
THE INNOVATION IMPERATIVE

DRIVERS FOR CHANGE IN THE ASIA PACIFIC GATEWAY

BUSINESS PRIORITIES IN 2011



ASIA PACIFIC GATEWAY
SKILLS TABLE



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**Asia Pacific Gateway
Skills Table**

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CONTENTS

- 5** Foreword
- 6** Executive Summary
- 9** Introduction
- 11** Background and Study Design
- 12** The Labour and Skills Lens
- 13** The Gateway 'Silos'
- 14** Themes from the Interviews
- 16** Areas of Innovation
- 16** Technologies
- 20** Business Processes
- 23** Opportunities to 2020
- 23** Information Access Opportunities
- 26** Trucking Activities
- 28** Containers and their Uses
- 28** Logistics Processes – Western Goods Stay West
- 29** Greening Activities
- 30** Conclusion
- 31** Appendix 1
- List of Organizations and Individuals Interviewed
- 32** Appendix 2
- Interview Questionnaire

FOREWORD

The West Coast’s Asia-Pacific Gateway is seen as one of Canada’s greatest economic opportunities and one that is becoming increasingly important to Canada’s national prosperity. By 2020, the Province has set a target of 95 million tones of bulk and break-bulk-traffic to flow through the Gateway, up from 85 million in 2010. Furthermore, during the next 15 years it is expected that the Gateway’s supply chain—airports, seaports, railways, roadways and border crossings—will be called upon to manage twice as much container traffic as it currently handles. As government data suggests, each increase of one percentage point in the container market share alone accounts for up to 4,000 jobs - this suggests tremendous growth in the workforce.

But a looming demographic and labour market crisis in Canada has the potential to have a significant impact on the Gateway and consequently on our society and economy. Our population is aging. As the baby boomer generation moves into retirement, the proportion of our population in their prime working years will decline significantly. With population age, labour market requirements change. Coupled with the emergence of what has been called the knowledge economy it means that new skills will be required to meet the shift of business to new processes and technologies. This calls not just for a larger workforce but also for one with skills that can meet the needs of employers deploying new technologies and processes.

Most sectors of the transportation industry have the added challenge of attracting recruits to an industry that is perceived to be outdated, with management cultures that have not kept abreast of change and innovation. The Asia Pacific Gateway Skills Table, created in anticipation of a worker shortage in building, expanding and operating the Gateway, is a collaboration bringing together business, labour and education to create dialogue and seek solutions for the development of an adaptable, skilled workforce to achieve the Gateway’s competitive success.

This report provides a snapshot of the technologies and business processes identified by Gateway companies as their priorities in the near future and is intended to form the basis for the Skills Table to enter into a discussion with employers and other stakeholders to prepare the workforce they need. And, to dispel some of the perceptions that the transportation sectors are not investing in new technologies and productivity improvements.

Oksana Exell
Executive Director
Asia Pacific Gateway Skills Table

EXECUTIVE SUMMARY

Canada's Asia Pacific Gateway is a world class transportation network designed to make Western Canada the most competitive entry and exit point in North America for Asian and Canadian goods and services. Its integrated, seamless supply chain includes airports, seaports, railways, roadways and border crossings, connecting Canada and the North American Market to Asia and the world. The Gateway is comprised of the west coast ports (Prince Rupert and Port Metro Vancouver [PMV]), major airports (Vancouver, Abbotsford and Prince George), three major transcontinental railways (CP, CN and BNSF), one B.C. short line railway that serves local industries (Southern Railway of B.C.) and an integrated high quality highway system accessing all of North America.

The Gateway is a critical intermodal freight link between Asia and markets throughout North America. Intermodal freight transport involves the transportation of freight in an intermodal container or vehicle, using multiple modes of transportation (rail, ship, and truck), without any handling of the freight itself when changing modes. The method reduces cargo handling, and so improves security, reduces damages and losses, and allows freight to be transported faster.

This study aims to shed light on the current areas of innovation or technological improvement in the various sectors and associated operational silos of the Asia Pacific Gateway. In the interviews we uncovered areas of opportunity to enhance or encourage greater innovation. This information allows for some recommendations of areas or studies where government may be able to support industry in developing skilled resources, expanding competitiveness, and capturing an ever growing portion of Asia Pacific trade. The primary focus of this study is on procedures and tools of innovation and technological process improvement.

However, underlying any improvement created by innovation is the need to ensure that the human resources have the skills, knowledge and attitudes essential to a culture of innovation. So while there is very little direct comment on Human Resources, the overall lens remains that of the skills and abilities necessary for a strong and competitive Asia Pacific Gateway.

The study collected qualitative interview information, experience, perceptions and ideas from 38 individuals. These interviewees represented 26 organizations from the following industries: shipping and marine, rail, trucking, retail, security, government, and training and education. The information presented here are those of respondents rather than a scan of any academic, research or other 'think-tank' type organizations.

Throughout the interviews several themes emerged that crossed sectors, areas of operation and focus of business. These themes fall into 5 general areas:

- /1 As the economy recovers, business remains primarily focused on improving existing processes and technologies not introducing new ones
- /2 Innovations in recruitment and retention that focused on the needs, perspectives and priorities of the under 30 worker have greater impact than technological training programs for the over 50 worker.
- /3 On the whole, the Asia Pacific Gateway operates as efficiently as its competitors – other North American port, road and rail systems.
- /4 Individual worker performance management and monitoring are increasingly used as key tools in business management innovation.

→/5 Best practice and innovative thinking entities, such as universities, research associations, or other ‘think tanks’, are not widely used or considered as a source of information.

A central focus of this study was to uncover respondents’ thoughts on emerging innovations or opportunities for the Asia Pacific Gateway to improve competitiveness, sustainability and efficiency. There were five broad categories of opportunity identified: information access, trucking activities, containers and their uses, logistic processes, and ‘green’ activities.

INFORMATION ACCESS OPPORTUNITIES

The global supply chain operates on a base of information. Some of it is universally available but most is proprietarily developed and managed by various players throughout the supply chain. The result is that an end-to end (or full supply chain view) of the movement of goods is difficult if not impossible to find. The terminals or rail companies or freight forwarders have all focused their energies on driving greater efficiency from their internal business processes, yet there are many opportunities between the silos of the supply chain that, if given visibility, would point to more areas to streamline or re-engineer processes for greater predictability, efficiency, cost competitiveness or environmental sustainability.

Based on the results of our interviews, the opportunities to improve the flow and efficiency of information throughout the Asia Pacific Gateway supply chain fall into three areas:

- /1 End-to end Container Tracking
- /2 Weigh In Motion Truck Safety and Highway Movement Systems
- /3 Key Performance Indicators (KPI) focused on the whole Asia Pacific Gateway supply chain

TRUCKING ACTIVITIES

The process by which container freight is moved by truck to off-site trans-load, de-stuffing or warehousing facilities is considered problematic by most of the organizations working in the lower mainland Asia Pacific Gateway. At the same time it offers an extensive range of opportunities that simultaneously can enhance efficiency, competitiveness and reduce the environmental impacts of trucking.

Based on the results of our interviews, the opportunities to improve the flow and efficiency of container truck movements into and out of the Asia Pacific Gateway ports can be categorized into four areas:

- /1 Integrated Reservations Systems
- /2 Speed Gates
- /3 Gate Automation and Biometrics
- /4 Empty Containers and Double Ended Trip Planning

CONTAINERS AND THEIR USES

As container shipping costs remain competitive, raw logs, lumber, steel and pulp products (those that can be cut or made to a standard size to 'fit' into the dimensions of a container) are increasingly shipped in containers. Even some bulk products such as wood pellets are seeing a transition to containerized shipping. Specialty grains were the backbone of B.C.'s container business in the beginning and continue to be an important part despite the recent move of many forest products to containers.

