Transportation Policy Innovation Centre

MOVING CANADA'S TRANSPORTATION POLICY INTO THE 21ST CENTURY

Critical Conversation

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INTRODUCTION

This paper is about the unspoken assumption behind Canada's transportation policy and how modernizing it can improve the commercial position of all supply chain participants, and the country.

Organized transportation was originally thought of as a service that is provided by a carrier to a shipper, with obligations on the former but few if any on the latter, and with no consideration of other players in the same transport system. Transportation stood apart from production – the two were considered independent. Dispute resolution was done on a one-by-one basis, with negligible consideration of how a ruling, or the cumulative effect of multiple rulings, affected the system as a whole.

That premise is a product of the 1800s when the world was a slower and simpler place. There were no supply chains, no globalization, no Lean production, no complex interconnected networks, no impatient foreign customers, and no urgency.[1] Now there are. Yet the 1800s premise is still governing the transportation space today.

The proposition being asked of participants in this 2025 "Critical Conversation" is whether Canada should replace the century-old premise with one that's closer to the realities of 21st Century commerce (and begin following that path to its logical conclusion).

The old premise was in declining utility from about 2000 to earlier this year, 2025, when the tariff crisis landed on Canada's doorstep and reduced its utility even faster. It seems timely to stop and ask what Canadians want the goods-moving part of our economy to be conceived to accomplish.

This paper considers Canada's standing in the world of commerce; the effect of transport policy on economic performance and wealth-generation; the evolution of policy; the rise of knowledge about how complex systems behave; what this knowledge tells us about our current policy and regulatory paradigm; and what we could do to pull ourselves out of a long and troubling descent.

The assumption on which the main point of this paper is based, is that good analysis begets new policy, which begets new legislation, which begets a new business climate, which begets new types of business decisions, which beget better commercial and trade performance. This paper and the accompanying Critical Conversation are at the beginning of this progression. It would not be realistic to expect miracles overnight.

The scope of this paper is confined to goods-movement problems that can be dealt with by the policy tools available to Transport Canada. We acknowledge, but do not explore, goods-movement problems that need to be dealt with by other government departments and agencies, for example the Labour Program of Employment and Social Development Canada and the Canada Border Services Agency. Those agencies' disposition towards enhancing supply chain performance is affected by the underlying premise that we propose be updated. So, while those issues are beyond the scope of this initiative, we expect they will (or at least can) be affected by its outcome.

1. There was also no understanding of feedback loops, system dynamics, the Forrester Effect, quality management, management of variation, management of constraints, forecast-driven supply chains, strategies for buffers and inventory stocks, and virtually all other elements in contemporary management of complex systems of dependent events. All of these emerged in the 20th Century.

OVERTURE

You could be forgiven for thinking these are not the best of times. In global standard-of-living rankings (GDP per capita), Canada dropped from fifth place in 1981 to thirteenth in 2023. Canadians are now below the OECD mean. Much of the problem comes from underperforming supply chains.

But wait, there's more. Canada's ranking in the World Bank's Logistics Performance Index plummeted from tenth place in 2010 to twentieth in 2018. The World Bank rated the quality of Canada's trade and transportation infrastructure at twentieth in the world in 2018, far behind the U.S. at seventh, and Germany in first. A recent Deloitte report found that poor-quality infrastructure was hurting Canada's economic competitiveness. Another Deloitte report concluded that Canada's regulatory competitiveness is weak and we are slow to adapt. A recent innovation report card by the Conference Board of Canada places us fifteenth among twenty major economies, and makes it clear we are in dire need of change.

But optimists rejoice! These are not the worst of times, either—at least not yet. But we are heading that way. In recent years, Canada's reputation as a reliable exporter of bulk commodities to Asian markets has suffered, yet there is little sign of lasting improvement of the underlying causes. That means things *will* get worse. Recently Canada has been losing container traffic to the U.S. If that trend continues[2], the loss of scale will drive up costs for supply chains in a feedback loop that harms national competitiveness even more, even faster. There is no shortage of other examples.

