simply IE Canada). Specifically, the CAIE operates two committees to formally liaise with Customs: the Customs Legislative and Trade Security committees. Beyond these committees, there are several formal and semi-formal engagement modalities to further enrich the engagement between Customs and the trade community.

Case in point is that CAIE publications such as *Tradeweek* (fortnightly newsletter) and *I.E. Global* (bi-annual magazine) frequently contain articles authored by Customs officials from, for example, the CBSA, United States Customs and Border Protection (USCBP), and the World Customs Organization (WCO). In addition to conveying updates on Customs visions, plans, and programs, these articles serve to reiterate the Customs agencies' requests for input on future Customs trade and security initiatives. Aside from conventional engagement forums such as town hall meetings, other important mediums for dialogue comprise conferences/workshops hosted by groups with commercial interests in trans-border supply chains; e.g., CAIE and other professional organizations such as Supply Chain Logistics Canada. Perhaps because of these institutional structures, the trade community has had reason to commend the government for progress on certain matters of importance to trans-border supply chain performance.

In light of the information presented in the two previous paragraphs, it would seem reasonable to conclude that all discussions aiming to produce guidelines for Customs-business collaboration are complete so no further discussion is needed. This paper disagrees. For one, as illustrated earlier in Table 1, the trade community continues to identify what it sees as serious inhibitors to trans-border supply chain performance and remains a vocal critic of Customs policies, especially those policies concerning border security. The criticisms reflect a widely held view in the trade community that Customs, in relentlessly pursuing border security goals, has failed to fully grasp the business realities of trans-border supply chain operations. The trade community's mantra that "security trumps trade"<sup>[1]</sup> captures the essence of the criticisms. A necessary condition for this view to change is an improvement in the process of engagement between Customs and the trade community. This paper posits that one means of improvement is a shift from what seems to be a disproportionate focus by Customs to increase the number of companies that become validated under a supply chain security program; e.g., programs such as PIP and FAST.

To be sure, nothing is inherently wrong with efforts by Customs to extol the business benefits of validation (faster border checkpoint procedures, etc.) in order to encourage more companies to become validated. However, a company that perceives the cost to attain these benefits as being beyond its means or being beyond the benefits themselves will see no point in seeking validation. As such, a Customs-trade engagement process that is myopically dominated by efforts to sell the benefits of validation will fall short of true collaboration, a shortfall that can be inimical to the goals of both sides. Thus, an item that must loom large in the engagement process is the effect of companies' validation cost in the trade community's supply chain performance and in border security. Two illustrations of the relevance of companies' validations cost are presented here. The first illustration concerns the individual company's logic in deciding whether or not to seek supply chain security validation. The second focuses on how costs at the micro-level of the individual company can affect the aggregate level of supply chain security.

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<sup>[1]</sup>An example of reports that capture this concern is the joint Canadian and US Chambers of Commerce report titled: "Finding the Balance: Reducing Border Costs While Strengthening Security"; Accessed July 13, 2008 at <http://chamber.previewsite.ca/images/uploads/Reports/finding-the-balance.pdf>

### 3.1 *Role of cost in an individual company's decision to seek validation*

Illustration of the mathematical decision support logic at the micro-level of a single company requires the following definitions:

$s$  = the cost incurred by a company when its shipment is selected for physical inspection

$v$  = the company's annualized cost to gain validated (certified) supply chain status

$n$  = the company's annual number of trans-border trips

$r_v$  = the probability that a shipment through a validated supply chain is physically inspected

$r_u$  = the probability that a shipment through an un-validated supply chain is physically inspected

The answer to the question of whether a particular company should become validated is the basic answer from the economic theory of the firm: the company should do so if becoming validated is more profitable than not being validated. Annual total cost of Customs inspection for a company that opts out of validation would be  $snr_u$  and for a validated company, the corresponding total cost would be  $v + snr_v$ . Therefore, the conditions under which validation makes sense for a company can be mathematically expressed as:

$$snr_u > v + snr_v, \text{ or, equivalently, as } n > v \div s (r_u - r_v) \quad (1)$$

In all likelihood, there are companies for which the condition in (1) will not be met; e.g., those that make few trans-border trips (small value of  $n$ ). This may explain the paucity of validated companies. For example, in October 2006 under 2% of importers involved in significant cross-border movement of goods into Canada adopted the PIP program<sup>[2]</sup> and current estimates suggest that no more than about 7% have now done so. Therefore, from the standpoint of achieving its goal of greater participation of companies in the government-endorsed supply chain security programs, Customs obligations in the engagement process must extend to helping companies detect ways to reduce the right-hand-side of the inequality in (1). This obligation does not seem onerous because, through the supply chain security validation audits it conducts, Customs has the advantage of seeing many different of supply chain security practices, and gleaning which practices are the most cost effective. Further, dissemination of

