

Technology and Skills in Transportation

WESTAC 

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Prepared by Eulala Mills



Introduction

Economic globalization and international trade have grown faster than the overall economy, quadrupling between 1980 and the present. New economies are emerging, trade routes are shifting, and Canada faces new economic challenges. Demand for freight transportation is increasing in line with our growing population and increased economic activity. As a result, North America is experiencing increased congestion at our borders, our seaports, and on our major surface transportation corridors.

B.C. is Canada's Pacific Gateway, the preferred gateway for Asian trade to North America and the world. Transportation is a key support for economic growth and development. More than any other sector, it serves the dual purpose of generating direct employment and underpinning job creation, development and progress throughout B.C. Traffic through Port Metro Vancouver and the Port of Prince Rupert has increased impressively. As an example since 2010:

- Total coal tonnage is up 16 per cent at the Port of Prince Rupert;
- Potash is up 30 per cent to a new record of 7.2 million metric tonnes;
- Seafood exports to China exceeded \$100 million in 2011;
- Grain is up 17 per cent.

The main criteria used by shipping lines for port/gateway selection are: market coverage (local versus intermodal markets); sailing schedules and frequency; transit times; total transport costs; port capacity and infrastructure (i.e., on-dock rail, draft); road access/congestion and labour. Supply chain economics are also an important factor and there are economic alternatives that favour all water routes from Asia to the U.S. east coast (the largest areas of goods consumption in North America) as importers continue to explore supply chain solutions that increase reliability. The US west coast port congestion and intermodal constraints as well as rising fuel prices have made all-water routes more economical. Since 2000, all-water routes have gained market share and now account for about 25 percent of U.S. imports from Asia (this may increase to 33 percent or higher). As a result, U.S. Atlantic ports, especially New York/New Jersey, as well as Halifax have the potential to increase their market share from Asia.

The Supply chain, as an organizational concept, has been around for less than 30 years, and the technology focused on improving it is newer still. In reality, in comparison to centuries of freight movement and management, most aspects of logistics and supply chain management end to end are new and evolving.

Innovation includes the provision of new goods or services and new ways of supplying existing goods or services. The essence of innovation is improvement over current practice through the exploitation of advances in knowledge. Improvement can pertain to products, services, business models, marketing, and to general purpose technologies. Innovation is clearly a very broad concept, and while the definition may not be particularly helpful in identifying key policy issues, it invites a few observations: Innovation is much broader than R&D, including often less tangible involvement of businesses and consumers. Innovation is, by definition, about change and involves uncertainty for innovators and non-innovators. When individuals and societies are risk averse and less risky activities are easy to access, then innovative effort is discouraged even if the rewards in case of success are high. This view

emphasizes that attitudes toward innovative activity depend on macroeconomic and social configurations, and that a balance should be struck between these configurations and innovation/growth objectives.

Executive Summary

Forty individuals from across western Canada and representing all six sectors (Air, Construction, Logistics, Marine, Rail and Trucking) in the Asia Pacific Gateway were surveyed or interviewed to gather their impressions about the current priorities in technology and innovation investments. They were also asked about the impact of technology and innovation on the workforce.

In general respondents put priority on capital infrastructure rather than human capital investments. Respondents put environmental technologies at the top of the list followed closely by business process automation investments. Work tools, such as 'apps' and worker mobility enablers (smart phones, tablets) are the human capital investment priorities. On the other end of the scale, E-Learning technologies were seen by very few as important for current investment.

Of note were comments related to environmental protection and recovery. For several respondents (both interviewees and on-line survey participants) the 'social license' issue related to both land use and disaster recovery was of critical importance not only to innovation in the Gateway but, perhaps more importantly, to expansion and realization of growth opportunities for products and services delivery through the Asia Pacific Gateway.

When respondents answered questions related to the most important area for innovation focus, Supply Chain/Logistics were seen as the most important area.

"Logistics is fundamental to all of our work; it needs to be the area of most investment and energy. The process is the center of the work of the gateway."

Cross Entity Collaboration came second for those interviewed and several of those surveyed used Prince Rupert as a model of what cross entity collaboration can create in terms of customer satisfaction and growth.

"Cross entity collaboration is key – Prince Rupert is the example, it has been developed through collaboration between several large entities. They set a target – save 100 hours to Chicago – they measure performance and can demonstrate that they have consistently beaten their target. ...this collaboration has driven customers to the Port – it is the key to our competitive advantage in the Asia Pacific Gateway."

When asked what could be done from a policy or regulatory perspective to better enable innovation across the Asia Pacific Gateway, nearly a third of respondents agree that an effort to, at minimum, describe and coordinate the vast array of permitting and approval processes required by all levels of government is essential to innovation and growth in the Asia Pacific Gateway.

The project also looked at the impact of technology on the workforce. The majority of respondents felt that when change happens in the work process the key to getting the full value is to develop a comprehensive change management program that includes thought leaders, broad and detailed communications, comprehensive training and long term reinforcement.

Throughout the interviews participants commented on their perception that finding skilled workers was challenging and shortages were looming if not a reality already. In the on-line survey we asked about challenges in hiring new workers. For skilled trades the single biggest issue (48% of responses) is seen to be competition from other industries. However, the next highest response (24%) is 'I have not had difficulty finding skilled trades workers.'

In the on-line survey, participants were asked about what they look for first when hiring a new employee. 'Attitude and cultural fit' were equally important as 'certification' for trades workers, with 'experience in my industry' a close third. For non-trades/professional workers the opinion was quite different, here experience in my industry was a strong first and attitude with cultural fit running second.

Summarizing the information, there appear to be five areas where further action may be of benefit to the Asia Pacific Gateway and its component organizations. In no particular order these are:

1. Work Experience not certification is employers' key priority in hiring new employees; this has significant implications for post-secondary program structure design and delivery.
2. Are Asia Pacific Gateway employers having difficulty filling vacancies? The responses show that 20-25% have not had challenges finding workers. The reality, area of work, size and impact of what is described as a looming vacancy crisis is important to establish in the near future.
3. There is conflict between the current focus on investment in Capital Infrastructure and the acknowledged but largely unsupported strategic need for strong HR support systems and tools.
4. Overlapping jurisdictions, processes and responsibilities in permitting and decision making for growth and expansion is a strong area of concern across all respondents.
5. Cross entity collaboration appears to be the most common need expressed for future innovation for the organizations working in the gateway.