Beyond the shipping process efficiencies, using containers (20, 40 or 45 foot) allows for smaller lot purchases. This then expands the market of potential customers for these goods as financing and overall costs enable smaller customers to buy the product at source rather than from a re-seller once the goods have arrived in bulk.

LOGISTICS PROCESSES / WESTERN GOODS STAY WEST

The majority of consumer goods (well over 50 percent) enter Canada via the lower mainland ports. For goods destined to be sold west of Ontario, this means that many are shipped from the lower mainland to Ontario, warehoused, re-packaged and shipped back to western Canada. There is a growing movement to capture and distribute goods destined for western Canada in the lower mainland and/or in Calgary. This has many benefits from reduced emissions to the retention of empty containers nearer the ports.

GREENING ACTIVITIES

Many of the innovation opportunities found in the operating and technology trends of Supply Chain entities have an environmental benefit. Highway systems can be created that reduce idle time, enable efficient operation and reduce emissions. Port access processes can be managed to cut emissions, smooth traffic volumes and reduce wait times. Clearly the efficiency of the system creates an environmental benefit.

“Innovation and efficiency opportunities increasingly are challenged to demonstrate the benefits not only to the bottom line but also to the environment.”

Innovation and efficiency opportunities increasingly are challenged to demonstrate the benefits not only to the bottom line but also to the environment, whether by reducing emissions, moving more goods on bigger vehicles and increasing 'through-put' or creating environmentally beneficial business processes such as the slow trips used by shipping lines to conserve fuel. This study points to real opportunities available to organizations operating in the Asia Pacific Gateway, opportunities that can improve performance and create a more responsive and positive customer experience. These opportunities depend on the collaboration of Gateway participants including government at all levels, rather than operating as a federation of related but independent entities.

INTRODUCTION

Economic globalization and international trade are growing 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. The economics of global supply chains are being affected by volatile energy prices and there is growing concern that manmade and natural events can shut down supply chains and disrupt the global economy.

The main criteria used by shipping lines throughout the world 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, water depth); road access/congestion and labour. Supply chain economics are also an important factor.

Canada's Asia Pacific Gateway is a world class transportation network designed to make Western Canada the most competitive entry and exit point in North America for Asian and Canadian goods and services. Its integrated, seamless supply chain includes airports, seaports, railways, roadways and border crossings, connecting Canada and the North American Market to Asia and the world. The Gateway is comprised of the west coast ports (Prince Rupert and Port Metro Vancouver [PMV]), major airports (Vancouver, Abbotsford and Prince George), three major transcontinental railways (CP, CN and BNSF) and an integrated high quality highway system accessing all of North America.

The revolution in ship size that has been at least partly responsible for the growth in Pacific coast port traffic has stabilized. There are now economic alternatives that favour all-water routes from Asia to the U.S. east coast as importers continue to explore supply chain solutions that increase reliability. West coast port congestion and intermodal constraints, as well as rising fuel prices, are making 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. With the re-opening of a deeper Panama Canal expected in late 2014 this may increase to 33 percent or higher. As a result, U.S. Atlantic ports, especially New York/New Jersey, as well as Halifax are likely to increase their market share at the expense of their West Coast counterparts. The west coast, and particularly the Canadian ports, will need to demonstrate an efficient and reliable alternative if they hope to keep intermodal freight movement growing and contain any shift to all water shipping

“Canada’s Asia Pacific Gateway is a world class transportation network designed to make Western Canada the most competitive entry and exit point in North America for Asian and Canadian goods and services.”

Retail chains, however, look to various factors when choosing ports. Agility in response to customer trends and the speed for replenishment of stock are as critical as location and logistics costs. These large importers will often determine the most advantageous port of entry and design logistics systems around it.

Another factor to consider is that 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 comparison to centuries of freight movement and management, especially on water, most aspects of logistics and end-to-end supply chain management are new and evolving. In this study we asked participants to look at the supply chain as the context in which goods, services and information flow from the earliest supplier to the end user. We asked them to discuss supply chain management as the integration of information, processes, goods and funds from the earliest supplier to the ultimate customer.

For many years there has been a focus on the looming demographic shift in the labour market. The Asia Pacific Gateway, and the organizations that created it, have focused on strategies for attracting and retaining new entrants to the labour market in anticipation of a mass exodus of retirees and a shrinking labour pool. The global economic crisis over the past few years has coincided with the early years of this demographic change. While it is far too early to make any definitive statements, several forces appear to be changing the pressures in the labour market. These factors include the jobless nature of the current recovery, the recent reduction in Canadian immigration targets, and the trend for deferral of retirement reinforced by the removal of mandatory retirement. In this study, respondents consistently commented on the lack of trained, skilled, experienced labour but not on any lack of 'bodies'. It seems that the issues faced by the participants in this study are more related to developing skills and building entrepreneurship, innovation and collaboration in the workforce, rather than on filling vacancies.

This study is aimed at shedding light on the current areas of innovation or technological improvement in the various sectors of the Asia Pacific Gateway, at uncovering areas of opportunity to enhance or encourage greater innovation, and recommending where government may be able to support the industry in developing skilled resources, expanding competitiveness and capturing an ever growing portion of Asia Pacific trade. The study focused on procedures and tools of innovation, and technological process improvement. Underlying this is the need to ensure that the human resources necessary to the operation of the Gateway and its supply chain have the skills, knowledge and attitudes essential to a culture of innovation.

“This study is aimed at shedding light on the current areas of innovation or technological improvement in the various sectors of the Asia Pacific Gateway.”

BACKGROUND AND STUDY DESIGN

In general, innovation may be defined a measurable, sustainable, intentional process to help expand a business by providing a way for people to put ideas into valuable action. There are commonly three “types” of innovation:

→/ Incremental Innovation - incremental innovation is focused on making small but significant improvements to existing products or services. Think regular mail, priority post, Fed Ex.

→/ Breakthrough Innovations - this type of innovation introduces an existing technology into a new market, a new technology into an existing market or changes the way the offering is delivered. A good example is the automation of cranes at marine terminals, the introduction of joy-stick technology to create finer, easier and faster movement of containers on and off of ships

→/ Game Changers - this type of innovation disrupts an existing market or creates a whole new market. A good example is the introduction of GPS technology to ship navigation. The use of the satellites and positioning technology completely change the process of navigation and the accuracy of ship arrival planning.

Technology is generally understood as the usage and knowledge of tools, techniques, systems or methods of organization in order to solve a problem or create an artistic perspective. The use of technology began with the conversion of natural resources into simple tools. The prehistoric discovery of the ability to control fire increased the available sources of food and the invention of the wheel helped humans in travelling in and controlling their environment. Recent technological developments, including the printing press, the telephone, and the Internet, have lessened physical barriers to communication and allowed humans to interact freely on a global scale.

In this study, we asked respondents to look at technology from an information systems or technological device perspective and innovation of all three forms. From the lens of the Asia Pacific Gateway and the end-to end supply chain the Gateway supports, we asked respondents to examine the potential for technology or innovation (or both) to improve the:

- / competitiveness and the Canadian competitive advantage;
- / sustainability, both environmental and social;
- / productivity, process and service efficiency;
- / collaboration and cross silo opportunities;
- / costs.

“The use of technology began with the conversion of natural resources into simple tools.”

This study is a qualitative interview-based collection of information, experience, perceptions and ideas. The results are those of the respondents and have not been vetted against current academic research. However, many of the perspectives are echoed in an Industry Canada survey released in February 2011 (Global Business Strategy and Innovation: A Canadian Logistics Perspective) of supply chain best practices sent to over 6,000 businesses. The Industry Canada study supports the observations and recommendations included in this report, Technology and Innovation in the Asia Pacific Gateway: A Study of Key Organizations. The information presented here about current innovations in technology and business processes, opportunities for the future, best practices, and perceptions of the Asia Pacific Gateway are those of respondents

THE LABOUR AND SKILLS LENS

rather than a scan of any academic, research or other ‘think-tank’ type organizations.

