

Thinking of Infrastructure Beyond the PPP Model

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Introduction

In the earlier discussion paper prepared for the Executive Forum, **Understanding Public Private Partnerships: Emerging Issues in Canadian Infrastructure Delivery**, May 12, 2012, the authors described the mechanics of traditional PPP model and laid out some of the key issues. The conclusion to that paper, **'Moving Forward'** is cited below and serves as a convenient platform for this follow up discussion.

Most urban infrastructure today is based upon technologies and facility requirements that were developed over a century ago including roads, subways, street cars, water and sewer systems, communication networks, and even hospitals and schools. The question is whether these systems are still relevant and can carry forward into the next 100 years. The PPP model can be improved to deliver more innovative and adaptable infrastructure, but will it be the right infrastructure? Smart PPPs are not likely to tackle a fundamental barrier to embedding a public interest in the overall long-term performance of public-private partnerships. This will only happen when a model is derived that incentivizes the use of new technologies, promotes quality and efficiency improvements, captures the innovative potential of the private partner, and measures service delivery according to appropriate performance metrics. For example, a new model for hospitals should connect the design and construction of health care facilities to clinical outcomes if the real value for money exercise is to have relevance to society. With the current PPP model, it will be 30 or 40 years hence when the asset is taken back into public ownership that we will know if the model did deliver as promised, has proven capable of adapting to the change, and it has justified the long-term strategic investment of public funds.

There is now an opportunity to assess early results with the PPP model in delivering infrastructure across a number of countries, including Canada. This is important in view of the increasing commitment of governments at all levels to address infrastructure deficiencies across a broad range of categories and the momentum of the private sector to be more involved in the financing, development, operation and long-term investment in infrastructure. However, at this point in time where we are still largely wedded to the PPP model as a procurement device with a set of legal agreements that affect principles of risk transfer. The implications of binding this procurement model to a 30-year period to operate and maintain the infrastructure have seldom been discussed. In fact, governments appear to be more committed to find ways to 'fuel' the PPP model through greater access to capital than they are in assessing the efficacy of the PPP model based on projects that have been delivered over the past decade.

There is sound evidence that the PPP model has effectively addressed two primary concerns of government with large scale projects, namely the need to mitigate significant cost overruns and late delivery times. But this is where the inquiry seems to end. Very little is being done to assess what happens in the operational stages of a PPP. It is during this 30-year period that governments will learn if

the PPP model delivers as promised, if assumptions about risk transfer are correct, if the legal agreements are sufficiently robust, if institutional memories survive, and if value for money is realized.

While the public may be made aware of the procurement cost for a given infrastructure project, as defined by the cost at time of substantial completion, they are not aware of the total costs involved over the subsequent 30 years, who pays this cost, and who is ultimately at risk. It is estimated that the capital cost of infrastructure PPPs account for only 18% of the project's total cost, with the remaining 82% of costs are incurred over the 30-year contractual period. We now see that some of these infrastructure assets have a 'long wagging tail' after 20 years. We are not sure whether all obligations for an asset's maintenance and repair will be met despite the legal agreements. What will the asset really look like at the end of the 30-year period? What happens if it functional obsolescence overtakes depreciation during the 30 year period? What happens if the private Project Company simply forfeits their remaining equity capital in a PPP and walks away from the deal when liabilities overwhelm their balance sheet? Government is still the stable equity partner in any PPP arrangement.

PPPs work best when projects are large 'greenfield' projects, both from a public and private sector perspective. Unfortunately, this can divert attention away from some of the most prudent infrastructure investments in relatively small projects that may not garner much political attention but can deliver real user benefits. Similarly, PPPs are not well suited to addressing the prevalent underutilization of existing infrastructure investments, many of which are designed for peak capacity requirements and then highly underutilized the remainder if the time. New models are required to address effective ways to utilize existing capacity, as well as productivity, and this may be as simple as a new pricing mechanism and data tracking system to evaluate end user interaction with infrastructure assets.