Clearly technology and innovation investment remains focused on capital infrastructure. The common response was that the intention, when technology is added to the business process, is largely to increase the overall profitability and efficiency of the organization. The recognition is strong that the real value in these technological changes comes only when the human capital, the workers themselves, are invested in through training, learning and support. However it does not yet appear to translate fully into investment in the programs and tools that can enable that learning. For the Asia Pacific Gateway and its component organizations to truly benefit from investments in technology and innovation this misalignment of priorities will need to be addressed.

Project Purpose

The Asia Pacific Gateway Skills Table, as a part of its Labour Market Information (LMI) project, is examining the business priorities for innovation, largely technology driven, and the incentives or barriers to it across the transportation and logistics sectors in Canada. Working in partnership with WESTAC, the APGST will gather information from business leaders in these sectors to build a greater understanding of what creates business decisions to implement technological innovations, their key areas of technology or innovation focus and associated expectations around technological skill and knowledge needs of labour force trades and professionals. The policy, regulatory and program challenges and opportunities will also be examined.

Innovation, usually technology driven, is a measurable, sustainable, intentional process to help expand a business by providing a way for people to put ideas into valuable action. Efficiency, innovation and business process changes are creating a very different work environment in the Gateway than existed even 5 years ago. These changes affect the workforce, the skills, abilities and capacities needed by businesses, the standards for entrance into the workforce and, most importantly, the competitiveness of the Asia Pacific Gateway & Corridor. This project will focus on the attitudes in senior executives about their areas of focus for innovation and any impact on Human Resource programs, policies and planning for the businesses of the Asia Pacific Gateway & Corridor.

Project Outcome

The project will demonstrate the areas of priority in technological innovation (capital infrastructure or human capital), the areas of focus (equipment, logistics, and manufacturing), the purpose (ROI/efficiency, information/communication, speed to customer), the training and workforce skills impacts and the policy levers that challenge or enable these new ways of doing business. A report will be generated from a combination of direct interviews of a sample of business strategy leaders in the transportation and logistics businesses across the Asia Pacific Gateway & Corridor and a short on-line survey of a broader sample of these leaders.

Methodology

This is a qualitative assessment of the priorities of a wide range of leaders in organizations throughout the transportation and logistics sectors of the Asia Pacific Gateway. Forty individuals were either surveyed or interviewed directly. The interviews were 30 to 60 minutes and were completed by telephone using the interview framework attached as appendix A and the survey was done via a web based survey tool using the questionnaire attached as appendix B. The list of potential respondents (the whole of the sample used for both the interviews and online survey) is attached as appendix C. We have not included the names of those interviewed or surveyed to protect the anonymity of respondents.

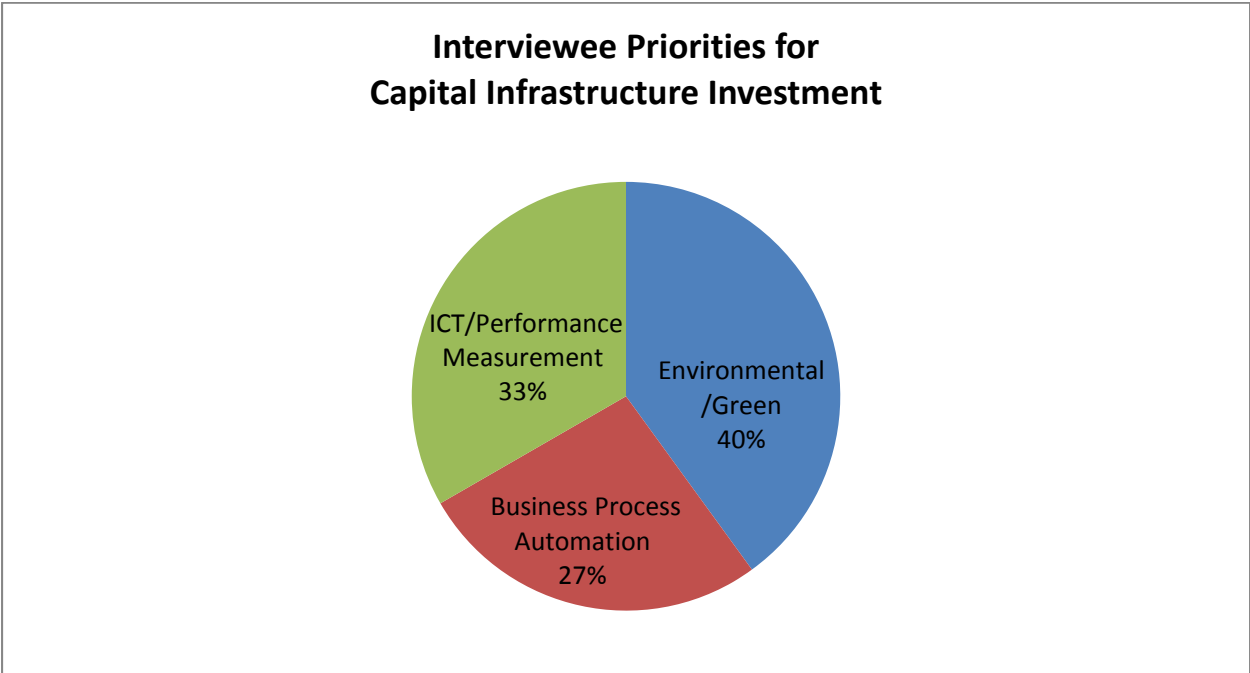
Interview and Online Survey Results by Question

Question 1. What do you think are the key priorities for Capital Infrastructure technologies?

- a) Environmental impact/green (e.g. alternative fuel vehicles, LEED certified buildings)
- b) Smart systems and automation of business process
- c) ICT and other communications/performance measurement technologies

For those interviewed priority was quite evenly distributed between the three options. Environmental technologies and innovations were most often mentioned as the priority. In specific both the ISO standards and the Green Marine Standards were noted several times as the current focus of innovation and effort in improving environmental outcomes in the Asia Pacific Gateway. This was true for a wide range of organizations, from those representing labour in the Asia Pacific Gateway to large scale distributors and shipping lines.

Also of note were comments made by interviewees related to environmental protection and recovery. For several of those interviewed the ‘social license’ issue related to land use and disaster recovery was of critical importance to innovation in the Gateway and, perhaps more importantly, to expansion and realization of growth opportunities for products and services delivery through the Asia Pacific Gateway.