With Canada now forced to pivot quickly from traditional trade relationships and routes with the US, the underperformance of supply chains is an urgent problem. The sudden need to re-architect supply chains to serve Asian and EU markets complicates the task and makes things more pressing than when we could rely to a high degree on north-south trade. Simply put, someone moved our cheese. Our traditional tempo of responding to problems like this won't deliver New Cheese.

THROUGH THE PAST DARKLY

During the Covid-19 pandemic, people's spending patterns shifted from purchasing services to consumer goods. The sudden change in demand sent a shock wave through supply chains. It was a textbook case of "variation" disrupting the flow of whatever is being moved along a system. Throughput dropped, delivery times stretched out, the amount of goods-in-transit spiked, and the reliability of the system's performance cratered. Coming out of the pandemic, similar shocks occurred in reverse, paradoxically delivering the same results. It was yet another textbook case of variation of any kind, positive or negative, reducing flow.

It wasn't just *consumer* goods that suffered. The accumulation of goods-in-transit that occurred throughout the system of production, storage, and transportation clogged the flow of agricultural products and industrial goods as well, including exports like grain.

Supply chains were, and still are, in the middle of what is essentially a **throughput problem**: not enough goods are getting to market, fast enough or reliably enough.

2. The proposed merger of Union Pacific and Norfolk Southern railroads in the US, if approved, is a virtual guarantee that competition for container traffic will uptick sharply. UP has justified the merger to US regulators in part by committing to take away as much as it can from Canadian railways.

It is a classic production problem. Manufacturers have been applying and refining their processes to deal with it for decades. The transportation sector was a latecomer, and national policy has hardly begun making the transformation needed to catch up.[3]

EVERYONE IS LOSING

Thank goodness for a weak Canadian dollar. Without it, our international competitiveness would be even lower than it is now. But that reduces purchasing power, makes Canadians less well-off, lowers our attractiveness to immigrants, especially high-talent ones who could go anywhere, and raises the cost of inputs sourced abroad by businesses. In other words, the weak dollar is an escape valve that disguises our economic productivity problems.

The 2022 National Supply Chain Task Force found that not a single stakeholder was satisfied with how well transportation supply chains were serving their needs. It took the Task Force eight pages to list what companies said was holding them back.[4] Most of them had one thing in common: when it came to getting their goods to market, they were suffering from constraints somewhere in their supply chain that reduced their throughput—constraints that had not been fixed.

That's the problem with low throughput: shippers and carriers alike in an affected supply chain lose. Some parties may, at times, do better than the others. But that's cold comfort because none of the parties will do as well as they could if their whole supply chain's throughput increased.

THE EFFECT OF POLICY ON TRANSPORTATION AND ECONOMIC PERFORMANCE

Pity the poor fish. He can't tell you anything about water. The inability of fish to perceive the medium in which they swim has something in common with businesses and government policy. Policy is in the ether, enveloping the world of commerce and giving rise to laws and regulations that determine what types of business behaviour are allowed, incentivized, discouraged, and prohibited. That in turn affects the business climate and influences many business decisions.

Despite the pervasiveness of policy, it would be surprising if many business leaders spent their winter evenings curled up by the fireplace with a hot toddy, reading books and articles about how public policymaking is done, and how policy comes to be manifested in ways that affect their own decision-making back at the office. Some of the manifestations of policy, like the following, clearly affect the amount and speed of commercial activity in Canada:

- hierarchy of rights under the law: shippers vs. carriers, labour vs. business, developers and builders vs. existing residents
- ownership and governance of ports
- terms and conditions of leases that permit terminals to operate on Crown land at ports

3. If it had, we might expect to see signs emerging in national policy and regulation that deal with factors that govern throughput. There don't seem to be many around.
4. See Annex B of the Task Force's report.