Methodologically, face-to-face interviews were conducted with 38 individuals from 26 organizations representing many aspects of the supply chain and the key organizations of the Asia Pacific Gateway. The interviews were conducted as conversations and the information presented represents the priorities, investments and areas of challenge described by individuals from these organizations.

The interview questionnaire contained 19 questions that covered a range of topics from current technology to future trends, from best practice leaders to human resource needs. A list of interviewees and their organizations is provided in Appendix 1, and the questionnaire is provided in Appendix 2.

At the heart of any system are the workers. The organizations of the Asia Pacific Gateway and the transportation logistics system that uses it have focused recently on developing an understanding of current labour supply and demand, gaps in skills and occupations, and opportunities for system-wide training and skill development. If the Gateway is to capture a growing share of Asia Pacific trade, a share beyond that driven by Canada’s own demand growth, companies working within the Gateway need to prioritise innovation.

“At the heart of any system are the workers.”

This study was aimed at creating an understanding of the technology and business process trends and drivers in the businesses that operate the supply chain servicing the Asia Pacific Gateway and, as such, most of the information is descriptive of those areas of operation. It was not strictly focused on labour market conditions or needs. There is only limited reference to labour skills and development in the document. However, the trends, best practices and opportunities for future development described in this document point to the need for a labour pool with a wide range of skills, a broad base of knowledge and the ability to integrate and visualize opportunities across sectors and silos.

The development of a “human resource strategy” for the Asia Pacific Gateway and, more broadly, the Canadian transportation and logistics sector aimed at Gateway growth, innovation and the integration of technology could have a significant effect on the

THE GATEWAY »SILOS«

Gateway and its constituents. An HR strategy that would seek to attract and support human resources with critical skills, abilities and attitudes, would enhance the impact of the other opportunities and create a strong and competitive environment for employers and employees. Most importantly, such a program would help to create the culture of innovation throughout the Gateway that breeds opportunities, efficiencies and processes that could revolutionize transportation and supply chain logistics in the Asia Pacific Gateway and make it a world leader in best practices.

The Asia Pacific Gateway Skills Table has defined five sectors in the operation of the Asia Pacific Gateway. They are Air, Marine, Rail, Road and Construction. This study added a focus on the logistics aspect of freight movement and limited the involvement of the Air sector as, on the west coast of Canada, it is currently a very small portion of the Asia Pacific Gateway supply chain. Given that it is not a direct player in the inter-modal supply chain, Construction was also not included in the study design.

Throughout the interviews, it became clear that innovation and technology were leveraged from the perspective of what was best for that specific type of organization. Terminals looked at things from the internally focused perspective of their own business as did shippers and shipping lines, retail chains and so on. Each of these 'silos' in the supply chain operates independently of the others and thereby the 'transition points' between the silos were challenging and in many cases quite inefficient. An example of this is a regular practice by one carrier of booking Marine Pilots in a way that made the entire supply chain look inefficient. In close to half of its bookings this carrier ordered a Pilot for the ship an hour or more (up to eight hours) in advance. This enabled the carrier to have the ship move out of port immediately after the hold was filled and certified, a very efficient and cost saving process for the carrier. However, all of the Pilots were scheduled assuming the ship was ready to sail when the Pilot arrived. This created delays in the system for other ships waiting for a Pilot and had the effect of making the whole supply chain appear less efficient to customers and other outsiders.

Many of the silos – terminals, rail, customs, specific retail chains and others – have internal processes that work well for them. These processes enable KPIs to

meet or exceed high levels of performance, but also have significant impacts in creating less efficiency for those outside of their silo. Since trucking often acts as the linkage between the other silos, it is the most obvious of the areas impacted by the processes of other silos. However, this internally focused behaviour appears in all of the sectors and silos. A contributing factor here is that there is no straight forward 'process' map or other visual tool that could demonstrate to each organization and/or silo their role in improving or harming the efficiency of others and in the overall competitiveness of the Asia Pacific Gateway and its transportation and logistics infrastructure.

THEMES FROM THE INTERVIEWS

As the economy recovers, business remains primarily focused on improving existing processes and technologies, not introducing new ones. This is incremental innovation – using the existing system and making it work as well as possible. It is an important aspect of business improving and efficiency development. Its internal focus, however, reinforces the siloed nature of the Asia Pacific Gateway and does not uncover the opportunities for large improvements between the entities.

“Using the existing system and making it work as well as possible.”

Innovations in recruitment and retention focused on the needs, perspectives and priorities of the under 30 worker and have greater impact than technological training programs for the over 50 worker. In terms of human resources, the Gateway organizations interviewed saw more benefit in 'refreshing' their workforce with highly skilled new entrants. Demographics have indicated that a large proportion of workers will move out of the workforce in this decade. Organizations have put substantial energy into attracting and retaining what has been seen as a scarce new entrant pool.

On the whole, the work of the Asia Pacific Gateway is as efficient as its competitors – other North American Port, road and rail systems. Almost every person interviewed made this statement. When similar cultural context is taken into consideration – that is the North American labour and regulatory environment – the Asia Pacific Gateway does as well as those who

customers would choose as an alternative. In many ways this is the central barrier to innovation in the Asia Pacific Gateway; the motivation for dramatic change is lacking. The opening of the new canal of the Panama Canal in 2014, the introduction of 8 and 10 thousand TEU ships, and the struggling economic environment on the east coast of the United States may change this. All water routes to eastern and central North America may become significant competition to the services on the west coast of North America, creating the motivation for change. Proactive responses to these conditions could ensure that the Asia Pacific Gateway remains a first choice for its customers.

The key innovation drivers for businesses in the Asia Pacific Gateway are:

- / Loss or gain of business to close competitors – ensuring the customer base is loyal and committed to the services offered;
- / How to become conduit/de-stuffer to US markets rather than US hubs – increasing the value added to the goods entering Canada by becoming a corridor not only for goods to move through but also for goods to be distributed through;
- / How to capture growth beyond the Canadian market. Ninety percent of the goods coming to Canada are for the Canadian Market. Canadian ports will grow with the Canadian economy and increases in Canadian consumption of all forms. However, in terms of North American freight this is a very small proportion. Most businesses are interested in strategies and plans that enable them to capture more of the US market.

Individual worker performance management and monitoring is increasingly a key tool in business management innovation. This was a human resource practice that was mentioned in several of the interviews. This is reinforced by the Industry Canada Global Logistics study released in February 2011. In that study, those firms that are identified as Best in Class had performance measures throughout the business and these measures differed at each level of the organization.

“Individual worker performance management and monitoring is increasingly a key tool in business management innovation.”

Best practice and innovative thinking entities such as universities, research associations, or other ‘think tanks’ are not widely used or considered as a source of information. In general the entities interviewed considered their internal planning and development operations to be the best source of information for the evolution of their business.

AREAS OF INNOVATION

What follows is a description of the technologies and business processes that respondents identified as new, evolving or contributing to improvement in the operation of the supply chain. This information was drawn from the interviews and collated into streams. It is reflective of the interviewees, their organizations and of a point in time – September 2010 to January 2011. These may not be the emerging trends or the most innovative technologies in global supply chain management, port and transportation operation/ logistics. Rather, they are the respondents' description of their organizations' innovations, new processes or emerging trends.

As an example, during the span of this study Walmart's Radio Frequency Identification (RFID) pilot was cancelled due to issues with performance and results. It may be that this change at Walmart will shift the trend in RFID use, however, at the time of the study respondents were unaware of this change and RFID was considered a viable competitor to GPS.

TECHNOLOGIES

RFID

RFID has been growing as a technology used to track product movement and location as part of an inventory management system and also to track vehicle and container movement. It does have range limitations and, as an example, could not be read while in transit on the ocean by a land-based system.