ICT and communications innovations were the next highest priority and in this area the most common comments related to the need for all of the players in the Asia Pacific Gateway to work more closely and enhance overall integration by creating and using shared information systems to manage the flow of goods into and out of Canada. As a sub category here there were several mentions of creating and enhancing a self-service mentality. The concept of building the information systems that allow clients

and customers to manage their activity be it exporting cargo to Asia or moving goods around the lower mainland, end to end without direct intervention or interaction with the many parties that are involved in each transaction was seen as a key area of innovation focus across the Asia Pacific Gateway sectors.

Third, but almost equal in importance, is the area of business process automation and performance measurement. Here several interviewees spoke about the demonstration of value through performance measures and the extent to which that aids competitiveness and draws customers into the Asia Pacific Gateway. Added to the competitive advantages that automation and measurement creates it was noted that it can also point out areas of challenge and under-performance to help focus the Asia Pacific Gateway on those areas most in need of improvement effort.

“Supply chains are very fragmented and communications is not well organized and aligned – empirical information will help business and policy makers support the smoothing and efficiency of the supply chain. ...– this will be Canada’s competitive advantage.”

Question 2. What do you think are the key priorities for Human Capital Technologies?

- a) E-Learning and other online skills products*
- b) Human resource management systems*
- c) Mobile ‘apps’ and other technological work tools*

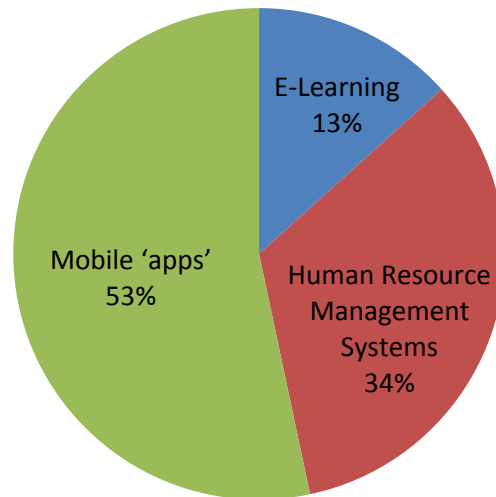
In this question there was a clear priority; Mobile ‘Apps’ and other technological work tools were seen as the most important area by more than half of those interviewed. There were a range of ideas and activities here. From tools for marine pilots that allow them to move ships more safely in fog and emergency situations to mobile offices that free workers from the need to be in a specific place at a specific time and thereby enable the 24/7 nature of the work more possible and worker supportive these tools are changing the face of work on the waterfront.

“Going forward, we now can get external data using mobile apps – e.g. ship finder that allows us to manage the timing of the work related to vessel arrival based on where it is in real time – so we can adapt schedules and crews on a real time and ongoing basis....”

On the other end of the scale, E-Learning technologies were seen by very few as important for current investment. Generally this had to do with the belief and business structure that support hands-on and train-the-trainer models of learning as most effective to helping workers adapt to change in the manner of doing business.

“E-Learning does what we want it to – use for orientation is fine, but for the more sophisticated things around the actual work it is not as effective as a hands-on type process in a team environment.”

Interviewee Priorities for Human Capital Technology Investment

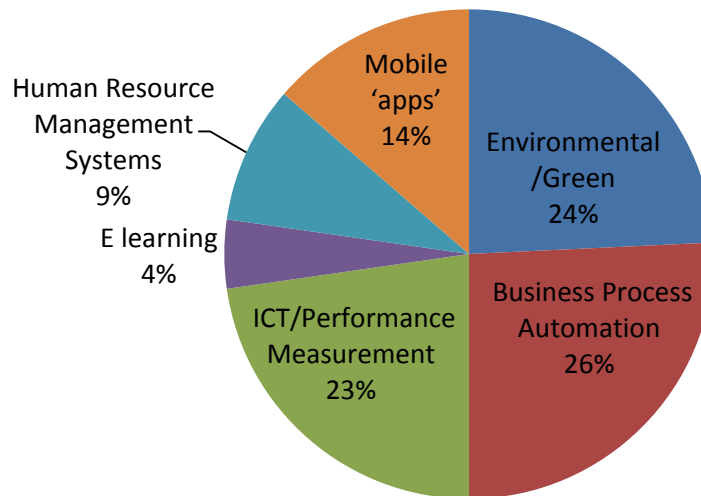


For those who saw the HRM systems as a priority it tended to relate to issues of attrition and worker turnover. Respondents noted that capturing information about the current workforce and their needs into the future was going to be essential to effectively managing what they see as a large worker turnover in the next 5 to 10 years.

When this issue was examined in the online Survey the Capital Infrastructure and Human Capital Technologies were combined into one question asking for the respondent's top three priority areas. The three Capital Infrastructure technologies were chosen substantially more often, and when combined represent 75% of the total, with each of the three areas (Environmental, Automation and ICT) coming in about even. This is very similar to the responses from those interviewed and the closeness in percentage of the areas indicates that the Asia Pacific Gateway is likely focused across all three areas of innovation and not currently leaning towards any one in particular.

On the Human Capital Technologies side, while in total they represent only 25% of online survey participants priorities, like those interviewed, Mobile 'Apps' are a substantially higher priority than either HRMS or E-Learning.

Online Survey Technology and Innovation Investment Priorities



Question 3. Which do you think is more important to productivity and/or business effectiveness?

While in the online survey, the respondent's preference for capital infrastructure investments is implied as Human Capital Technologies take a back seat in the ranking of priorities, those interviewed were directly asked to make a choice as to which matters most. Nearly 30% felt that a choice couldn't be made, that the two areas were interconnected.

"It's balanced between the two – we are a 22,000 mile long 'plant' with 22,000 workers – both need to be invested in in order for us to be effective."

Almost half those interviewed (47%) stated that the Human Capital technologies, and more clearly the Mobile 'Apps' and tools were more important to business effectiveness than any of the Capital Infrastructure technologies. This seems in contradiction to the clear investment priority shown by the online survey participants.

"Human capital is much more important – there is no big technology gap, it's a man power gap. We need to find the people who can and will do the short and long term work."

"Sustained competitive advantage is investment in people and advancing knowledge and thinking."

While this project did not delve deeper into this apparent dichotomy, it could be that this is a familiarity and direct ROI issue. Respondents are more informed about the impact and return of automation and

environmental investments but are aware that people hired to work in the ‘plant’ are the key to delivering on the investment. This area may be one worthy of more detailed investigation.