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<sup>[2]</sup><http://cbsa-asfc.gc.ca/agency-agence/reports-rapports/ae-ve/2006/pip-pep-eng.html>

supply chain security practices is already part of Customs *modus operandi*. An example of this is the 56-page USCBP report to provide the trade community with guidelines for best supply chain security practices<sup>[3]</sup>. However, if that CBP report is representative of others, what seems lacking is how the recommended practices might affect a company's trans-border supply chain costs. Indeed, that report contains just two brief allusions to the cost of security practices (pp. 1-2 and pp. 17-18).

### **3.2 Impact of companies costs on supply chain security**

Figure 2 will be used to illustrate why it makes sense for Customs to prioritize companies' costs in its engagement with the trade community. The figure is a conceptual economic equilibrium model that draws on insights from the work of Prentice and Hickson (2007) on the economics of transportation security. For simplicity, the assumptions in the figure are that the marginal cost of increased border security is the same whether the spending is by the private sector or the government; thus, marginal private cost (MPC) = marginal social cost (MSC). The graph also shows a curve for marginal social benefit (MSB): the benefits of border security to society at large. Note that there are also marginal private benefits (benefits of border security to private firms involved in trans-border trade). However, for the purposes of the point to be made, the diagram does not need to display a marginal private benefits curve (which would lie below the MSB curve). The diagram shows that if the  $MSB_0$  and  $MSC_0$  represent the current state of affairs, then the level of border security will be  $Q_0$  and corresponding marginal cost  $P_0$ . If the promotional efforts by Customs prompt some companies to perceive greater benefits from investing in supply chain security then both the private benefits and the social benefits will rise.

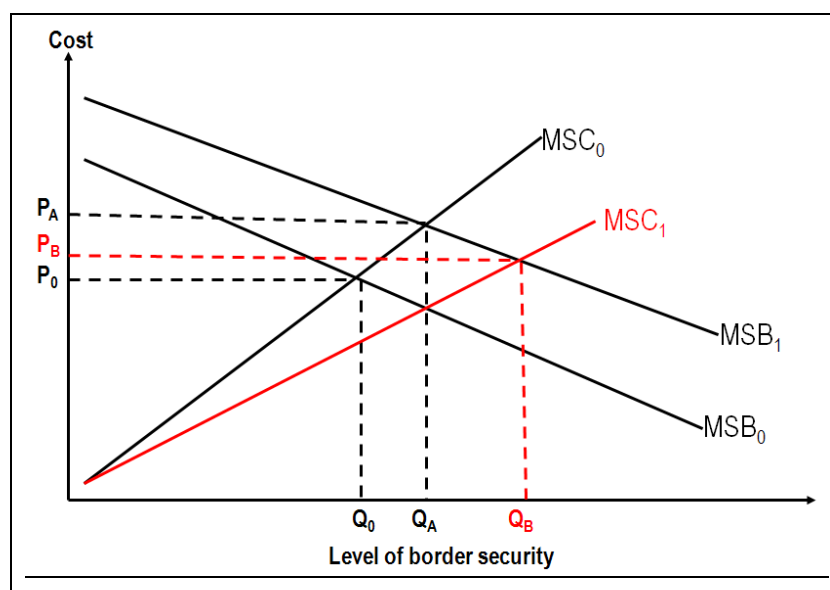
For example, with fewer companies classified as un-validated, Customs can spend more effort on rigorous inspection of shipments through those companies' supply chains, thereby assuring greater security for the wider society. Per the diagram, this higher level is  $Q_A$  and is achieved at a higher cost ( $P_A > P_0$ ). If, the promotional efforts are accompanied by efforts to disseminate knowledge about cost-effective supply chain security practices, some companies will now see financial wisdom in becoming validated (the value of  $\nu$  on the right-hand side of (1) will be

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<sup>[3]</sup>“Supply Chain Security Best Practices Catalog”; Accessed July 11, 2008 at <http://www.pac-am.com/docs/CTPATBestPractices.pdf>

smaller). If this results in a shift of the marginal cost curve from  $MSC_0$  to  $MSC_1$  then the new level of border security will be even greater ( $Q_B > Q_A$ ) and this will be achieved at a lower cost ( $P_B < P_A$ ). The logical deduction from this reasoning is that the unrelenting efforts to promote supply chain security benefits to the trade community, though valid, must be complemented by a similarly unrelenting search for ways to minimize cost.