- how much infrastructure money government chooses to spend, and on what
- staffing levels and procedures at ports of entry that affect the speed of border clearances
- degree of automation and digitization of paperwork to facilitate customs clearance at ports of entry
- requirements for transport companies to submit data to government, and the uses made of it
- degree of authority, expertise, and independence of the Canadian Transportation Agency ("the Agency"), Canada's transport regulator
- competition law and restrictions on multi-company collaboration in cross-industry initiatives
- how much government uses its power to convene and to exercise moral suasion, and for what purpose

The most important point about the historical progression of transport policy in Canada, up to and including the present, is simply this: there is no point at which legislators seriously considered questions of speed or throughput.

There is no point at which legislators seriously considered questions of speed or throughput

Over the years, the content of the Declaration of National Transportation Policy in the *Act*[5] morphed from relatively few goals to the point there are now eight. That is another problem.

THE CLEAVAGE

Tens of thousands of years of human history passed before Copernicus discovered an eternal truth that had been right in front of everyone's eyes: the Earth is not at the centre of the Universe; it revolves around the Sun. The following analogy may seem a stretch, but here goes anyway. In Canadian transport policy, a century went by before physicists, mathematicians, and industrial engineers discovered the rules for maximizing flow through an industrial process—rules that increase productivity more than any other organizing principle discovered so far. Those rules are in the body of knowledge often referred to as Lean production and its enhancements including TQM, Six Sigma, and Theory of Constraints. During that century the discoveries accumulated but the underlying premise of transport policy remained static.

Most substantial companies govern their operations by at least some rules of Lean. ("Full Lean" does not work for everyone.) But some of Lean's cardinal rules contradict the premise of Canadian transport policy, as we describe in the following section. It is probably not too much to say that every Canadian supply chain that has even one participant whose operating practices are affected by government transport policy rooted in the 1800s premise, will underperform to the detriment of all participants.

Flow has become the cardinal organizing principle for the production and distribution of goods worldwide. But it is not even a footnote in Canadian transport policy.

5. See Annex 2 for the current declaration.

A cleavage between transport policy and industrial production practices started opening wider in the early 2000s. Lean was becoming mainstream in most sectors of industry, including services. Supply chains were becoming the dominant mode of industrial production and trade. Globalization was in full bloom. Competition was growing from producers in developing countries. Consumers everywhere were becoming impatient. Investors had started hewing to the notion that companies' primary responsibility is to maximize shareholder returns. The race for economic growth among nations was intensifying. It was dawning on nearly every enlightened business and country that maximum throughput and maximum speed of delivery were the primary organizing principle of successful competition. That's where the world of commerce was going.

But transport policy kept pulling things back. In response to some controversial developments in supply chain relations, government intervened sharply and transport policy got re-frozen in aspic. Meanwhile, the world of commerce kept moving in the opposite direction.

Structural weaknesses in Canada's supply chains, caused in part by the influence of transport policy, lay largely hidden until Covid arrived. It came with a bang. Then it receded. After the wild ride there was something approaching a collective sigh of relief.

But together we hadn't used the time to figure out how to conceive a new paradigm, or implement it with alacrity, when the Trump tariffs arrived. They came with an even bigger bang.

Meanwhile, some indispensable players in national supply chains like federally chartered ports were following the playbook set by government when it commercialized them in the mid-1990s, bequeathing them with formal and informal expectations shaped by the 1800s policy premise that ignored speed and throughput. The ranking of Canada's performance against international competitors suggests how that is working out.

And here Canada stands, with an antiquated policy premise and an urgent problem on our hands.

COLLISION COURSE

What is our primary goal? Competition? Obligations? Equitable treatment? What does optimization theory tell us?

It tells us that if economic well-being is what we seek for Canada, then from a supply chain and logistics standpoint, the primary goal must either be maximum speed or maximum throughput. The two are not the same, but in most cases they are very close, and under certain conditions they are virtually synonymous.

Throughput is the measurement of how much the goal is being achieved.

Here are seven elements from optimization theory that apply to supply chains, and that are on a collision course with transport policy:

Principle: Every complex system will evolve in the direction that serves the primary goal.

Problem: Canada has no primary goal for transportation. The *Canada Transportation Act* declares eight goals and assigns them no priority. That means from a national point of view, the transport system will evolve more or less randomly, or in other words without a goal-serving purpose.

