MARINE PILOTAGE ON CANADA'S WEST COAST

by

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Abstract

Marine pilotage in the coastal waters of British Columbia, Canada is mandatory. The Pacific Pilotage Authority Canada (PPA) provides marine pilotage services on a coast-wide basis. The coast-wide model of marine pilotage services offers much flexibility to the users of the service; however, it has its share of operational challenges: *inter alia* pilot transportation logistics, increasing training and transportation costs, lower responsiveness to local port requirements and a diminishing pool of qualified mariners with coast-wide navigation knowledge and experience. To address the above-mentioned challenges holistically, this analysis recommends that the PPA provide a combination of coastal and port-based pilotage services in areas of high demand and where financially feasible.

Keywords: marine pilotage; pilot; Pacific Pilotage Authority Canada; PPA;

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Brian

Table of Contents

List of Figures

List of Tables

Glossary

APGCI	Asia-Pacific Gateway and Corridor Initiative
BCCP	British Columbia Coast Pilot Inc.
CMPA	Canadian Marine Pilots Association
CoC	Certificate of Competency
CTA	Canadian Transportation Agency
Detention	Time spent by the pilot after arriving at a vessel and before commencing the assignment
FRPA	Fraser River Pilots Association
GI - LR	Global Integration - Local Responsiveness
Handymax	A class of ship size typically of 40,000 to 50,000 deadweight tonnage
IMPA	International Marine Pilots Association
LNG	Liquefied Natural Gas
NHA	Nanaimo Harbour Authority
NGO	Non-Governmental Organization
OAG	Office of the Auditor General
Panamax	The largest class of ship size capable of travelling through the Panama Canal
Pilot	Any person who has the navigational conduct of a ship but does not belong to the ship
Pilotage Authority	An entity established to provide a safe and efficient marine pilotage service

Port of Entry	A port where customs officials are stationed to oversee the entry and exit of people and merchandise
PAPA	Port Alberni Port Authority
PMV	Port Metro Vancouver
PPA	Pacific Pilotage Authority Canada
PRPA	Prince Rupert Port Authority
TBS	Treasury Board Secretariat
TSB	Transportation Safety Board of Canada
US DoT	United States Department of Trade
VFPA	Vancouver Fraser Port Authority

1: Introduction

Marine pilotage, worldwide and in Canada, is an old profession. Pilots are mariners who have extensive knowledge of their local waterways and coastlines. They also possess expert ship handling skills. Pilots provide their services to incoming ships' captains to help navigate small and large ships safely into port. Most districts in the world offer port-based models of marine pilotage services. Unlike these, the Pacific Pilotage Authority (PPA) offers a coast-wide model of pilotage service in the waters of British Columbia *(see Appendix A)*.

Demographic changes are causing a shortage of skilled workers within the maritime industry in Canada. The province of British Columbia is facing challenges in the recruitment and retention of marine sector employees. In the not-too-distant future, the PPA will begin to face a shortage of pilots due to attrition, diminishing levels of eligible candidates and the increasing demands for pilotage services from a growing shipping industry. Many organizations within the industry are raising salary levels to retain their highly skilled workforce – possibly creating further issues for the PPA in attracting future pilot candidates.

Pilotage fees have been a source of conflict between ship owners and pilots' corporations (TSB, 1995). Pilot training and transportation costs continue to rise gradually. In catering to a coast-wide pilotage model, pilots' average travel time accounts for approximately 50% of their assignment duration. The PPA must develop strategies to

ensure the efficient use of its pilot resources and to provide a valuable and cost sensitive service to the shipping industry in British Columbia, Canada.

The Federal government's *Asia-Pacific Gateway and Corridor Initiative*, the province's *Ports Strategy 2005* and the numerous projects proposed within the oil and gas industry sectors are driving the heightened demand for local responsiveness in British Columbia's ports. A locally responsive pilotage service will help reduce industry costs, prevent conflict and alleviate industry concerns around pilotage inefficiencies.

With the mindset of providing a safe, efficient, cost sensitive and locally responsive pilotage service on Canada's west coast, the goal of this analysis is to:

- highlight few challenges of providing a coast-wide pilotage service;
- provide an analysis of British Columbia's marine pilotage sector;
- identify sources of value creation for the PPA; and
- provide options to address the highlighted challenges

Not taking anticipatory action on workforce development, being irresponsive to the growing needs of the shipping industry or failing to control costs for the services provided will continue to challenge PPA's endeavours to provide acceptable levels of coast-wide pilotage services.