Radio-frequency identification is applied to or incorporated into a product, animal, container, vehicle or person for the purpose of identification and tracking using radio waves. There are generally three types of

RFID tags: active RFID tags, which contain a battery and can transmit signals autonomously, passive RFID tags, which have no battery and require an external source to provoke signal transmission, and battery assisted passive (BAP) which require an external source to wake up but have significant higher forward link capability providing great read range.

GPS

GPS enables satellites to locate, in real time, the person, vehicle or object the tracking mechanism is 'attached' to. Increasingly GPS is used not only as a locator but as a real time operations monitoring system. Truck speed, trip length, rest periods and arrival departure times are managed and monitored using GPS locators. In the rail system, automated GPS readers are being installed to provide similar tracking and efficiency management information to trains, including speed management, addition and removal of locomotives, arrival and departure management.

There are significant opportunities in monitoring and thereby improving the efficiency of the end-to end supply chain using container based GPS tracking systems. An example would be real time load tracking as ships are unloaded and reloaded in port – GPS tracking mechanisms could provide both real time tracking of movement and also live modeling of load dimensions to direct gantry and other shore-based activity.

Trucking Trip / Driver Monitoring Systems

Weigh-in-motion devices are designed to capture and record axle weights and gross vehicle weights as vehicles drive over a measurement site. Unlike older

Technologies

static weigh stations, current weigh-in-motion systems are capable of measuring at normal traffic speeds and do not require the vehicle to stop or drive at low speed, making them much more efficient.

The integration of GPS and truck monitoring systems with weigh-in-motion highway safety programs (scales and the like) enhances the speed to market of goods by limiting the number of stops required of a truck to comply with safety, security and customs regulations. It also enhances the safety of the highway by recognizing changes in load weights or balances, monitoring the speed of trucks in motion and requiring stops at borders or other check points only where issues are identified.

Smart Phones / Handheld Data Devices

In many cases, the use and distractions created by smart phones and other handheld devices were considered safety and productivity issues. However, the creative use of these personal tools provides information as well as live access to critical regulations and job requirements. Their use is an emerging benefit.

Some logistics and other service providers in the supply chain are looking at the development of specific 'Apps' to support their customers' information needs and to deepen customer loyalty and commitment.

Automated Warehousing Systems

A warehouse management system is a key part of the supply chain and primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions,

including shipping, receiving, putaway and picking. The systems also direct and optimize stock based on real-time information.

Warehouse management systems often utilize Auto ID Data Capture (AIDC) technology, such as barcode scanners, mobile computers, wireless LANs and potentially RFID to efficiently monitor the flow of products. Company and process wide Enterprise Resource Programs (ERP) and other software systems designed to integral aspects of warehousing including self-propelled racking and other automation processes are changing the operation of many warehouses.

The integration of the logistics planning information to the warehousing and distribution processes drives process and inventory efficiencies. However it was mentioned that the ROI on these complex and expensive systems was not always obvious and may be more useful in integrated supply chains rather than in those that are distributed.

Integrated Shipping / Customs / Billing Systems

System integration is a primary focus today in logistics management. These information systems integrate the Information flow from the creation of the shipping request, through the customs, duty and import approval process and finally automating the billing based on the activities managed at the front end of the process.

Systems that enable visibility to the customer of their goods and billings along with the integration between shipping management and customers' inventory management systems are areas where several organizations are focusing their IT system development.

Technologies

The goal is to be seamless, with the goods as the focus point of the information. More and more systems are evolving the ability to 'see' the goods as they move through the supply chain and the costs/revenues those movements generate.

Increasing Crane and Yard Automation

The objective of automated crane and rail yard systems is to improve the container handling efficiency in the yard, track the location of all containers, and minimize the number of moves and length of storage time for all freight. These systems, unique to each deployment and organization, involves integration of shipping databases, transportation management systems, RFID and other locator mechanisms and automated crane and container movement equipment, into a single instance that manages and tracks movement from arrival to departure.

They also involve remote and camera operated Gantry systems enabling operators to manage many container moves at once, store containers to speed flow on and off ships, rail and trucks and track in real time the location and status of goods.

For bulk carriers, the process of displacement measurement is increasingly done using Weigh-in-Motion and optical scanner technologies. These systems, adapted from forestry, rail and highways are calibrated tightly to compensate for load and in water impacts and have the potential to be integrated with automated conveyors and other filling mechanisms. This is a substantial shift in process, reducing the need for Master Mariners. Master Mariners, as a result of their years of experience and expertise have previously been required to manually calculate load and attest to the safety of the loading process. This load

management technology will enable filling to be more automated and very tightly controlled and increasing the accuracy of the load.

Electronic 'Smart' Containers

These days, there are more and more of what are called "smart containers". At their most advanced, a smart container can tell who supervised its stuffing, what's in it, where it's leaving from and where it's going, who's carrying it, where it is at any given time, if its shifting or rolling, the temperature inside, whether an authorized person opens it, if there is any unauthorized breach through any part of a container (not just through the doors), and the presence of cargo such as weapons, illegal drugs, and human beings.

We can detect breaches into containers using magnetic switches, light, vibration, temperature, and more. Companies offer systems that use a combination of sensors, RFID, and satellite technologies to detect unauthorized breaches. Detecting a container's position is also quite simple, carriers and shippers can use services provided by satellite service providers.

However, though they now exist, we are still developing sensing technologies needed to adequately detect biological agents, chemical agents, shielded enriched uranium, humans, explosives, and drugs, the issues that governments are likely to consider the most important. The technologies are still in the early stages of development.

A smart container must also be capable of reporting what it detects. There are currently three generally accepted methods of transmitting such data: RFID, satellite, and cellular.

Technologies

At origin, container systems must include the identification of a party responsible for final inspection of the cargo prior to its dispatch and subsequent international movement. Someone must take responsibility for confirming the cargo on the bill of lading or booking sheet, for activating the smart container system, and for locking the doors. This responsible person must be vetted for his or her integrity and competence.

Equally, there must be a counterpart at destination, and both parties must be electronically associated with the smart container by a unique identifier in order to complete the system. This can be done with an activation key that is loaded at origin with the bill of lading and booking information. Other data (such as the identity of the supervising and arming agent at origin) then allow the final agent to deactivate the system at destination.

Reservation Systems

The reservation systems owned and managed by individual marine terminals, which continually evolve, were implemented in the marine terminals throughout Port Metro Vancouver in response to the 2005 trucking work stoppage. The intention was to speed the process and add predictability to the timing of truck arrivals to collect or deposit container freight. However, in Vancouver and Delta drivers spend more than half of their time waiting or being processed at terminals. Trucks are not allowed to wait at the Vancouver and Delta terminal gates more than 30 minutes prior to their reservation time resulting in trucks waiting outside of the terminal property. Incentives in the reservation systems also drive truck traffic into the busy core hours as prices are higher for evenings and on Saturdays than normal day rates. These higher prices are based on lower volumes and labour

agreement wage differences. However they add to the waiting time as they increase the volume of trucks moving at an already heavy traffic time.

Truck Information Systems

The efficient movement of goods on public highways requires a complex and integrated system of information about trucks and their cargo. Of primary importance is highway safety, while speed to market, amount of slow or idling times and reduction of traffic congestion are essential to supply chain efficiency and environmental sustainability.

Increasingly cargo trucks are incorporating sophisticated software systems to ensure efficiency as well as safety. This includes Trip Management Systems that monitor and manage the operation of the engine as well as enforce certain safety requirements (length of trip, frequency of stops etc.), speed limiters that ensure trucks stay below 105 KM, and GPS monitoring to map location in real time as well as speed and idle time.

Rail RFID and GPS Tracking and Autogates

Railroads are developing an integrated system of GPS and RFID monitors along with optical scanners and in-track scales to manage, end-to end, the speed, safety, efficiency and progress of a train and its individual cargos. This allows for the addition and subtraction of locomotives at key points in the journey, the monitoring of weight and load shifts and adjustments to weather and other track conditions in real time.