Principle: The most important principle of Lean is that no production stage should release its output until the following stage is ready to process it.

Problem: Under the *Canada Transportation Act*, every participant in a supply chain has the right under law to release its output at any time, regardless of the ability of the downstream participants in the supply chain to handle it. That means parties farther up the chain have permission in law to congest the transport system and reduce its throughput, disadvantaging everyone else in addition to themselves.

Principle: The end result of many local optima is never the optimum for the total system.

Problem: Transport regulations in Canada are enforced on a one-by-one basis. When a shipper has a complaint against a carrier, the regulator must attempt to resolve that case without taking into account the effects of its own decision on other participants, or the cumulative effect of multiple decisions it has made on the performance of the system as a whole.

Principle: Every supply chain has a constraint that limits its throughput. If you concentrate your efforts on identifying, managing, and alleviating the constraint—that one element that limits the system's ability to achieve its goal—you are effectively analyzing, improving, and managing the entire system. That always remains true until the constraint moves, at which point you must refocus on the new constraint.

Problem: As far as we are aware, there is no high-level capability and no organized effort in Canada to study important supply chains and find and relieve each one's governing constraint. Without the clarity that comes from concentrating on constraints, the complexity of supply chains shows up as an interconnected tangle of near-infinite proportions that defies understanding and solution. Almost no one can tell what to fix or even where to start.

Principle: Variation in a system, or variation that affects a system, is the No. 1 enemy of throughput.

Problem: Transport policy and regulations do not make anyone responsible for minimizing variation. Quite the contrary: the *Canada Transportation Act* invites variation, to the detriment of all supply chain participants. By making carriers responsible for providing whatever level of service their customers call for, customers have *carte blanche* to over-order in anticipation of shortages, to phantom-order during shortages, and to hoard assets when they aren't needed. Given the obligations in law, the carrier is obliged to deliver all the asked-for services and resources. Human nature being what it is, this surely occurs in times of real or anticipated shortage.[6]

Principle: Every supply chain is susceptible to the Forrester Effect, a law of system dynamics more commonly known as the Bullwhip Effect. It holds that demand and production levels oscillate up and down with increasing intensity with each step in a supply chain that you go farther upstream (away) from the end-customer. That unleashes variation into the system, often wildly. It takes practically nothing to trigger it. One of the most effective ways to minimize this powerful source of variation is for every supply chain participant to see the demand data from the end customer, not from its own most proximate customer. And data contained in a daisy-chain of forecasts transmitted upstream from one participant to the next, to the next, to the next, is worse than useless because it creates near-certain conditions for triggering the Forrester Effect.

Problem: Canadian transport policy and regulations are silent on this phenomenon and how to minimize it. To the best of our knowledge, none of the requirements currently placed on supply chain participants, for example carriers, speaks to the need to exchange data containing un-

6. A report commissioned for the *Canada Transportation Act* Review in 2015 gave proof that it does. (Coleman 2015)

edited information about demand from customers at the very end of the chain. And transport policy encourages or requires participants to pass along daisy-chained forecasts of demand.

Principle: The governing constraint in any supply chain is seldom the result of undercapacity of the physical infrastructure. Most constraints result from the practices used in managing the infrastructure's operations, or from ineffective management of flow immediately upstream of the constraint. Fixing those constraints can usually be done quickly, at minimal cost, and without pouring concrete; and throughput for the whole supply chain increases almost immediately.

Problem: There is a predisposition of government and sometimes of private industry to advocate for and fund infrastructure projects, often without applying a known method of solution[7] to find and open up the bottleneck as described above. That means scarce capital is susceptible to being spent needlessly, and the sought-for improvement can take years to show up – if it shows up at all.

THE RIGHT PROBLEM

Not for nothing was Canadian transport policy in the 1800s developed around the concept of unidirectional obligations. Railways were hard at work developing a reputation for abuse of their market power.[8] History is replete with evidence that government needed to intervene and curb what we now consider unfair business practices.