2: Challenges with Coast-Wide Pilotage

Ship captains are not necessarily aware of the specific navigational conditions of the local waters of all the ports where their vessels call. Pilotage contribution to maritime safety is primarily the pilot's experience and local knowledge within port and coastal waters (Grundevik & Wilske, 2007). In addition, workforce recruitment, knowledge of the entire coast line, recurrent training on ship handling techniques and ongoing familiarization with electronic navigational technology, which ensure pilots' currency, have been identified by the Pacific Pilotage Authority Canada (PPA) as being very important to maintain navigational, environmental and maritime economic safety in the compulsory pilotage waters of British Columbia, Canada.

Marine pilotage services in the coastal waters of British Columbia ensure navigation and environment safety and keep the wheels of maritime commerce turning. Pilotage services have proven to be very valuable over the decades; however, the shipping industry and marine terminal customers continue to demand more value for their money. Occasionally they challenge the price and quality of the services rendered. Almost all issues boil down to the costs of providing a coast-wide model of pilotage services; i.e. monies required for training, remuneration, logistics, transportation and being locally responsive.

2.1 Local Responsiveness

British Columbia's seaports handle over eighty-two million tonnes (2007) of cargo and about two hundred and fifty cruise-ship calls per year. The ports of Vancouver in the south and Stewart in the north handle approximately 81% and 0.25% respectively of the annual sea trade. Steady growth is projected in grain and coal export through the ports of Vancouver, Prince Rupert and Deltaport. The largest anticipated growth is in the oil and gas export sectors, primarily through the port of Kitimat and some through the ports of Prince Rupert and Vancouver. The quantities and cargo types differ and the frequency of annual ship calls varies (between 20 and 4000) from one British Columbia seaport to another. Every port operator sees their operations as being important and smaller ports expect to receive similar levels of pilotage services as the bigger ones do.

The marine transportation industry has evolved from a port-to-port business into a door-to-door one (US DoT, 2007). Marine transportation is no longer just about moving cargo and people across bodies of water. It is about better managing the entire shipment process by providing greater efficiency, reliability and cost savings. It is about meeting customer expectations and providing an excellent service, pilotage services included.

Local responsiveness is influenced by situations at the sub-unit level whereas global integration is determined from the perspectives of the corporate headquarters level (Ghoshal & Nohria, 1989). For example, in providing a coast-wide pilotage service, the PPA does not find it financially feasible to have locally resident pilots in most remote marine ports in British Columbia. As a result, ships' captains do not have immediate access to pilots' services when in these ports. They are required to order for pilot services in sufficient time to allow for pilots' travel time and transportation itineraries. Changes to

service orders are difficult to accommodate once pilots have departed to these remote ports for their assignments. To balance its well-established coast-wide pilotage services with local responsiveness, the PPA should be sensitive to local port dynamics and impediments. PPA's operations strategy must ensure the benefits of a coast-wide system yet at the same time be responsive to the demands of British Columbia's primary and remote ports and the ships that call these ports.

2.2 Future Source of Pilots

Ensuring the right quantity of workers with the necessary qualifications now and into the future has become a major concern for employers, industries and policy makers in British Columbia (Jothen, 2009). British Columbia and Canada have an aging workforce. In addition, the rate of labour force growth is slower than the rate of workers leading to retirement. British Columbia is expected to experience a decline in the labour force participation rate from 65.6% in September 2006, to 62% in 2010, and less than 60% by 2025 (Kunin, 2007).

A large number of pilot candidates are from the local tug industry in British Columbia. British Columbia's tug and tow industry traditionally was joined at the hip with the forest industry. The business of towing logs or chip barges along the coast has seen a significant downturn, severely limiting towboat work opportunities (Dykes, 2011). The restructuring of the local shipping industry and the changing nature of coastal shipping patterns has resulted in fewer local mariners having explicit and experiential coast-wide knowledge. Localized voyages are diminishing their coast-wide knowledge. Increasingly, the PPA is finding that these mariners barely meet the qualifications required under the current recruiting and licensing system. The PPA will need to make

changes to its recruiting protocol and/or lengthen its apprenticeship programs to continue to have a highly skilled workforce that can provide a coast-wide pilotage service.