A final point in this discussion is where people fit in the partnership, the very people that the PPP is intended to serve. The PPP model may not stand up well to the rigors of stakeholder involvement, and perhaps this accounts for the limited use of revenue-based PPP models that Canadian governments are prone to avoid. The political risks of possibly upsetting the electorate are just too great.

This discussion paper is directed at framing the questions and prioritizing research that may shed light on possible answers. This discussion is not intended as a criticism of the PPP model, rather it is a way to prompt thinking about infrastructure that goes well beyond the PPP model.

We have identified five key discussion topics that should be forefront when addressing current and future infrastructure development in Canada today.

1. The Business Models Related to Infrastructure Needs

Infrastructure provides the foundation upon which nations, cities, and rural communities prosper and thrive, both socially and economically. For decades decisions related to infrastructure have been made from an engineering and urban planning perspective, with a recent emphasis on the public policy and economic dimensions of infrastructure development. However, issues associated with social equity, environmental degradation, sustainability, new technologies, and climate change introduce further levels of complexity that individual disciplines alone cannot fully address.

In addition to these decision making processes governments are increasingly turning to models of infrastructure delivery that depend on the skills and resources of the private sector to harness talent

and resources, not the least of which is private capital. Scarcity of water, power generation by renewable resources, climate change and deterioration, and even the delivery of health care or education increasingly depends upon solutions for which borders and jurisdictions are a minor irritant. Financial resources available to invest in 'alternative assets', including infrastructure, seek the best risk-adjusted rates through private investment vehicles that are international, the players in this game rely on a global presence, and today accounts for upwards of 1/3 of all global capital investment. In addition new technologies are as likely to emerge from developing economies as they are from well-established nations. This is what is driving the business of infrastructure today.

The trend of increasing private sector involvement in the delivery and maintenance of infrastructure is not without its detractors. Some governments see this trend as a threat to their existing governance models and to public sector unions this raises the specter of job insecurity. Ideological barriers exist in many jurisdictions to the 'privatization' of the delivery of such critical commodities as water and public transportation, and vested interests can be a potent barrier to a shift in how things might be done. Despite these concerns, significant changes are being made with new business arrangements that combine the strengths of the public and private sectors in formal partnership arrangements to affect new infrastructure models.

By thinking of infrastructure as more than an engineering or public policy issue it becomes apparent that there are a variety of business models underlying the delivery and management of infrastructure that need to be developed and understood to further multiple objectives. But what is a business model? Put simply, a business model is a theory for how resources can be used to deliver value. Whether an organization is public or private, an appreciation for how objectives can be achieved given the complexity of the social, economic, political, technological and physical environment is critical to crafting effective infrastructure investment and management strategies. A recent example can be seen in Innisfill Ontario whereby the municipal government developed a business model which will see Uber to deliver rides traditionally offered by a hub and spoke public transit service. This will enable the municipal government to deliver similar service without the capital investment associated with creating a public transit system.

Business models can be crafted to achieve both financial and non-financial objectives, whether directly or indirectly. In Scotland, a rural town devised a business model whereby it would oversee the investment in wind turbines. Proceeds from the energy sold have been directed to fund affordable housing. Where creativity resides is with business models that represent the nexus of public and private engagement and are capable of launching projects that neither government nor the private sector could handle alone. For example, in New York City Sidewalk Labs (a division of Alphabet/Google) and the municipal government have entered into a partnership where Sidewalk Labs has deployed kiosks that emit free wifi for users and collects data on commuting patterns, air quality, and weather events. In addition to the revenue potential of this data to Sidwalk Labs, the municipal government will have access to this data to better plan future infrastructure.

Discussion Questions

- What do we mean by a business model in the context of infrastructure?
- Why is a business model a requisite to any infrastructure procurement program/process intended to address (public) objectives?

- How do legal, regulatory, capital, governance and accountability systems affect the realization of (public) objectives?
- Where and how do end users enter the picture in this discussion?
- If there are multiple business models to consider, how best to evaluating their appropriateness?
- What will be the role of Canada's proposed Infrastructure Bank?