Question 4. What do you see as the highest priority for Innovation? Why?

- a) Supply Chain/Logistics*
- b) Manufacturing/Business operation metrics*
- c) Equipment*
- d) Human Resource allocation and function*
- e) Communications and information access*
- f) Cross entity collaboration*

Whether in the Online Survey or the Interviews, Supply Chain/Logistics were seen, by the majority of respondents, as the most important area for the Asia Pacific Gateway to focus innovation efforts.

“Logistics is fundamental to all of our work; it needs to be the area of most investment and energy. The process is the center of the work of the gateway.”

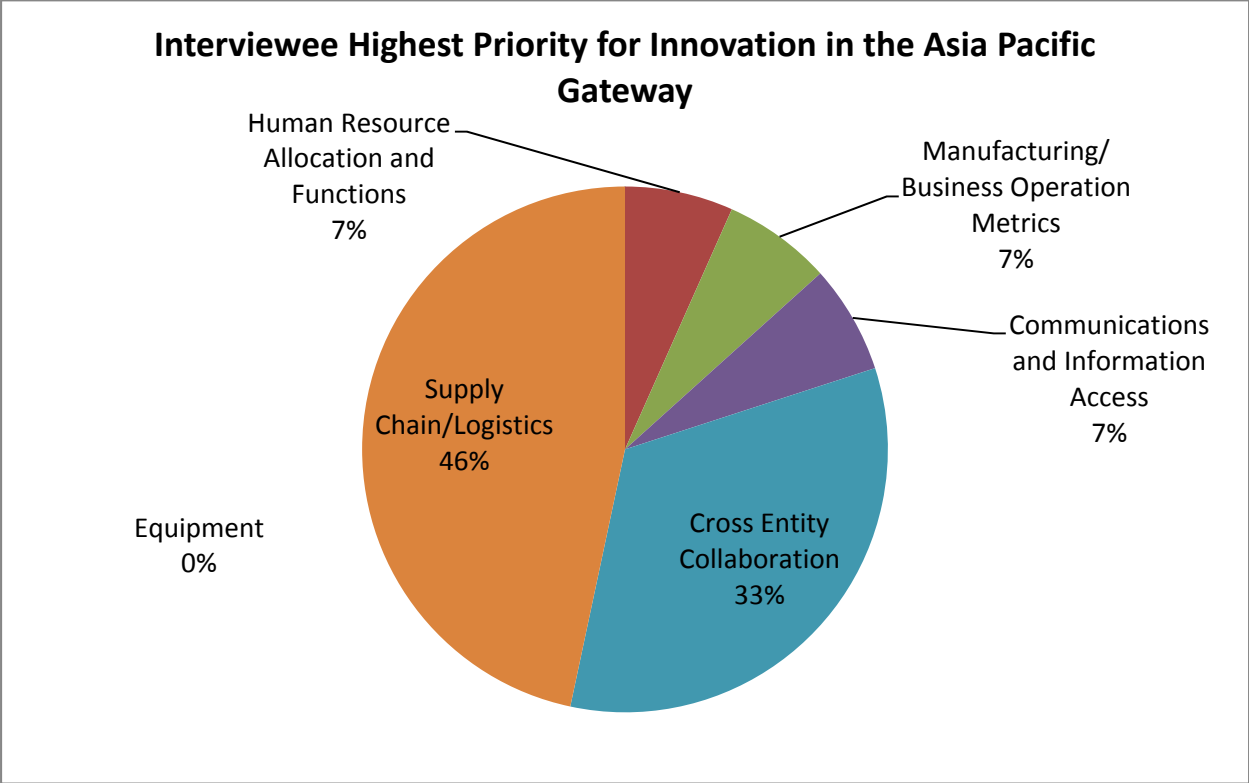
This may seem obvious as the first priority, given the work of the Gateway, although those interviewed interpreted the category widely. In many cases comments related to the ability to communicate efficiently, effectively and across organizations making information a factual foundation for the gateway as a whole as the central focus of innovating the Supply Chain and Logistics function of the Asia Pacific Gateway.

“There are multiple participants in the supply chain – all need to have the same information at the same time to be effective – data needs to be fact not opinion.”

“Innovation comes when you cross the organizational boundaries”

Cross Entity Collaboration comes second for those interviewed. They see it as the necessary next step to move the Asia Pacific Gateway up in international views. Many of those surveyed used Prince Rupert as a model of what cross entity collaboration can create in terms of customer satisfaction and growth.

“Cross entity collaboration is key – Prince Rupert is the example, it has been developed through collaboration between several large entities. They set a target – save 100 hours to Chicago – they measure performance and can demonstrate that they have consistently beaten their target. ...this collaboration has driven customers to the Port – it is the key to our competitive advantage in the Asia Pacific Gateway.”

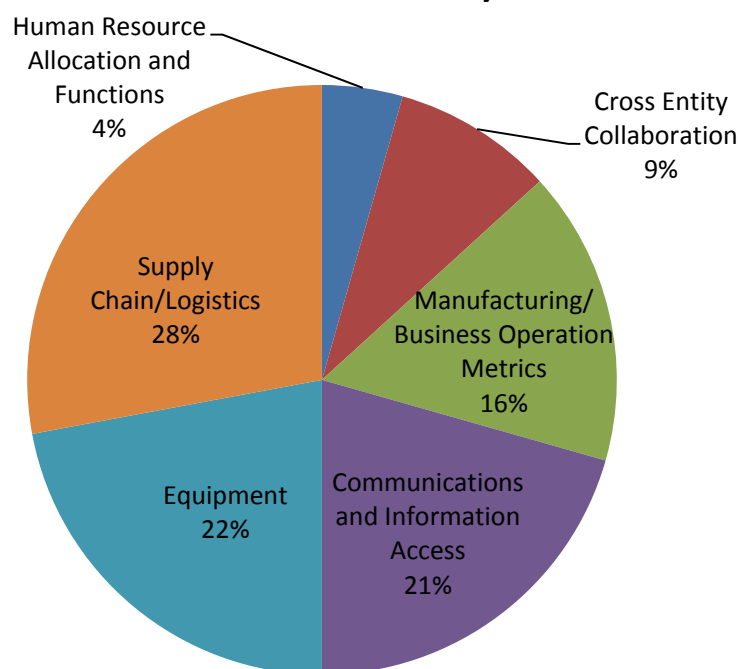


One interesting difference between the online survey and the interview respondents in this question relates to Equipment. For those interviewed none suggested that Equipment was the first priority, in fact many stated that the equipment was largely up to date and was not in need of innovation.