BUSINESS PROCESSES

Service Agreements / Key Performance Measures

The use of management information, key metrics and a continuous improvement mindset has created a culture in many aspects of the Gateway that supports the use of information to inform process and to address and resolve issues. Terminals and ports have performance agreements with railroads; shippers have performance agreements with terminals; and more metrics and performance standards are driving improvements in the transition points in the supply chain. These agreements address measures of key actions such as timely transition to and from marine terminal to rail, or accuracy of arrival and departure times. What needs to be done next is to weave these into a holistic supply chain performance measure(s).

Slow Trips

In 2008, a combination of the recession and growing awareness in the shipping industry about climate change emissions encouraged many ship owners to adopt "slow steaming" to save fuel beginning. This lowered speed from the standard 25 knots (45 KM) to 20 knots (35KM), but many major companies have now taken this a stage further by adopting "super-slow steaming" at speeds of 12 knots (about 14mph).

Travel times between the US and China, or between Australia and Europe, are now comparable to those of the great age of sail in the 19th century. Maersk, the world's largest shipping line, with more than 600 ships, has adapted its giant marine diesel engines to travel at super-slow speeds without suffering damage.

This reduces fuel consumption and greenhouse gas

emissions by 30 percent. It is believed that the company has saved more than \$95 million on fuel since it began its go-slow process.

From the customer's perspective while lead times have increased, the slower crossings are built into the planning cycles for just-in-time and just-in-sequence manufacturing and retail processes. The longer time at sea is seen by respondents to reduce costs in the reduced need for warehousing and lowered inventory carrying costs.

Warehousing in Transit

With the longer cross-pacific transit times, retail and manufacturing companies have shifted from a warehouse distribution process to a warehouse in transit process that uses the ships, terminals and rail as storage and then has goods going straight to factories and stores rather than arriving at warehouses for re-distribution. This is an extension of the just-in-time business processes that have been core to manufacturing for several decades and have been adapted to the retail supply chain.

The increasing investment in transload and distribution centers combined with the closure of more traditional warehousing facilities is an extension of this trend. Retail and manufacturing firms are looking to reduce stock on hand and rather replenish on a much more frequent basis. This implies that goods spend most of their time in transit between supplier and customer and are in use, on the shelf or in the hands of the final customer faster and without the need for warehousing.

Size and Capacity per Trip

Ultra Post Panamex Container Ships that can hold up to 12,000 TEU, two mile long trains pulled by only two locomotives, double length tractor trailers – in all of the freight movement sectors increasing size or capacity per trip is desired and evolving. These capacity expansions reduce costs, including labour costs and increase sustainability by increasing the volume of cargo for each trip. On the other side of the equation they also reduce the number of trips which reduces the amount of flexibility available to customers making the supply chain tighter, and predictability and timing more critical to customers.

Integrated Service Teams and Cross Training

At several organizations in a variety of the supply chain sectors, an integrated team supports the business end-to-end and eliminates the ‘single point of failure’ inherent in more localized staffing models is under development or in place. Several lenses are used to determine the scope of the team, the business of the organization, the needs of the customer, the sector or section of the supply chain supported or the core business that must operate 24/7. The extent of the cross training and overlap is remarkable. The combination of a range of experience and expertise is creating cultures that support open dialogue, challenges to the status quo, customer centric thinking, and continuous improvement methodologies.

Break-Bulk to Container

In the 1960’s when the ocean container was introduced to the shipping process, it revolutionized shipping for a huge range of consumer and other standard size

goods. In the intervening period many break-bulk products have shifted to containerized shipping. The remaining break-bulk commodities mostly consist of items that either do not fit in conventional containers or can be more efficiently handled by other means. Over the years the list of such commodities has been shrinking and the remaining break-bulk trades have been focused on steel, lumber, machinery, newsprint and project cargoes. However, as container shipping costs remain competitive, raw logs, lumber, steel and pulp products (those that can be cut or made to a standard size to ‘fit’ into the dimensions of a container) are increasingly shipped in containers. Even some bulk products such as grain and wood pellets are seeing a transition to the containerized shipping processes.

Beyond the shipping process efficiencies, using containers (20, 40 or 45 foot) allows for smaller lot purchases. This then expands the market of potential customers for these goods, as financing and overall costs enable smaller customers to buy the product at source rather than from a re-seller once the goods have arrived in bulk.

Double-Ended Container Moves

A means to enable trip planning so that a truck delivering an empty container or one packed for export can access and plan an associated pick up of an import container adds greatly to the efficiency of the supply chain. One suggestion respondents made was that they wanted to see an integration of the reservations between the terminals both the ease trip planning but also to ease congestion at the Port entrance in downtown Vancouver. They believed that a system could be developed that managed all of the terminals and captures both imports and exports. This would allow trucks to schedule their time to limit

if not eliminated empty back haul runs. In interviews, some stated that as many as 60 percent of the trucks were engaged in a one-way move. This is a substantial opportunity to create benefits on many fronts. There would be an improved ability to earn revenues for trucking firms by dropping and picking up in a single trip. There would be congestion benefits as the number of empty trucks could be substantially reduced. Environmental benefits would be generated from reduced emissions and idle times and it could also create a competitive advantage for the port in capturing businesses from large scale logistics companies whose customers are both importers and exporters.

Container Standardization

Ocean Containers are 20, 40 and 45 foot sizes. Rail container cars and truck container trailers hold a maximum of 53 foot containers – three 40 foot containers can be repackaged into two 53 foot containers. For containers that are not repacked, there is up to 13 feet of excess capacity on a rail car. While it is an international issue and capital intensive from a re-fit perspective, there remains an opportunity to fill that capacity by either standardizing container sizes to the larger 53 foot capacity or developing a mini container that would fill the 13 foot space left by the ocean containers.

Also in development is a collapsible container. Although very new and substantially more expensive, these containers fold to 25 percent of the size of an expanded container and are stackable. This could enable a large increase in the 'per trip capacity' to ship empty containers creating an environmental as well as a capacity benefit to the Asia Pacific Gateway.

Empty Container Management

A consistent issue for shippers, carriers and logistics operations in the Asia Pacific Gateway is access to empty containers. Often they are stored offsite and the identification of their location and planning for return to the port is haphazard at best. The container tracking system discussed in the opportunities section below would address the location and tracking issues. The other side of the equation is the return of the containers to exporters and shippers. Terminals and PMV could use the reservations systems to manage this aspect of truck container movement to streamline the process and to smooth the demand issues created by the storage of empty containers offsite.

Bio-metrics and other Security Management Programs

A regularly commented issue was that of trucks without proper paperwork or a reservation time backing up the access to the terminals. Several respondents noted that creating a system that allowed for the integration of permitting and trip management with truck licensing and port access can have a dramatic effect on efficiency of movements into and out of the terminals.

Systems like this operate in several of the US ports, truck access is an automated process managed through a licensing and biometric or other automated recognition process. For example, the Port of Miami's Cargo Security Gate System is used to control access to the restricted cargo-areas of the Port. All vehicles entering the restricted area must be screened before access is granted. By the use of cameras, proximity readers, magnetic-stripe readers, biometrics, OCR

(optical character recognition) readers, card-imagers, cameras and microphones all vehicles and persons are screened and equipment information is captured and stored with little or no human intervention.

Capital Infrastructure and Road / Rail Movements of Goods to Ports

Over the past 5 years there have been substantial (multi-billion dollar) capital investments in terminals, highways and rail lines. This has dramatically expanded the capacity and through-put potential of all the lower mainland and Prince Rupert port facilities. In turn the expanded capacity has improved the competitiveness and reputation of the Ports and encouraged increasing growth. However, in both ports the direct gated road access into the port for truck traffic remains an ongoing barrier to capturing the full potential of the other investment and capitalizing on the trade opportunities from Asian and, to a lesser degree, US markets.