2. Tackling Revenue Sources

Much of our public infrastructure is still looked upon a “free good” by taxpayers, with the assumption that it is paid for through taxes. This is the case in Canada than in many other countries including the US and those across the European Union. Canadians tend to have an aversion to any semblance of ‘privatization’, and rarely encounter toll roads or bridges. Residents of Toronto immediately refer to Highway 407, a well used toll highway that government at the time could not afford, as the scourge of privatization.

Given that most infrastructure in the near future will be transportation related and might well address new technologies such as autonomous cars and trucks, battery or natural-gas propelled buses, driverless transit vehicles, or new modes of shared mobility, the question arises: Who pays for all of this? Governments without the financial resources and a robust enough tax base are not likely to encourage the adoption of these technologies. User pay business models will increasingly take precedence, despite the lack of political will at the provincial level with a recent example seen in Toronto and its discussion of tolls on two large municipal highways. But we must be prepared to move beyond archaic fare collection systems that have plagued public transit in most Canadian cities and look to more integrated payment systems that utilize current technologies and with the users in mind, dispense with the separation of the public and the private domains, and make the value proposition transparent for the user.

Two examples come to mind. The first is the Stockholm congestion charge which took 1 of every 5 cars off the road, reduced congestion and travel time for the remaining cars, facilitated the movement of goods around the city, reduced greenhouse gas levels and provided a massive annual subsidy to Stockholm’s public transit system. After an initial 8 month trial period, the congestion charge received 80% of voter support in a referendum. One year earlier in a similar referendum, 80% were opposed to the congestion charge.

The second example is the Helsinki Mobility App, *Maas*. At a tap of a smartphone screen this app will show the best way to get from point A to point B by combining public transport and a variety of options from participating private firms. If there is no obvious route, the App might suggest a bicycle from the city’s bike-share, followed by a train and then a taxi; an on-demand bus (“hail” it on the app and it will come and pick you up); or a one-way car-share to a tram and a rented “e-bike” with a small electric motor to alleviate the strain of pedaling for the final leg. Once a route has been chosen it will make any bookings needed, as well as ensuring that hire vehicles are available and public-transport sections are running on time. Costs will be displayed for every option, making clear the trade-offs between speed, comfort and price. Customers will be able to buy one-off journeys or “bundles” modeled on mobile-phone contracts, allowing a certain amount of travel each month. This is one example of the new frontier in pricing and revenue models that are user friendly.

Discussion Questions

- What are the objectives of revenue models?
- Do we need to access new sources of revenue to fund infrastructure? Why not continue to rely on general revenues or and the tax base?
- What are the possible policy implications, real and perceived risks, and some of the potential unintended consequences (socio-economic disparity) associated with different revenue sources to fund infrastructure?
- Can governments agree upon and adopt clear, policy guideline on user pricing, such as those pronounced by the Federal government (new infrastructure = tolled, existing infrastructure = availability), or the refusal of the Ontario government to support a recent pricing initiative proposed by the City of Toronto?
- How do you reconcile the potential benefits of dynamic pricing models with political accountability?
- What can we learn about effective user pricing models from other jurisdictions?
- How do we tie revenue sources to value propositions for stakeholders and end-users?

3. Developing New Value-Capture Models

The business case for introducing and improving infrastructure is often linked to the generation of multiple economic, social and environmental benefits. Notwithstanding the significant capital, operating, and maintenance costs associated with the development and improvement of infrastructure, the current wave of Canadian infrastructure projects has largely overlooked opportunities to monetize the value generated by the introduction and improvement of infrastructure. Instead, there are numerous examples where the introduction and replacement of infrastructure has resulted in “windfall” profits for owners of adjacent properties experiencing considerable uplift in land values directly attributed to infrastructure investment. A key example can be seen in the West Don Lands of Toronto, which has been the recipient of considerable public investment in flood-protection infrastructure as well as public subsidization of soil decontaminated in order to accommodate the Toronto 2015 Pan/Para Pan American Games. This infrastructure investment has facilitated the redevelopment of many adjacent properties, the profits of which will not be tracked or directly applied to repay the costs associated with that infrastructure. This outcome is consistent across several large infrastructure investments in Ontario, including the York University subway extension and the Eglinton Light-Rail Transit development.