“Employers are happy (productivity is good) and are not looking to make large capital investments in their equipment.”

In the Online Survey, Equipment is ranked second in priority, though only one percent above Communication and Information Access. This may be due to a slightly different profile in the two groups of respondents. More likely the difference relates to the flow of conversation during the interviews. At this point in the interview process many participants were focused on discussing competitive advantages in the Asia Pacific Gateway and they saw that related to information and collaboration as equipment is largely common across the globe and creates efficiency but not competitive advantage.

Online Survey Respondents Highest Priority for Innovation in the Asia Pacific Gateway



Question 5. Where do you think government/business can enhance or change regulations that will enable/hinder innovation?

There was a very wide range of answers here from both sets of respondents. They fell into 7 categories:

1. Overlap of responsibilities and decision making authority (27% of responses)
2. Labour and Union regulations (15% of responses)
3. Training programs and responsiveness (11% of responses)
4. The lag between innovation and regulatory change (11% of responses)
5. Financial incentives to support innovation (11% of responses)
6. Environmental Issues (4% of responses)
7. Other areas (20% of responses)

In the 'other' category some responses related to specific industries, some related to other supply chains or gateways and some were related to specific programs. Clearly, with the highest proportion of respondents commenting on challenges related to the overlap of responsibilities and processes in the permitting, environmental approval and decision making processes, this is an area of opportunity for decision making authorities.

"We need harmonization of policies and regulations that govern the movement of goods across Canada."

“Project approval timeframe and costs are escalating and inhibiting investment, this can be the tipping point to kill the project and it seems to be getting worse not better. Multiple jurisdictions and increasing number and complexity of the processes needed to get permits, approvals - it is potentially ending some investments before they begin”.

“The lack of alignment and integration between the province, federal government and municipal authorities in areas related to the gateway and the misalignment between them is our greatest challenge”

The respondents seem to agree that an effort to, at minimum, describe and coordinate permitting and approval processes required by all levels is essential to innovation and growth in the Asia Pacific Gateway. Some go further and suggest that an overall business process mapping and optimization is needed.

At the same time, there is agreement among those interviewed that the environmental impact and land use development processes are needed and that ‘social license’ issues in the communities the Asia Pacific Gateway operates in cannot be ignored or short circuited. They state that the process needs to be harmonized and coordinated, not removed or circumvented.

Question 6. What is the main purpose of Innovation/Technologizing?

- a) ROI and Profit - Better Business Returns*
- b) Information – better business process*
- c) Speed and Customer Expectations – better, faster, cheaper*

While many of those interviewed were clear that all three options were strongly interrelated, when asked to choose the one that was the ‘price of admission’ the majority chose profit and return on investment. Given that many respondents are businesses with shareholders and owners, this again does not come as a surprise.

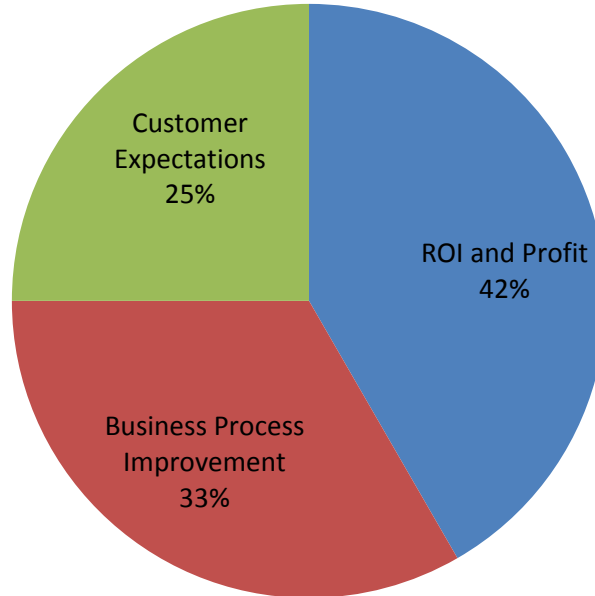
There were however, some different opinions:

“Innovation means you have a healthy company and culture. New ways to do things that brings value in the relationship with the customer. If you chase only ROI you may miss the real needs of your client and end up hurting your profit base.”

“ROI is key, except where safety is concerned, investments for the sake of safety are done because they need to be not because there are economic returns to it.”

“Speed and customer expectation is our main driver, we want to make customers happy and keep them working with us – this then creates the ROI. Customer will go to where the process is smoothest and waits are minimized....”

All Respondents - Main Driver for Innovation



Question 7. When you implement new technology what are the key training/hiring implications?

- a) New skills and their inclusion in existing training programs*
- b) Emergence of trades technicians (the blurring of the line between a trades worker and a technical expert)*
- c) Adaptation and change tolerance in individuals*
- d) Internally developed (company specific) or externally developed training (vendor, certifier, PSI)*

This question was asked only of interviewees. Generally comments related to change management and adaptation. The majority of participants felt that when change happens in the work process the key to getting the full value is to develop a comprehensive change management program that includes, thought leaders, broad and detailed communications, comprehensive training and long term reinforcement.

“As technology becomes more integral to the workplace the adaptability skills of individuals becomes 'the' key skill of your workers...”

“Adaptation and change tolerance is our main concern...”

“The impact of change on the individuals is our greatest asset and also our biggest challenge – everything rests on the way in which individuals adapt to change.”

Both the online survey and the interview asked more specifically about change adaptation of trades compared to non-trades/professionals.

While the online survey shows some difference between the two categories, with trades seeming to be seen as slightly less adaptable, the differences are relatively minor.