Having started out as deck officers, pilots are at the pinnacle of their maritime careers. Studies conducted for the Maritime Sector Human Resources Strategic Planning Committee (MSHRSPC) indicate that skill shortages will be experienced in deck officer/engineer, naval architect and marine surveyor categories over the current decade. In addition, the Canadian Occupational Projections System (COPS) data for the Asia-Pacific Gateway related occupations project an increase of 238,300 jobs in 2015 as compared to the 2005 workforce demand with the rate of attrition being higher than the employment growth demand in most industries. Table 2.1 shows the increase in demand for marine navigation officers from 2005 to 2015. Anecdotal evidence from amongst the local mariners seems to corroborate the COPS data.

Table 2.1 Selected Occupations Growth 2005 - 2015

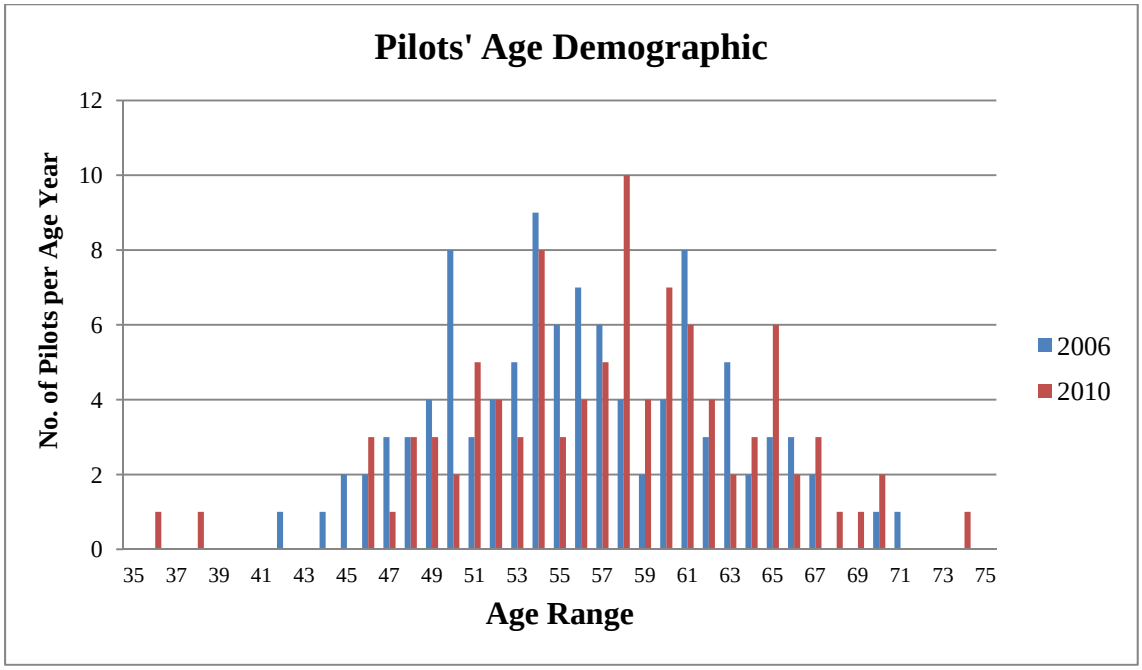
Selected Occupations	Average Annual Growth Rate (2005-2015)	Net Change 2005-2015	Attrition 2005-2015	Total Openings 2005-2015
Transportation Managers	2.1%	560	840	1,400
Customs, Ship & Other Brokers	2.3%	160	240	400
Dispatchers & Radio Operators	1.8%	1,020	1,300	2,320
Deck Officer, Water Transport	**2.5%**	**290**	**360**	**650**
Shippers and Receivers	1.9%	2,980	3,630	6,610

(Source: COPS Projections, December 2006)

PPA's pilot workforce is gradually aging. Attrition rates will climb over the next decade. In fact, the ages of a few pilots are in the seventies at the time of writing this

report. Figure 2.1 shows that during the years from 2006 to 2010, the median age has increased from 55 to 57.5 and the modal age has increased from 54 to 58. Combined with a diminishing pool of eligible candidates, an aging workforce provides for challenges with retention, recruitment and training in the years ahead. PPA's human resource strategy for the next decade must reverse the aging trend to ensure the sustainability of its workforce.