There are, however, examples of value-capture models used globally to fund new infrastructure investment. The introduction of the London Crossrail subway and the extension of the Number 7 subway line within Hudson Yards, New York City are both projects where the cost to construct and partially maintain publically owned infrastructure will be funded by a series of measures that extract payment from businesses, end users and adjacent land owners that directly benefit from the infrastructure investment.

Models of successful value capture tend to share similar characteristics, including strong government leadership and support, transparent linking of value uplifts to the repayment of infrastructure costs, accountability measures and continuous monitoring, and a strong appreciation of the different sources of value that can be created. That said, successful value-capture models are unique to the environment

and the relevant project, and tend to demonstrate a strong appreciation of the realistic economic added value generated by the infrastructure project and received by property owners, businesses, institutions, and residents in the surrounding area. This differs from the blanket adoption of template value-capture models that tend to shift value from one region to another.

Discussion Questions

- Based on the considerable costs to the public and the risks involved to both public and private partners in the delivery of new infrastructure or rehabilitation of existing infrastructure, should the public not be compensated for the value created for adjacent land owners who might otherwise enjoy 'windfall' profits?
- Are there models for value recapture that work and that recognize different sources of value (financial, social and economic)?
- Are governments forfeiting the imbedded value of data collection in this new world of 'Big Data' and the Internet of Everything?
- What can be learned from the experiences of existing value-capture models, and what remains to be developed?

4. Infrastructure Productivity

Airlines and airports are leaders in demonstrating infrastructure productivity that is user driven, employs some of our most advanced technologies, is highly regulated to protect public safety, is financially self-sufficient, relies on multiple revenue sources from land fees to retail outlets, provides revenue for governments through taxes and land rent payments, and continually reinvests in facilities and equipment. Compare this to public transit. So much of our public infrastructure is underutilized and designed for peak capacity over relatively short periods of time whether underground utilities, above ground highways, or public transit. Compounding the problem is the lack of real-time data to track utilization, the archaic methods of undertaking continuous repairs and maintenance and the disruptions that result, and our propensity to continue to expand infrastructure elements that were largely invested in the late 18th and early 19th century.

The building of infrastructure itself is prone to the same lack of productivity that has plagued the entire construction industry in most developed countries for decades as compared to what we see in the manufacturing and services sectors. Infrastructure is not a highly researched field with the exception of civil engineering and materials science, and slow to adapt to new and evolving technologies. Infrastructure productivity is also plagued by the silo mentality within governments that typically assign highways, transit, water, electricity, or sanitation to deferent departments that jealously guard their domains. Yet, the frontier of infrastructure productivity is often integration, cross fertilization of ideas, or redefining the problem to be solved. Approximately 40% of water in Toronto's water system is lost to leakage in aging pipes. This raises the question as to why we don't develop technology to treat water at the point of consumption and not at source, and do more to capture and recycle 'grey' water - following the lessons learned in Singapore.

Infrastructure productivity also touches upon sustainability as it effects the allocation of resources and environmental impacts. Our highways, airports, transit lines, and utilities, collectively, have a significant

impact on our objective to reduce carbon emissions and to make our cities more sustainable. One good example is the recent research on Renewable Natural Gas (RNG) derived from refuse and landfills. Refuse is a byproduct of city living and the methane it produces can be recaptured to fuel busses and other transit vehicles with very little reinvestment in road infrastructure. But this requires changes within traditional public authorities, cooperation with private sector partners, and challenging current practices.