Figure 2: Impacts of greater perceived benefits and lower costs of border security



#### 4. Customs-trade collaboration aimed at efficient flow of legitimate border traffic

Regarding the problem of supply chain delays at border checkpoints, a conspicuous feature in reports from sources such as the Conference Board of Canada<sup>[4]</sup> and the Ontario Chamber of Commerce<sup>[5]</sup> is that there is no shortage of suggested solutions. What seems lacking is rigorous examination of the efficacy of proposed solutions. This report addresses that gap for one of the potential solutions: an appointment system for freight trucks arriving at border checkpoints. An appointment system can be categorized as an example of inter-organizational

<sup>4</sup>“Is Just-In-Case Replacing Just-In-Time?: How Cross-Border Trading Behaviour Has Changed Since 9/11”; Accessed July 11, 2008 at [www.conferenceboard.ca/documents.aspx?DID=2050-42k-2007-06-01](http://www.conferenceboard.ca/documents.aspx?DID=2050-42k-2007-06-01)

<sup>5</sup>Examples are “Easing the Chokepoints: A Plan for an Efficient Canada-US Border”; Accessed July 1, 2008 at <http://www.ontariochamber.org/Policy/Reports/340>; “2008-2009 Ontario-US Border Policies”; Accessed September 20, 2008 at <http://www.ontariochamber.org/Policy/Reports/412>

cooperation for at least two reasons. First, there must be cooperation between trans-border trucking companies and their clients (shippers) to modify the times of load pick-ups and deliveries to synchronize with appointment times at the border checkpoint. Second, as in a doctors' office where it is assumed that doctors and other personnel will be available to serve patients at the time of their appointment, Customs and trucking companies would have operate under a similar assumption. Therefore, two necessary conditions for the system to be effective are (a) Customs cooperates by fulfilling its implicit obligation to provide timely processing to each truck that complies with the appointment system and (b) trucking firms cooperate by arriving at their appointed times (or within their appointed time windows).

Figure 3 depicts the kind of operational change that is required for an appointment system to work. Part A of the figure is for arrival patterns (both based on an average of 50 trucks arriving per hour) throughout a 24-hour day (1440 minutes). One pattern is very unstable: during the peak hour, the average arrival rate per hour fluctuates between a peak of 94 and a low of 6 (i.e., the type of pattern that might result without an appointment system). The dotted line is one example of an appointment system: some trucks arriving during peak hours are shifted to other hours so that the average arrival rate for the peak hour is reduced to 78 and the low is 22. Part B depicts a corresponding transition for Customs: reducing the coefficient of variation of processing times from 1 to 0.45 (dotted line in the graph) without changing mean processing time (of 5 minutes). Table 2 presents the findings from using the Arena<sup>®</sup> simulation software to determine the expected effects of these operational changes. The details of the full simulation study are beyond the scope of this report, so for expositional simplicity and without loss of generality, the following limitations are placed on what is presented here: the results are limited to Customs processing at the primary stage (results for secondary stage processing involving physical shipment inspection are excluded) and shipment type distinctions such as FAST versus non-FAST are ignored. The simulation parameters such as the probability of a shipment being selected for secondary stage inspection were estimated based on sources such as (i) statistical reports from the US Bureau of Transportation Statistics, (ii) meetings of border stakeholders (e.g., Customs), (iii) reports by the Conference Board of Canada and by the Canadian and US Chambers of Commerce, and (iv) industry articles such as those in Table 1.

Figure 3: Examples of operational changes required for effective truck appointment systems