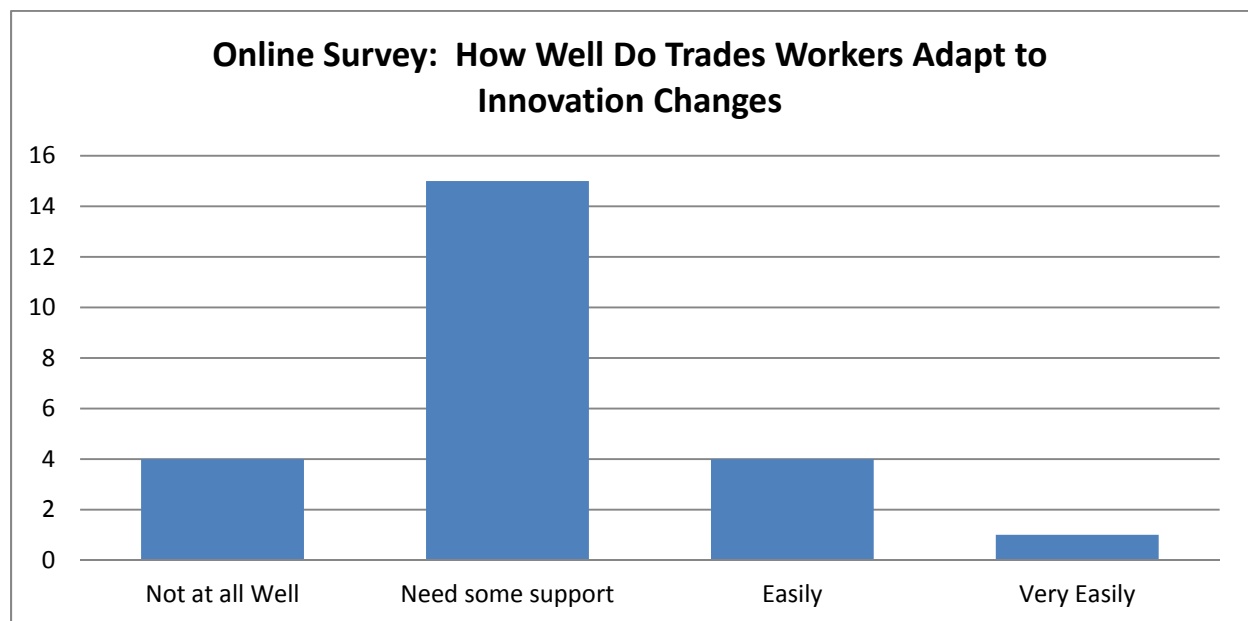
The interviews painted a more descriptive picture. Respondents talked about the trades as being generally the older demographic and therefore those workers are not as comfortable with technology as their younger counterparts. Several of those interviewed considered technological adaptation to be an issue that will be non-existent in the next 5 to 10 years as the older workers who are less confident with technology retire and their younger and/or more technologically savvy counterparts move into their roles.

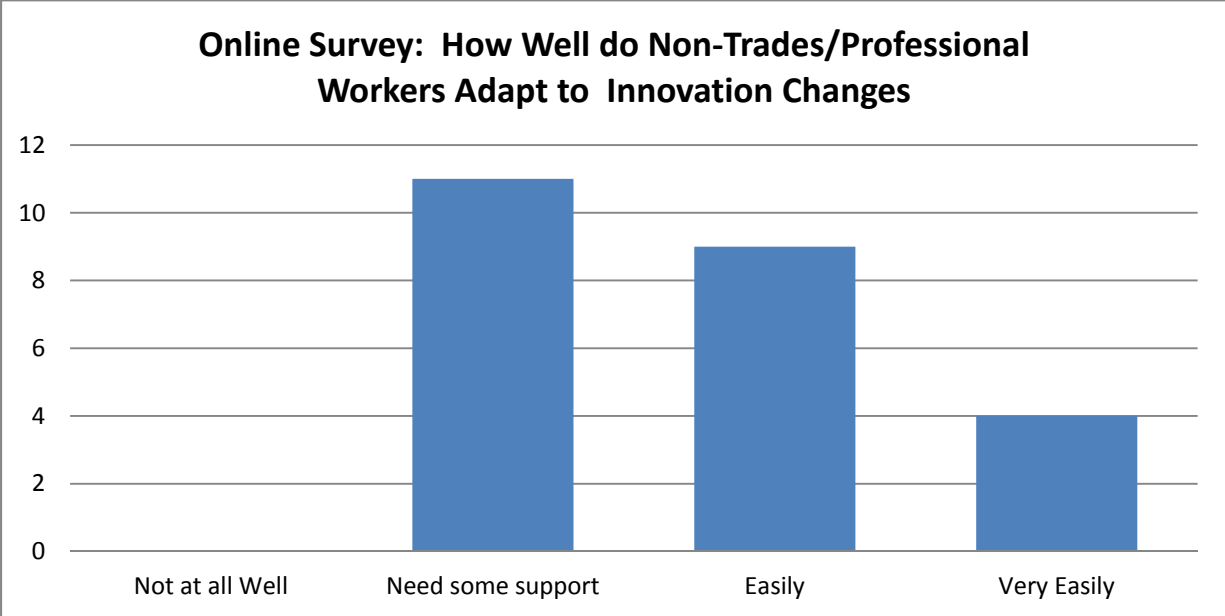
“This is a human question not a type of worker question – there will be those who want to keep doing the work the way they always have, regardless of where they work in the organization. And the opposite is true – the change leaders and innovators who are constantly improving because of their own internal drive exist everywhere in the organization.”

Many talked about innovation simply being a part of the work environment today and therefore, adaptability is a key skill for any worker regardless of his or her area of expertise.

“This is really a demography issue – the younger the worker the more technologically adept they will be, it’s just the nature of changing social technology”

“Age is the biggest factor to adaptation, after 20-30 years doing it one way, adapting to a new way is harder”





In the interviews, this set of questions also generated a number of comments about expected shortages of skilled workers and trades. It was here that the most expressed their concern about challenges on finding workers to fill vacancies and the large number of expected retirements in the next 5-10 years.

“Shortages are coming, we need to think well ahead of time in terms of hires – look early to get the best selection”

Though many interviews were confident that they could find the workers with the right attitudes and then once hired, build the necessary skills.

“We’ll find smart people and then we will train them.”