OPPORTUNITIES TO 2020

A central focus of this study was to uncover respondent's thoughts on emerging innovations or opportunities for the Asia Pacific Gateway to improve competitiveness, sustainability and efficiency. There were two broad categories of opportunity identified – information management and trucking activities. As well, opportunities are apparent in containers and their uses of logistic processes and in 'Green' activities. This section aims to provide a broad overview of concepts identified by respondents and to describe areas that government, industry and business may want to examine more deeply.

INFORMATION ACCESS OPPORTUNITIES

The global supply chain operates on a base of information. Some of it is universally available but most is proprietarily developed and managed by the various organizations throughout the supply chain. The result is that an end-to end, or full supply chain view of the movement of goods is difficult if not impossible to find. The terminals or rail companies or freight forwarders have all focused their energies on driving greater and greater efficiency from their internal business processes, yet there are many opportunities to improve the interface between the silos of the supply chain, that if given visibility, would point to more areas to streamline or re-engineer processes for greater predictability, efficiency, cost competitiveness or environmental sustainability.

Based on the results of our interviews, the opportunities to improve the flow and efficiency of information throughout the Asia Pacific Gateway supply chain fall into three areas:

1

—
End-to end Container Tracking

In the Asia Pacific Gateway, as in the rest of the global market, freight moves by container - either ocean container (20 and 40 foot standard) or truck/rail (53 foot standard). Regardless of the section of the market in which an entity operates the tracking and movement of containers is central to achieving business goals.

Also true and universally accepted, supply chain and logistics innovations are driven by ever greater detail in the information flow related to the movement of goods. However, while the use of containers is universal, access to information about them is fragmented. The shipper has information while on the sea that terminal, rail and trucking companies do not. Customs agencies have information about timing and container movement that freight forwarders do not. Rail companies have information that warehouse and retailers do not.

Inside each silo (ship, terminal, rail, truck, warehousing, retail etc.) innovations have driven greater efficiencies and the efforts are now aimed at smaller margins of change. The biggest opportunities for large scale innovations and improvements currently exist between the silos, where information and management systems don't exist (or at least are substantially less developed as the benefits are shared among businesses and ownership is less clear).

Similar to the impact that GPS management has had on the use of trucking systems, an open source 'free' access system that used GPS or RFID tracking technology linked to each unique container would close this information gap and enable the whole of the supply chain system to innovate in the 'margins' between

each area of operation as well as further innovate in their own area of expertise. However, as this crosses the boundaries of each silo in the Asia Pacific Gateway 'system', the impetus to develop both the requirement for GPS/RFID technology in all containers and the open access system to track them does not seem to exist, although the desire for the information certainly does. This may be an area for government action and support. The current Security regulations requiring containers to be tracked for port entry combined with the development of an open source and universal access (security issues to be managed at a governmental level) information system have the potential to drive significant innovation in all aspects of the supply chain and Asia Pacific Gateway operation.

2

—
Weigh-In-Motion Truck Safety and Movement Systems

The efficient movement of goods on public highways requires a complex and integrated system of information about trucks and their cargo. Of primary importance is highway safety, while speed to market and reduction of slow or idling times are essential to supply chain efficiency.

The North American system of truck weigh stations (scales) is essential to improving highway safety. With the addition of Trip Management, speed limiters and GPS monitoring on most modern transport trucks and the innovation in highway design that adds embedded scales in the roadway, weigh-in-motion systems are creating both safer and more efficient highway corridors.

Weigh-in-Motion devices are designed to capture and record axle weights and gross vehicle weights as

Information Access Opportunities

vehicles drive over a measurement site. Unlike older static weigh stations, current Weigh-in-Motion systems are capable of measuring at normal traffic speeds and do not require the vehicle to stop or drive at low speed, making them much more efficient.

The integration of GPS and truck monitoring systems, with Weigh-in-Motion highway safety programs (scales and the like) enhances the speed to market of goods by limiting the number of stops required of a truck in compliance with safety, security and customs regulations. It also enhances the safety of the highway by recognizing changes in load weights or balances, monitoring and limiting the speed of trucks in motion, and requiring stops where issues are identified.

These systems exist in various forms in parts of B.C., other provinces and in the US, and are used in a variety of ways. In the B.C. program, called Weigh2GoBC, carriers who have enrolled in the free program, carry a registered transponder and as the truck approaches a Weigh-in-Motion enabled station, the transponder sends the necessary information to the inspectors – while weigh pads in the road measure the vehicle's axle weights. If all information indicates that the safety requirements have been met, a light on the driver's transponder illuminates green and the truck can continue on without stopping at the scale. If there is a problem, the transponder lights up red and the driver has to pull in for a further inspection.

Vehicles only have a limited time benefit: once a vehicle receives the go-ahead at a Weigh2GoBC-enabled station, it can only be given a bypass at Automatic Vehicle Identification (AVI) equipped inspection stations for a maximum of 12 hours.

The program's purpose is to help improve the efficiency of goods moving throughout the province, while reducing the unnecessary idling of commercial vehicles. By allowing those who operate within the regulations to bypass weigh and inspection stations, Commercial Vehicle Safety and Enforcement staff can focus on those carriers that warrant closer scrutiny.

While it exists in several of the corridors throughout the Asia Pacific Gateway, an integrated network that enables measurement while a truck drives at highway speed and passes information from one station to the next is not yet in place. From the perspective of the Asia Pacific Gateway, developing a standard system that enhances efficiency, safety and creates lower emissions is an innovation that could create competitive benefits as well as enhancing the safety of the highways.

3

KPI Focused on Whole Asia Pacific Gateway Supply Chain

Specific terminals and rail or shipping organizations have developed performance agreements with associated key metrics and incentives. These are reported to have a demonstrable impact on overall performance and are being used as a sales tool to attract customers. The expansion of this process to include the end-to-end Gateway supply chain could provide both insight into the movements between silos and the opportunities for efficiency and process improvement. As well, each player in the Gateway would have objective information to demonstrate both their own competitiveness with other organizations in the Gateway and also the overall competitiveness of the Asia Pacific Gateway with other west coast ports and gateways.

Information Access Opportunities

Trucking Activities

PMV is developing a data portal that is intended to hold a set of key metrics on the movement of goods into and out of the mainland terminals. While this is still under development, the opportunity exists to work with their team to focus the work on Gateway impacts and opportunities among silos, as well as those measures of terminal, rail and vessel performance currently used. Examples here might include:

- / Trucking turn times;
- / On-time vessel departure;
- / Marine Pilot on time deployment;
- / Out of port vessel waits;
- / Rail on time arrival proportions;
- / Length of time to return empty containers;
- / Proportion of truck trips that are double ended;
- / Proportion of goods for western retailers reshipped (shipped east then returned west);
- / Total time to destination;
- / Length of time in CSA facilities.

TRUCKING ACTIVITIES

The process by which container freight is moved by truck to off-site trans-load, de-stuffing or warehousing facilities is considered problematic by most of the lower mainland Asia Pacific Gateway organizations. At the same time it offers an extensive range of opportunities that simultaneously can enhance efficiency, competitiveness and reduce the environmental impacts of trucking.

The analysis of truck movements, included in the B.C. Container Trucking Forum Container Simulation Project, held true in the experience reported in interviews in this study. The B.C. Container Truck forum (2007) specifically found:

- / Drivers made an average of seven one-way trips per day, but the trucks are loaded on average with a container for only 5 of these;
- / More than half of driver's trip time is spent waiting or being processed at terminals;
- / Turn times at on-dock container terminals average 52 minutes, and are almost identical among the three large terminals (Vanterm, Deltaport and Centerm);
- / On average, these terminals process 80 percent of trucks within 80 minutes.