Whether the transport regulation that arose in those early years was optimal for its time is not the question. At least policy-makers were trying to solve the right problem.

Railways still have market power. But so do ports, airports, shipping conferences, the St. Lawrence Seaway, the CBSA, and many others. It is beyond the scope of this paper to explore whether they or any other critical supply chain player could do a better job of meeting their customers' service expectations, for example if they were run more competently, or were putting more resources on the ground, or weren't malicious, or weren't prioritizing their shareholders' interests above all.

As the *Canada Transportation Act* Review Panel of 2001 said in its report, the transportation system is fundamentally not anti-competitive and it works reasonably well for most shippers most of the time. So what changed since then?

Here is what we suggest readers consider. In a world of supply chains, globalization, Lean, impatient foreign customers, urgency, and shock waves from our largest export market, is the current policy
paradigm around the concept of unidirectional obligations trying to solve the right problem?

7. Arguably the most respected method of solution is Theory of Constraints.
8. Railways were not alone. The oil industry, the chemical industry, the meatpacking industry, and others, were hard at it too.

THE WAY OUT

We need to improve the speed of the system that moves our goods to market. Doing that will increase its throughput capacity.

If Canada moves into a speed and throughput world, three things will occur: productivity and economic performance will rise, our ability and reputation to deliver quickly and reliably will improve; and supply chains will be more resilient and less dependent on creating and stocking inventory that ties up capital and reduces their productivity.

The Declaration of National Transportation Policy would need to be re-written to reduce the list of eight ostensibly equal goals to a primary one: *maximizing the speed and throughput* of the goods-moving system.

All manner of other tools could be brought to bear from industrial optimization practices developed in the decades since Ohno first conceived and applied them at Toyota, and technologies like digital twins and AI emerged to make the finding and removing of constraints in a supply chain a practical reality.

ACKNOWLEDGING DIFFICULTY

There's no point ducking it. The transition to a new policy premise will not be simple or painless. There are innumerable changes in business practices for Canadian companies to consider, and some of them require a more holistic mindset. There will be a period of uncertainty, while the federal government figures out what a new suite of policy measures should look like, how the rules should be applied, and how to deal with unintended consequences. Even the question of what gets measured will involve non-trivial change.

THE BROADER SIGNIFICANCE

Making the concept of speed maximizing and throughput the underlying premise of transportation policy introduces a game-changer: *time*. Readers are invited to review the eight goals in the Declaration of National Policy in the *Canada Transportation Act* shown in Annex 2. Not a single one deals specifically with the passage of time.

That means it is ignoring one of the most important variables of all. Every supply chain participant, every company, every national economy, lives in a world that is dominated by time.

By introducing *time* as a compelling factor, the premise of transport policy would not just start to expect more speed of movement in supply chain operations. It would also signal an expectation of more speed in such things as government approval of new initiatives—and even more speed in the tempo of updating policy itself.

It has been about three decades since the *Canada Transport Act* was substantially changed. That is a pretty slow tempo. It is why this paper argues that policy change has become urgent.

The *Canada Labour Code* may be in a similar situation, but that is beyond the scope of this paper and the Critical Conversation. In any case, it is outside the mandate of Transport Canada.

THE QUESTION

Participants in the Critical Conversation are asked to consider the following question before arriving at the working session:

> *Does federal policy affecting the movement of goods need modernizing to prevent supply chains from constraining Canada's economic growth, and if so, how?*

We hope participants can come ready to express their own organizations' willingness to consider seriously the adaptation process mentioned above.

ANNEX 1

"LEAN" COMES TO FREIGHT TRANSPORTATION

Squint hard and you can see the beginnings of "Lean production" in Henry Ford's moving assembly line that débuted in 1913. Conceived to maximize Flow, Ford's innovation shrank the time it took to build a car from more than 12 hours to one hour and 33 minutes. Not bad for a rookie—a throughput gain of 670%! But while Ford's fundamental concept still passes the test of time 122 years later, his *application* of the concept was too inflexible to prevail. It couldn't adapt to producing multiple different models of car at the same time. By the late 1920s GM had overtaken Ford in sales and market share.