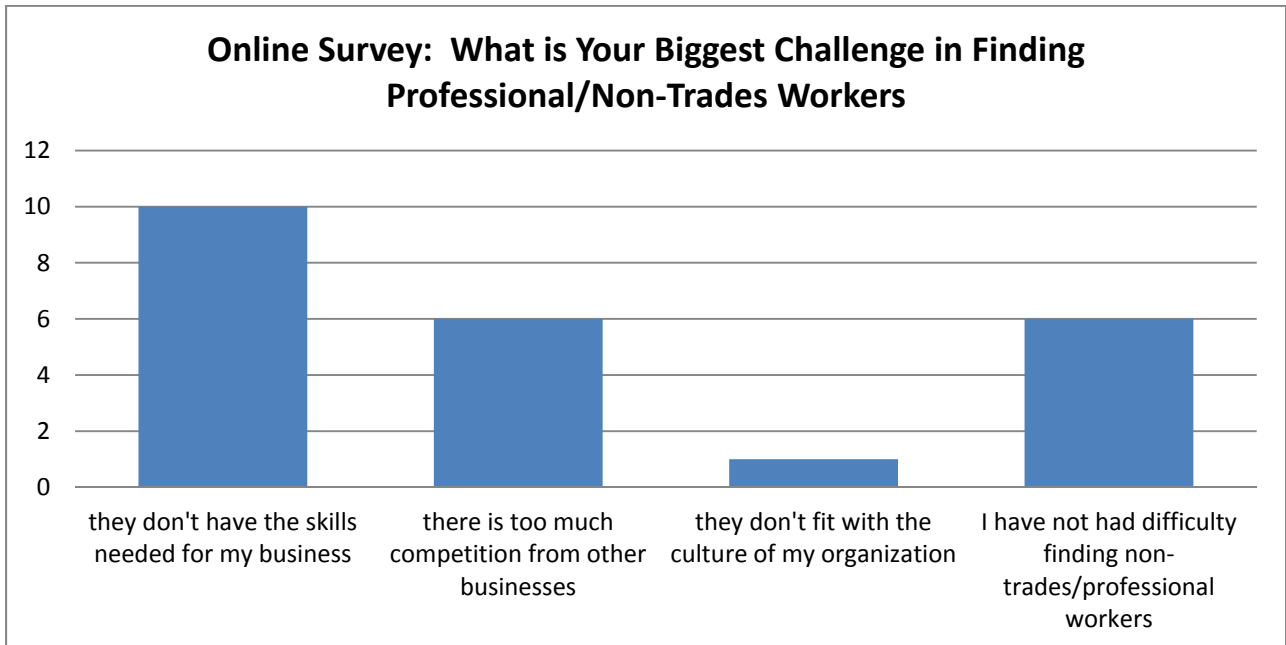
“Primarily we hire technologists and train electricians in-house from scratch”.

Question 8. What is your biggest Challenge in finding Skill Trades, non-trades/professional workers?

Throughout the interviews participants commented on their perception that finding skilled workers was challenging and shortages were looming if not a reality already. In the online survey, participants were asked about challenges they face in hiring new workers. For skilled trades the single biggest issue (48% of responses) is seen to be competition from other industries. However, the next highest response (24%) is ‘I have not had difficulty finding skilled trades workers’.



When the non-trades/professional workers are the focus of the question the most frequent challenge is 'they don't have the skills needed for my business'. The issue of culture is the smallest challenge and about a quarter of those responding said they have not had difficulty finding non-trades/professional workers.



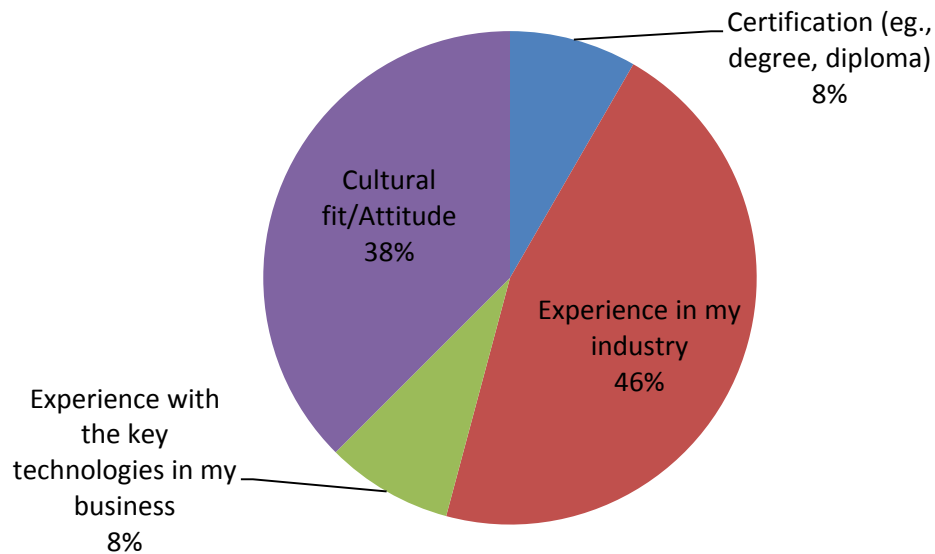
Question 9. When you are hiring a new employee, what is your first priority?

In the online survey, participants were asked about what they look for first when hiring a new employee.



'Attitude and cultural fit' were equally important as 'certification' for trades' workers, with 'experience in my industry' a close third. For non-trades/professional workers the opinion was quite different, here 'experience in my industry' was a strong first and 'attitude with cultural' fit running second. Very few participants thought that experience with key technologies were important regardless of the type of worker and certification was equally unimportant for non-trades/professional occupations. This sheds some interesting light on employers' priorities, experience being near the top of the heap for both types of workers and certification being nearly irrelevant in the non-trades/professional category. It may be worthwhile to delve somewhat deeper into this area as it could have quite significant impact on education and training programs, especially related to work experience support.

Online Survey: First Priority When Hiring a Non-Trades/Professional Worker



Possible Areas for Action

In looking at the responses from both the online survey and the interviews, there appear to be five areas where further action may be of benefit to the Asia Pacific Gateway and its component organizations. In no particular order these are:

1. Work Experience (not certification) is employers' key priority in hiring new employees; this has significant implications for post-secondary program structure design and delivery, both in trades and in other areas of certification.
2. Are Asia Pacific Gateway employers having difficulty filling vacancies? The responses show that 20% or more have not had any challenges finding workers. The reality, area of work, size and impact of what is described as a looming vacancy crisis is important to establish in the near future.
3. There is conflict between the organizations current focus on investment in Capital Infrastructure and the acknowledged but largely unsupported strategic need for strong HR support systems and tools.
4. Overlapping jurisdictions, processes and responsibilities in permitting and decision making for growth and expansion is a strong area of concern across all respondents.
5. Cross entity collaboration appears to be the most common need expressed for future innovation for the organizations working in the gateway.

Conclusion

This online survey and interview project crossed western Canada, touched on all six of its core sectors and included leaders that had tactical and strategic focus in their roles. It has demonstrated several areas of common focus including a priority on experience over certification when hiring and a frustration with the complexity of permitting and approvals for development and expansion.