Based on the results of our interviews, the opportunities to improve the flow and efficiency of container truck movements into and out of the Asia Pacific Gateway ports can be sorted into four areas:

1

Integrated Reservations Systems

Each terminal manages its reservation system independently, however Port access in downtown Vancouver serves more than one terminal and the reservations process does not accommodate or adjust for multiple terminal volumes.

The reservation systems were implemented in the terminals throughout PMV in response to the 2005 trucking work stoppage. The intention was to speed the process and add predictability to the timing of truck arrivals to collect or deposit container freight. However, in Vancouver and Delta, drivers spend more than half of their time waiting or being processed at terminals. Trucks are not allowed to wait at the Vancouver and Delta terminal gates more than 30 minutes prior to their reservation time. This process results in trucks waiting outside of the terminal property. Incentives in the reservation systems also drive truck traffic into

Trucking Activities

the busy core hours as afternoon prices are higher for evenings and Saturdays than normal day rates. These higher prices are based on lower volumes and labour agreement shift differentials. However they add to the waiting time as they increase the volume of trucks moving at an already heavy traffic time.

In some cases, reservation windows are very broad allowing more than half a day for a truck to arrive. This is in response to traffic and other issues that trucks accessing the downtown Vancouver terminals encounter; it also acknowledges the limitations in the number of trucks that can move in and out of the terminals during operating hours, and the gate management process for entry to the port.

The potential for an integrated multi-terminal reservation system is significant as it would focus on traffic efficacy and flows into and out of the port. It could also, when combined with terminal-based price incentives for later appointments, make significant improvements to both commuter traffic issues in the downtown core and to the number of trips a truck could complete during a shift.

2

Speed Gates

Often a significant portion of a container ship's cargo is dedicated to a single customer – Canadian Tire or Walmart are both good examples, as is DB Schenker who move their customers' containers from the port to their own trans-load facility to repackage the goods into larger containers with goods for specific clients or destinations and then for further distribution. In some cases up to 70 percent of a container ship's cargo is dedicated to a single customer.

These large scale organizations have complex logistics management systems and integrate end-to end product management. Terminals can take advantage of this by allowing the scheduling bulk or even dedicated pick up times (possibly at lower per trip cost and off-peak times) and providing dedicated loading areas. This then lowers volumes at peak times and smooth's the movement off the terminal to enable efficient throughput.

3

Gate Automation and Biometrics

A common observation was that trucks without proper paperwork or a reservation time were delaying access to the terminals. The integration of permitting and trip management with truck licensing and port access can have a dramatic effect on efficiency of movements into and out of the terminals.

In several of the US ports truck access is an automated practice managed through a licensing and biometric or other automated recognition process. For example, the Port of Miami's Cargo Security Gate System is used to control access to the restricted cargo-areas of the Port. All vehicles entering the restricted area must be screened before access is granted. By the use of cameras, proximity readers, magnetic-stripe readers, biometrics, OCR readers, card-imagers, cameras and microphones all vehicles and persons are screened and equipment information is captured and stored with little or no human intervention.

Trucking Activities

4

Empty Containers and Double-Ended Trip Planning

A consistent issue for the Asia Pacific Gateway is access to empty containers. Often they are stored offsite and the identification of their location and the planning for their return to the port is haphazard at best. The container tracking system described in the first section of the Information Access opportunities above would address the location and tracking issues. The other side of the equation is the return of the containers to exporters and shippers. Terminals and PMV could use the reservations systems to manage this aspect of truck container movement to streamline the process and to smooth the demand issues created by the storage of empty containers offsite.

Another solution would be to enable trip planning so that a truck delivering an empty container or one packed for export can access and plan an associated pick up of an import container. One suggestion to accomplish this was the integration of reservations between the terminals with a system that could capture both imports and exports. This would allow trucks to limit if not eliminate empty back haul runs.

In interviews some stated that as many as 60 percent of the trucks were engaged in a one way move. This is a substantial opportunity to create benefits on many fronts. There would be improved ability to earn revenues for trucking firms by dropping and picking up in a single trip. There would be congestion benefits as the number of empty trucks could be substantially reduced. Environmental benefits would be generated from reduced emissions and idle times and it could also create a competitive advantage for the Port in capturing businesses from large scale logistics companies whose customers are both importers and exporters.

Containers and their Uses

Logistics Processes – Western Goods Stay West

CONTAINERS AND THEIR USES

In the 1960's when the ocean container was introduced to the shipping process, it revolutionized shipping for a large range of consumer and other standard size goods. In the intervening period many break-bulk products have shifted to containerized shipping. The remaining break-bulk commodities mostly consist of items that either do not fit in conventional containers or can be more efficiently handled by other means. Over the years the list of such commodities has been shrinking and the remaining break-bulk trades have been focused on steel, lumber, machinery, newsprint and project cargoes. However, as container shipping costs remain competitive, raw logs, lumber, steel and pulp products (those that can be cut or made to a standard size to 'fit' into the dimensions of a container) are increasingly shipped in containers. Even some bulk products such as grain and wood pellets are seeing a transition to containerized shipping.

Beyond the shipping process efficiencies, using containers (20, 40 or 45 foot) allows for smaller lot purchases. This then expands the market of potential customers for these goods as financing and overall costs enable smaller customers to buy the product at source rather than from a re-seller once the goods have arrived in bulk.

LOGISTICS PROCESSES WESTERN GOODS STAY WEST

To create efficient warehousing and distribution systems, many retail entities have centralized their warehousing in Ontario. This has goods warehoused nearest the largest population base and creates a streamlined 'just in time' store inventory management system.

Logistics Processes – Western Goods Stay West

The majority of imported consumer goods (well over 50 percent) enter Canada via the lower mainland ports (the containerized goods entering via Prince Rupert are largely destined for the US). For goods destined to be sold west of Ontario this means that many are shipped from the lower mainland to Ontario, warehoused, re-packaged and shipped back to western Canada. This is obviously inefficient from a western point of view as it adds up to 2 weeks extra time for goods to arrive in western stores, requires twice the energy and cost expenditures on the rail system, and adds extra handling which in turn adds warehousing costs and increased loss and damage risks.

While there are certainly goods that arrive on the west coast and are warehoused and distributed from the west coast, there is increasing investment and energy spent to capture and distribute more of the goods destined for western Canada in the lower mainland and/or in Calgary. There has been substantial investment in warehousing in Calgary in the past three to five years. In fact, of the investment in warehousing and transshipment facilities over that period, 25 percent has been in Alberta, primarily Calgary and a further 10 percent has been in B.C. This has many benefits from reduced emissions to the retention of empty containers nearer the ports. There is also a job creation/economic benefit to expanding the western distribution of goods. Freight forwarders and retail chains are now developing a range of processes aimed at reducing the inefficiencies in the distribution of goods destined for the Western provinces.

Greening Activities

GREENING ACTIVITIES

Many of the opportunities found in the operating and technology trends of supply chain entities have an environmental benefit. From creating highway systems that reduce idle time, enable efficient operation and reduce emissions, to managing port access processes to cut emissions, smooth traffic volumes and reduce wait times, the efficiency of the system creates an environmental benefit.

There are also some specific green opportunities. Over the next two to four years ships in port both in the lower mainland and Prince Rupert will increasingly be required to ‘plug in’ to maintain power rather than operating using fuel generators. By 2012, all ships inside Canadian waters will be required to operate using low sulphur fuels. PMV has an emissions reduction program that, with three tiers based on the extent of the emission management process and technologies, reduces port fees for compliant ships.

Ship builders are increasingly looking to sail and parasail structures as a means of improving the operating cost of shipping as well as reducing substantially the environmental impact of ship movement. In rail and trucking, natural gas and electric motors are becoming more common and are creating substantial reductions in emissions.

Innovation and efficiency opportunities increasingly are challenged to demonstrate the benefits not only to the bottom line but also to the environment, whether by reducing emissions, increasing ‘through-put’ or by creating environmentally beneficial business processes.