Ford's concept of Flow got renewed interest after WW II, as Taiichi Ohno began perfecting what became known as the Toyota Production System. It combined Ford's principle of Flow with a stream of process innovations developed by Ohno that, when implemented, set throughput and quality records and propelled Toyota to become the largest carmaker on Earth. It *did* accommodate multiple models of car at the same time.

Toyota began living in a *throughput* world. Throughput (and equivalently Flow) became the company's primary goal. Other manufacturers were still living in an *operating-expense* world, one that demands efficiency from the company's individual departments, predicated on the assumption that each department is independent of the others. But they never are. In a complex system, production units are always interdependent. The operating-expense paradigm—in other words, the pursuit of efficiency—rests on faulty logic. Optimizing locally (in other words, each department by itself) is a guarantee the overall system will underperform and throughput will suffer.

By the 1980s Toyota's process was spreading to other Japanese manufacturers and making inroads with North American carmakers as well. By the time John Krafcik coined the memorable (but mis-construed) phrase "Lean production" in 1988, it had begun to penetrate even non-auto manufacturing in North America.

The concept was never static. It was further developed and complemented by process innovations in the 1980s like TQM, Six Sigma, and Theory of Constraints.

By the 1990s Lean had begun spreading even to non-manufacturing industries like banking, healthcare, construction, and other services.

In the early 2000s, Lean finally reached freight transportation. It arrived first on Canada's CN railway. It was a new application of Ohno's process innovations for attaining maximum throughput, made possible by consistency of Flow and minimum of variation.

Transportation can now be seen for what it actually is—an integral part of logistics. No longer a process standing apart, transportation needs to be managed as part of a broad system for the production and distribution of goods, and subject to more or less the same rules of regulatory governance and the marketplace as those of other supply chain participants, neither elevated nor subordinated.

Today many or most companies govern their operations by applying at least some rules of Lean. But not many are "Fully Lean": there are characteristic circumstances in which Lean works well and others where it does not. Readers will find insight about this and much else in the highly informative paper "Standing on the Shoulders of Giants".

The most basic rules of Lean are:

Improving Flow is a primary objective of operations. That is equivalent to reducing lead times, and is virtually synonymous with maximizing throughput.

No stage in a production process should release its output until the next stage is ready to process it.

Flow is governed by when *not* to produce.

The more orders that are simultaneously present on the shop floor—when there are too many orders on the floor—traffic jams start to occur. The more traffic jams, the more management attention is needed to sort out the priorities.

A disruption that occurs in one work centre consumes capacity not just from itself, but from all the upstream and downstream work centres at the same time. (For our purposes, supply chain participants are the counterparts of “work centres”.)

Every due-date commitment should be given only according to the as-yet-unallocated capacity of the bottleneck in the system.

ANNEX 2

DECLARATION OF NATIONAL TRANSPORTATION POLICY

Section 5, *Canada Transportation Act* — current version

Declaration

5 It is declared that a competitive, economic and efficient national transportation system that meets the highest practicable safety and security standards and contributes to a sustainable environment and makes the best use of all modes of transportation at the lowest total cost is essential to serve the needs of its users, advance the well-being of Canadians and enable competitiveness and economic growth in both urban and rural areas throughout Canada. Those objectives are most likely to be achieved when

(a) competition and market forces, both within and among the various modes of transportation, are the prime agents in providing viable and effective transportation services;

(b) regulation and strategic public intervention are used to achieve economic, safety, security, environmental or social outcomes that cannot be achieved satisfactorily by competition and market forces and do not unduly favour, or reduce the inherent advantages of, any particular mode of transportation;

(c) rates and conditions do not constitute an undue obstacle to the movement of traffic within Canada or to the export of goods from Canada;

(d) the transportation system is accessible without undue obstacle to the mobility of all persons;

(d.1) the transportation system is accessible without barriers to persons with disabilities; and

(e) governments and the private sector work together for an integrated transportation system.

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