Clearly technology and innovation investment remains focused on capital infrastructure. Even on the human capital side, the investment focus is primarily on tools rather than skills development or expansion. Again the common response was that the intention, when technology is added to the business process, is largely to increase the overall profitability and efficiency of the organization. This is often created by enabling one worker to accomplish a wider range of tasks in a shorter period of time through the use of new 'tools'. The recognition that the real value in these technological changes comes only when the human capital, the workers themselves, are invested in through training, learning and support is very strong. However, it does not yet appear to translate fully into investment in the tools that can enable that learning. For the Asia Pacific Gateway and its component organizations to truly benefit from investments in technology and innovation this misalignment of priorities will need to be addressed.

Appendix A: Technology Paper Project Interview Framework

1. What is the nature of the work of your organization?
2. Do you work locally, regionally, nationally, globally?
3. What do you think are the key priorities for Capital Infrastructure technologies:
 - a. Environmental impact/green (e.g. alternative fuel vehicles, LEED certified buildings)
 - b. Smart systems and automation of business process
 - c. ICT and other communications/performance measurement technologies
4. What do you think are the key priorities for Human Capital Technologies
 - a. E-Learning and other on- line skills products
 - b. Human resource management systems
 - c. Mobile 'apps' and other technological work tools
5. Which do you think is more important to productivity and/or business effectiveness?
6. What do you see as the highest priority for Innovation, Why?
 - a. Supply Chain/Logistics
 - b. Manufacturing/Business operation metrics
 - c. Equipment
 - d. Human Resource allocation and function
 - e. Communications and information access
 - f. Cross entity collaboration
7. Where do you think government/business can enhance or change regulations that will enable/hinder innovation
 - a. Red Seal/trades certification Requirements
 - b. Safety/Environmental controls and regulations
 - c. Innovation incentive programs
8. What is the main purpose of Innovation/Technologizing
 - a. ROI and Profit - Better Business Returns
 - b. Information – better business process
 - c. Speed and Customer Expectations – better, faster, cheaper
9. When you implement new technology what are the training/hiring implications
 - a. New skills and their inclusion in existing training programs
 - b. Emergence of trades technicians (the blurring of the line between a trades worker and a technical expert)
 - c. Adaptation and change tolerance in individuals
 - d. Internally developed (company specific or externally developed training (vendor, certifier, PSI)

10. How easily do your trades workers adapt to technical/innovation changes in work process? Why?

11. Do you see any differences with non-trades/professional workers? Why?

Appendix B: Web Online Survey

[SURVEY PREVIEW MODE] Westac/APGST Technology and Innovati... http://www.surveymonkey.com/s.aspx?PREVIEW_MODE=DO_NOT...

Westac/APGST Technology and Innovation Survey

1. Which 3 of the following technology areas are your highest priority?

Environmental impact/green (e.g. alternative fuel vehicles, LEED certified buildings)

Smart systems and automation of business process

Information Communication Technology (ICT) and other communications/performance measurement technologies

E learning and other on- line skills products

Human resource management systems

Mobile 'apps' and other technological work tools

Other (please specify)

2. Which 3 of the following are the areas of activity that you will focus innovation and/or technology implementations in the next 1-5 years

Supply Chain/Logistics

Manufacturing/Business operation metrics

Equipment

Human Resource allocation and function

Communications and information access

Cross entity collaboration

Other (please specify)

3. What is your main purpose in implementing a technology in your business?

ROI/Profit - Better Business Returns

Information – better business process

Speed and Customer Expectations – better, faster, cheaper

Other (please specify)

4. How well does your trades workforce adapt to new technology?

Not at all well

Need some support

Easily

Very Easily

5. How well does your professional workforce adapt to new technology?

Not at all well Need some support Easily Very Easily

6. What is your biggest challenge in finding skilled trades?

- they don't have the skills needed for my business
- there is too much competition from other businesses
- they don't fit with the culture of my organization
- I have not had difficulty finding skilled trades workers

Other

7. What is your biggest challenge in finding professional/non-trades workers?

- they don't have the skills needed for my business
- there is too much competition from other businesses
- they don't fit with the culture of my organization
- I have not had difficulty finding skilled trades workers

Other

8. When you are hiring a new trades/technical employee is your first priority

- Certification (eg., red seal, trades ticket etc.,)
- Experience in my industry
- Cultural fit/Attitude

Other (please specify)

9. What do you find most effective in building technical skills when you implement a new technology

- Internally developed training programs
- Product developed (i.e., by the company that the equipment/software was purchased from) training programs
- A mix of both

10. What do you see as the biggest policy or regulatory challenge to innovation in your business



Done

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Appendix C: List of Potential Respondent Organizations*

Alberta Roadbuilders
Alberta Transportation
Ashcroft Terminal
Assoc. for Mineral Exploration BC
BC Coast Pilots
BC Jobs, Tourism & Skills Training
BC Min of Transport
BC Roadbuilders
BC Trucking Association
BC Wharf Operators
BCMEA
BST Management
Calgary Airport Authority
Canadian Pacific Railway
Canadian Tire
Canpotex
Canadian Manufacturers & Exporters
CentrePort Canada
Chamber of Shipping
CN
COPE 378
CRSA Logistics
DP World
Fraser Surrey Docks
Fraser Wharves Ltd.
GCT Global Container Terminals
Gearbulk Shipping Canada
Global Transportation Hub
Harbour Link Container Svcs
Hunter Dickinson
ILWU
Initiatives Prince George
International Ship-Owners Alliance of Canada
InterVISTAS Consulting
Kinder Morgan Canada
Ledcor Resources & Transportation
Maher Terminals
Mining Association of BC
Nanaimo Port Authority
Neptune Bulk Terminals
North West & Canada Cruise Association
Pacific Coast Terminals
Pacific Pilotage Authority
Panalpina Inc.
Port Metro Vancouver
Prince George Airport Authority
Prince Rupert Grain
Prince Rupert Port
Quickload Terminals
Ridley Terminals
Ros Kunin & Associates
Seaspan
Saint Lawrence Seaway MC
Squamish Terminals
SRY Rail Link
Teamsters Canada RC
Teck
Thunder Bay Port Authority
Thunder Bay Terminals
TransLink
Transport Canada
TSI
United Steelworkers
Van Horne Institute
Vancouver Airport Authority
Vancouver Wharves (Kinder Morgan)
Viterra
Western Stevedoring
Westshore Terminals

**58% of these responded to the online survey and/or were interviewed.*



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The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada.

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