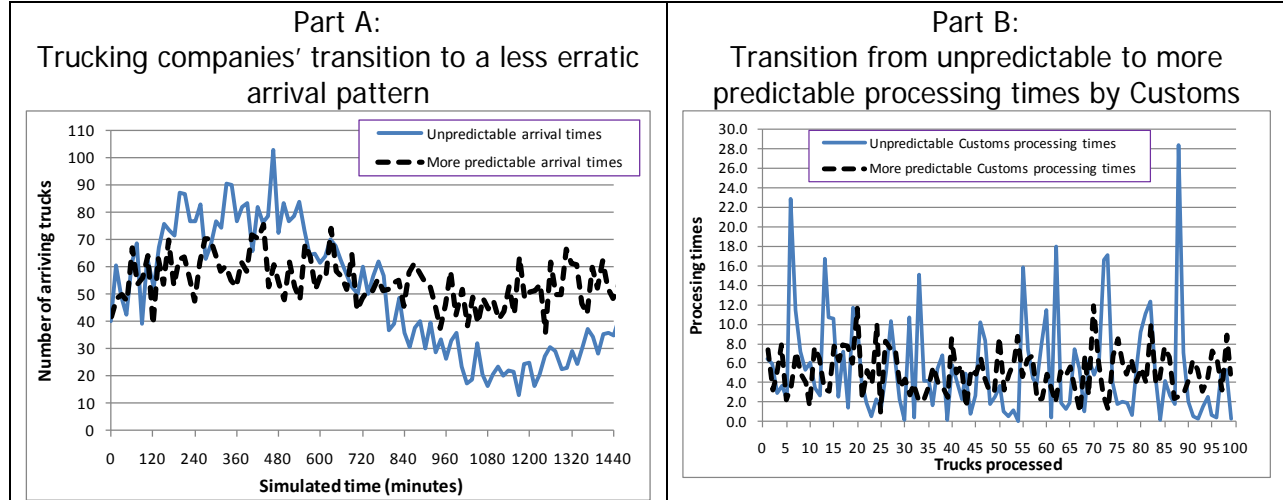


Table 2 compares the results for the scenario of no appointment system (coefficient of variation for service time = 1 and range in mean arrival rates between the peak and non-peak hours =  $95 - 5 = 90$ ) with the results for an appointment system (coefficient of variation for service time = 0.45 and range in mean arrival rates between the peak and non-peak hours =  $78 - 22 = 56$ ). The table shows the improvements with respect to relevant metrics for both trucking companies and Customs: waiting time, congestion, and processing resources (primary stage inspection booths). The findings show that an appointment system would yield wait times that are not only much shorter but also much more predictable. The reduction in border delays will translate into financial savings for trucking companies. Likewise, the reduction in the required number of booths under an appointment system is a source of significant financial saving. That is because a larger number of booths will require heavy investment in infrastructure at border checkpoints. The operational changes needed to reap these gains go beyond each party's independent action to make transitions such as those in Figure 3. For example, while Customs can attain service time consistency by, for example, providing front-line officers with training and technology, trucking companies also play an important role in service time consistency. That role covers basic things such as having the proper documentation available upon arrival at the border crossing. Naturally, Customs would be expected to reciprocate by facilitating the required operational changes among truckers.

Table 2: Efficiency Improvement Benefits of an Appointment System

	QUANTITATIVE IMPROVEMENTS	CONCLUSION: APPOINTMENT SYSTEM BENEFITS
Average time a truck waits before being processed	Cut by at least 50%	Less time wasted at the border
Upper limit of 95% confidence interval for waiting time	As above	Significantly less uncertainty in freight delivery planning
Average number of trucks waiting to be processed at any given time	As above	Significantly less truck congestion at border checkpoint
Required number of primary stage Customs booths	Reduced by up to 40%	Significantly less border resources required to process trucks

### Concluding Remarks

The crux of this paper boils down to two crucial themes that permeate the three areas of inter-organizational collaboration discussed herein. One theme is that cost considerations must be at the forefront of discussions about any inter-organizational initiative to accomplish the goals of the involved parties. This does not mean that costs take precedence over the desired goals; e.g., Customs border security goals. What it means is that inter-organizational collaborators have to relentlessly seek ways of accomplishing the goals at minimum cost. Doing so requires efforts to measure these costs and to understand their determinants. The other theme is that an individual organization's efforts to help collaboration partners are not merely altruistic but also facilitate achievement of the helping organization's goals. A Customs agency making efforts to share its knowledge of cost-effective supply chain security practices with the trade community is a case in point. A corollary to the second theme is that in order to achieve its own (perhaps selfish) goals, each collaborator must be prepared to act unselfishly towards its partners. In essence, the collaboration must reflect what Autry, *et al.* (2008) coined as inter-organizational citizenship behaviours (ICBs). These ICBs include *altruism* (behavior directed at helping a partner solve problems or acquire needed skills and knowledge), *constructiveness* (interest and activity in inter-organizational affairs affecting the relationship), and *advancement* (taking steps to improve relationships, knowledge bases, and integrated processes).

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