Dealing with infrastructure productivity goes well beyond the promises of the PPP model, but so do the benefits. Enhanced productivity lies at the nexus of organizational change and technology, and requires new types of business models that blur the distinction between the public and the private sectors, much as we now see with our airports that were once government entities.

Discussion Questions

- Have we made the case for new infrastructure project from a public benefit perspective, or are political mandates a key driver (shovel ready projects)?
- Are the benefits highly exaggerated and the overall infrastructure deficit highly distorted from a productivity perspective? If so, what are the factors underscoring this behaviour?
- Can technology advancements such as data collection devices, cloud-based computing, autonomous vehicles, and hand-held devices be used to enhance the utility of infrastructure, particularly existing infrastructure?
- Can infrastructure be scaled to match productivity profiles (airports, cargo handling, and trade corridors)? Can intangible service providers replicate the services delivered by existing infrastructure? If so, what governance models will be designed to address the accessibility and equity considerations of those service providers?
- Why have we failed to use existing infrastructure more productively (design for peak capacity, significant underutilization, and mispricing)?
- Do we understand the distinction between depreciation (accounted for in the PPP model) and functional obsolescence (not a function of time nor money)?
- Does the mismatch between the life of an asset and the business model suggest that the public sector is the implicit equity holder in PPP? If so, should additional objectives be pursued?

5. The Role of People and Institutional Memory

The delivery and continued operations of infrastructure is a collaborative effort between public, private and civil sector parties that must be sustained over long time periods. Such relationships can involve advisors, equity sponsors, public sector procurers, providers of debt capital, contractors and political actors. Some of these collaborative relationships are formal and require legal agreements, whereas others are built on trust and goodwill. In the course of time uncertainty may prevail when interpreting legal agreements that are inherently incomplete or vague. With personnel turnover, contractual interpretations may change and appreciation for complex contractual provisions may wane. The result

may be the emergence of tactical measures that rely more on trust and goodwill and less on legal recourse. Without robust training processes for contract managers and organizational structures to enhance institutional memory, people and relationships will become critical to the fulfillment of project outcomes and, in PPPs, value for money. Even today, PPP projects within the operational phase are experiencing differing levels of contractual enforcement largely due to the relationships developed by private Project Companies and facility contract managers, and the level of training received by contract managers. One could argue that people are the fourth “P” in PPP.

Discussion Questions

- Are organizations entering into partnership agreements fully aware of the risk and the costs involved into the operation stages of infrastructure partnerships?
- Are current practices and processes failing to recognize the role and importance of intuitional memory and the transfer of imbedded knowledge?
- Will governments have the leadership and/or political will to cancel contracts if they fail to deliver what is "promised"? Might they do so without an appreciation of the institutional memory associated with an infrastructure asset to understand what was originally "promised"?
- What role will people play in the interpretation and enforcement of long-term legal agreements such as PPP agreements?
- How can there be a transfer of tacit knowledge to enhance the learning curve of organizations to go beyond the procurement stage and to fully understand the business models underlying the infrastructure partnership agreement?
- Are people the fourth "P" in PPP? If so, should we begin to think of PPP as more than a contractual or procurement model?

Conclusion

A number of trends are foreseen as challenging existing definitions of infrastructure as well as offering unique opportunities for those who are willing to explore infrastructure as a business model. Some of these trends are embedded in other industries such as data collection, in new technologies such as battery power or hand-held wireless devices, or changing user demands. Others are mandated by factors such as scarcity, patterns of urbanization, or a rising (declining) middle class and income inequality. Resource scarcities, environmental concerns, and climate change will hasten the functional obsolescence of some traditional forms of infrastructure and drive the search for new innovations. New business models are likely to be located at the nexus of where government and investor interests, the marketplace, and new technologies intersect. Early movers are firms and public agencies that capitalize on the willingness of consumers to pay and share, those considering improvements to existing devices such as the autonomous car, or cities that want to “get smart” through shifts in how they perceive needs and address these needs in ways that are more environmental and social responsible and can contribute to enhanced quality of life for urban dwellers.

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