CONCLUSION

This was a study of 38 individuals in 26 organizations that is anecdotal and qualitative. The intention was to paint a picture, at a point in time, of the relationships and innovation focus of the participants in the logistics and transportation efforts in the Asia Pacific Gateway. The results point to several areas of opportunity, including coordinated truck reservation systems, container focused tracking, increasing the proportion of goods consumed in the west distributed from the west. What they have in common is a focus on the work across the Gateway. The opportunities are not in one silo; in fact the work in each silo is often highly effective and has only incremental room for improvement. The real opportunities are across silos, at the points of transition or the points where the efficiency of one organization creates inefficiency in another.

“Opportunities that can improve performance, enhance competitiveness, and create a more responsive and positive customer experience.”

Since the study concluded, Industry Canada has released a study of Global Logistics and best practices. This much larger, Industry Canada study supports and underlines the outcomes in this study. Further, at a Transportation Summit, offered by WESTAC and the Global Institute of Logistics held in Vancouver March 2-3, 2011, many of the presentations demonstrated the value of ‘Gateways’ working together to offer a customer experience that outperforms the competition. Those gateway partners that had successfully created a sense of shared responsibility, of a community that works in cooperation to achieve the goals important to the customer, vastly outperformed their competitors.

This study points to real opportunities available to the Asia Pacific Gateway; opportunities that can improve performance, enhance competitiveness, and create a more responsive and positive customer experience. These opportunities depend on the Gateway participants including government at all levels, rather than operating as a federation of related but independent entities operating as a system that innovates and benefits as a whole. It has been shown in efficiency studies, economic assessments and best practice analyses that ports that create relationships and synergies between the organizations that make up their supply chain attract and retain customers much better than their competitors. There is an emerging ‘philosophy’ of cluster governance in Ports that is attracting notice throughout the world. Most of the opportunities uncovered in this study for the Asia Pacific Gateway to outperform its competitors, either in efficiency, cost, reliability or sustainability, require coordination and collaboration between at least two, and in most cases several, different organizations. If the Asia Pacific Gateway can develop a culture of collaboration it can become a best in class Gateway and a model for the world.

LIST OF ORGANIZATIONS AND INDIVIDUALS INTERVIEWED

AREA OF ACTIVITY	ORGANIZATION	INDIVIDUAL
Terminals	TSI DP World Neptune	Kelly Visscher, Chris Postle Matthew Hoag Tony Nardi
Shipping Companies	COSCO CTL Westrans	Dave Bedwell Daryl Raibl
Freight Forwarders and Customs Brokers (marine and air)	DB Schenker Paul Courtney and Associates GW Nickerson Perishables International	John Ellis and Fernando Villagran Paul Courtney Maureen Macarenko Martin Regan
Rail Companies	CN	Carrie Mackay
Marine Pilots	Pacific Pilotage Authority	Kevin Obermeyer
Retail	Canadian Tire	Robert Meredith, Fred Moussette
Port Authorities and other Oversight Agencies	Port Metro Vancouver Port of Prince Rupert Vancouver Harbour Master Greater Vancouver Gateway Council	Christine Dioszeghy, John Mah Maynard Angus Yoss Leclerc Bob Wilds
Trucking	BC Trucking Association CPX Trucking	Louise Yako Kevin Johnson
Security	Paladin	Jason Begin and Vic Byrom
Northern Gateway	Prince Rupert Port Authority GW Nickerson	Maynard Angus Maureen Macarenko
Waterfront Labour, Recruitment and Training	BCMEA ILWU IBEW	John Beckett Tom Dufresne Laird Cronk
Government	BC Ministry of Transportation Defense R&D Canada	Lisa Gow and Dave Bachynski Pierre Munier
Training and Academic Organizations	Canadian Supply Chain Sector Council Trans CDA UBC	Kevin Maynard and Beverly Myers Russell Robertson and Kent Orrock Garland Chow

INTERVIEW QUESTIONNAIRE

TECHNOLOGY AND INNOVATION IN THE ASIA PACIFIC GATEWAY

I appreciate you taking time out of your busy schedule to provide your expertise and perspective on technology and innovation in the Gateway and in your sector specifically. If there is any other individual whom you believe might be able to add value to this conversation please feel free to include them in our meeting.

PROJECT OVERVIEW

The Asia Pacific Gateway Skills Table (APGST) has embarked on a new project to capture information related to current best practice models of technological and business innovation operating in Ports, Supply Chains and other transportation systems key to the Gateway. The research will focus on:

- / Current Technology Best Practices in the supply chain and shipping industries in North America, Europe and Asia
- / Technological innovations and business efficiency processes related to the end-to end supply chain in key areas of the Asia Pacific Gateway
- / Current plans for technological change and other innovation in the Asia Pacific Gateway and where the focus is – mechanical efficiency, labour productivity or supply chain integration
- / The technological skill and knowledge needs for the Asia Pacific Gateway labour force and the extent to which the current skill levels meet the emerging needs.

Attached are the questions we will discuss, please feel free to call (250-920-9635) or email (levelhead@shaw.ca) if you would like to discuss any aspect of this project ahead of our meeting.

INTERVIEW QUESTIONS

- 1 What technologies do you anticipate introducing in the next 1–3 years? What have you introduced recently (within about 3 years)?
- 2 Are there business processes or other innovations that you are planning or piloting?
- 3 What impacts to do you see this having on productivity? Reliability? Security? Efficiency?
- 4 What are the current challenges in your organization that you are considering addressing using a technology based solution?
- 5 What Ports/supply chains/ shipping systems do you see as leading the industry internationally and how do you think the Asia Pacific Gateway can adapt those processes?
- 6 In developing new technologies, more efficient or productive business processes or other innovations in the way you do business do you access and / or collaborate with academia and research institutions?
- 7 What do you think characterizes the most efficient supply chains?
 - a) What aspects does the Asia Pacific Gateway contain
 - b) What could it adapt?
 - c) What, if any, barriers exist to the Asia Pacific Gateway becoming a model of supply chain best practice?
 - d) How could the Asia Pacific Gateway use the latest technology/ business practices more efficiently and/or effectively?
- 8 What are the barriers to technological innovation in your business, industry, the Asia Pacific Gateway as a whole?

9

What are your barriers to productivity and/or efficiency, whether or not they are related to technology and innovation?

10

What drives your decisions around technological innovations and change?

11

What aspects of an integrated supply chain assist your business to function, what types of technology do you use in this integration now and what, if anything, would you like to see added/used/shared by the Asia Pacific Gateway?

12

Innovation is more than just technology, what areas of business do you see the most important and or impactful innovations being introduced in your business and/or in the Gateway as a whole?

13

Are you aware of or working with any co-ordinating agencies that are focused on/supporting innovation/technological innovation in the Gateway? If not, what would you want in such an entity? Do you think there is any existing agency or organization that might be well positioned to take on such a role (government (federal, provincial or local), gateway council, skills table)?

14

What, if anything, would you think government/the skills table can do to enhance or encourage greater innovation in the gateway?

15

How do you plan to prepare your workforce for upcoming changes and what, if any, skill level will they need to have to use these technologies effectively?

16

What do you see as the most critical challenges in skills development when you introduce technology?

17

Do you see a difference between older and younger workers in terms of technological literacy and the ability to adapt to increased technology in the workplace? Are you aware of using or developing any programs to assist in this area? Is the issue more critical for the existing, rather than entering workforce?

18

How is technology being integrated into the various trade based occupations (e.g. electricians, ironworkers, heavy equipment operators) in the Asia Pacific Gateway? What about other areas of innovation?

19

What can we (the Asia Pacific Gateway Skills Table) do to help labour market entrants have the necessary technical/digital/adaptive skills?



ASIA PACIFIC GATEWAY
SKILLS TABLE

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