Figure 2.1 Pilot Age Demographics 2006 - 2010



(Source: Pacific Pilotage Authority)

2.3 Non-Revenue Time Spent on Assignments

The PPA operates, maintains, and administers marine pilotage services within all compulsory pilotage waters on the coast of British Columbia, Canada, i.e. between the States of Alaska in the north and Washington to the south. The pilots join incoming ships via pilot boats at designated pilot boarding grounds and disembark from outgoing ships to

a pilot boat that returns them to shore after the ship has successfully negotiated coastal waters. The designated pilot boarding grounds are at Victoria, Port Hardy, Prince Rupert and Sand Heads at the mouth of the Fraser River. Occasionally, pilots embark and disembark via helicopter from ships destined to or from ports on the west coast of Vancouver Island.

The time spent by the coastal pilots on assignments (revenue hours), i.e. on pilotage duty, not counting travel and detention (waiting), does not provide a true indication of their workloads (Bernier, 1968). This was true half a century ago and is true today, especially when compared to the workloads of port-based pilots. The pilotage district on the west coast of Canada is one of the largest in the world with over 15,000 miles of coastline. Depending on a ship's origin and destination within the pilotage district, the pilots may have to travel extensively before and after assignments and spend a considerable amount of time on detention.

Extensive levels of non-revenue travel and detention reduce the efficiency in work force usage. For the years from 2006 to 2011, table 2.2 compares the coastal pilots' revenue earning hours to their non revenue-earning hours while on assignments. The average amount of non-revenue hours over the six-year period is approximately forty-eight percent of the total assignment time. One hundred coastal pilots average seven hundred to eight hundred revenue-hours per year. Any reduction in travel time equates to an efficiency gain by about the same percentage as the reduction; i.e. a reduction of ten percent in the travel hours will result in an approximate gain of nine to ten virtual pilots.

Table 2.2 Coast Pilot Assignments Hours: Revenue vs. Non-Revenue

Year	Revenue Hours		Non-Revenue Travel Hours	
2006	80,311	52.3%	72,981	47.7%
2007	80,254	50.9%	77,256	49.1%
2008	77,920	52.5%	70,416	47.5%
2009	74,934	51.6%	70,228	48.4%
2010	71,947	52.0%	66,343	48.0%
2011	75,137	50.8%	72,805	49.2%

(Source: British Columbia Coast Pilots)

2.4 Training Costs

Pilots require having vast experience and extensive knowledge of the waters within which they offer their services. In addition, they need to have specific knowledge of the many vessels they navigate. Within a very short period of the time, pilots have to acquaint themselves with the characteristics and manoeuvring of an unfamiliar vessel, while taking weather conditions, currents and tides into account, before setting course and giving instructions to sail (IMPA 2004).

Recognizing that pilots play an important role in promoting maritime safety and protecting the marine environment, the International Maritime Organization (IMO) through its Resolution A.960 has provided recommendations on training for pilots.

Training recommended to ensure the continuation of pilots' proficiency and to update their knowledge includes:

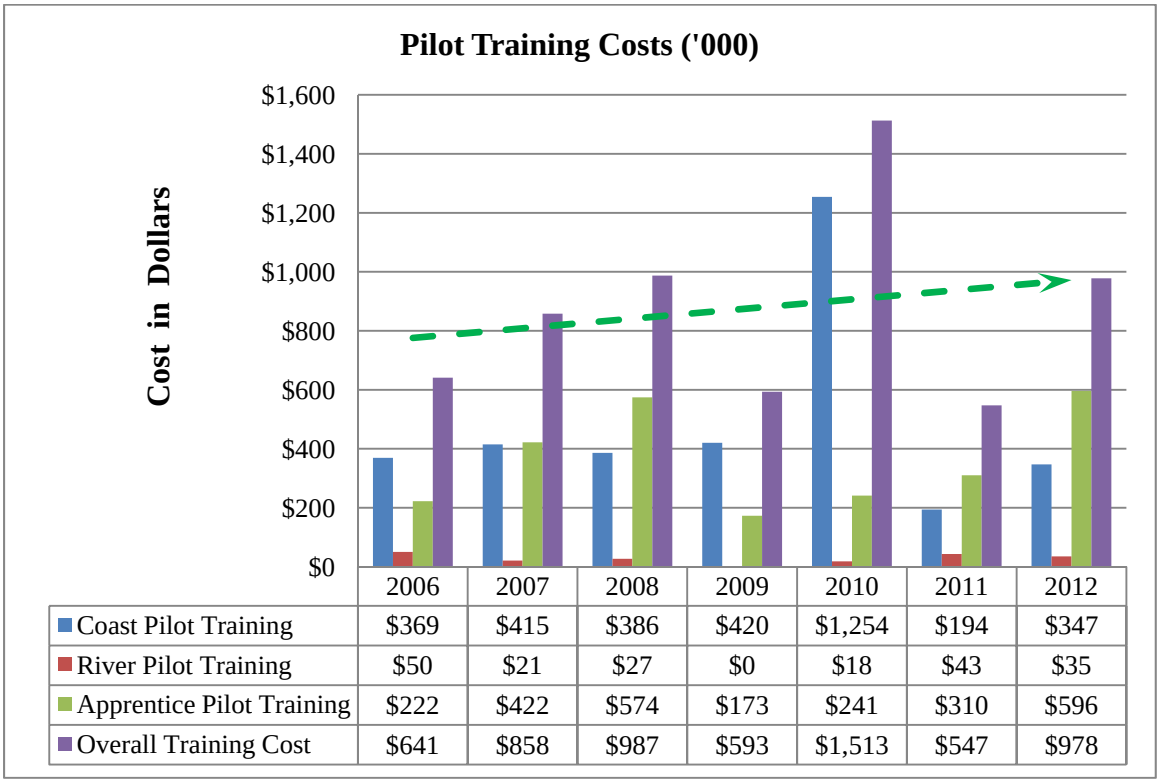
- enhancing the ability to communicate;
- bridge resource management to facilitate communication and increase efficiency;
- simulated radar training and emergency ship handling procedures;

- ship handling using manned models;
- new [electronic] equipment with special regard to navigation aids; and
- personal safety, survival at sea and hypothermia remediation

While some of the recommended training courses are available locally in British Columbia, the schools in Europe offer a better quality of the more advanced simulation and manned-model *(see Appendix B)* training courses. Fees for some of the recommended courses range from $5,000 to $15,000 per person for a week's training. In addition, out-of-region training involves travel and hotel costs. Travel times increase the duration, over and above the training times, that the pilots are away from the job. Understandably, the costs to train pilots on a continual basis add up to very significant amounts. The PPA passes these costs on to the customers.

Figure 2.2 indicates that PPA's costs to train pilots over the last seven years have been up and down. While the year 2010 saw a large expenditure on electronic navigation and tethered tug training, years 2007, 2008 & 2012 saw large expenditures on apprentice pilot training. The training costs trend line over the seven-year period indicates a gradual increase annually. In anticipation of the forecasted pilot attrition rate, the demand for additional pilots in the decade ahead and the increased apprenticeship requirements, the PPA will need to budget for higher training expenditures and keep the industry appraised of its plans.

Figure 2.2 Pilot Training Costs 2006 - 2012



	2006	2007	2008	2009	2010	2011	2012
Coast Pilot Training	$369	$415	$386	$420	$1,254	$194	$347
River Pilot Training	$50	$21	$27	$0	$18	$43	$35
Apprentice Pilot Training	$222	$422	$574	$173	$241	$310	$596
Overall Training Cost	$641	$858	$987	$593	$1,513	$547	$978

(Source: Pacific Pilotage Authority)

2.5 Travel Costs

After the coast pilots' service contract payments and launch operation costs, PPA's next largest expense category is pilot travel costs. Figure 2.3 shows that the dollar amount for pilots' travel has steadily increased over the last four years; however, its ratio to total revenue remains steady at 8%. The predicted shipping growth over the next five to ten years in British Columbia's northern ports will further increase pilots' long distance travel and associated costs. The tariff for pilotage services allows for the recuperation of travel expenses; however, efficiencies gained through pricing or travel reductions can be passed on to the customer and will help make British Columbia ports more competitive.

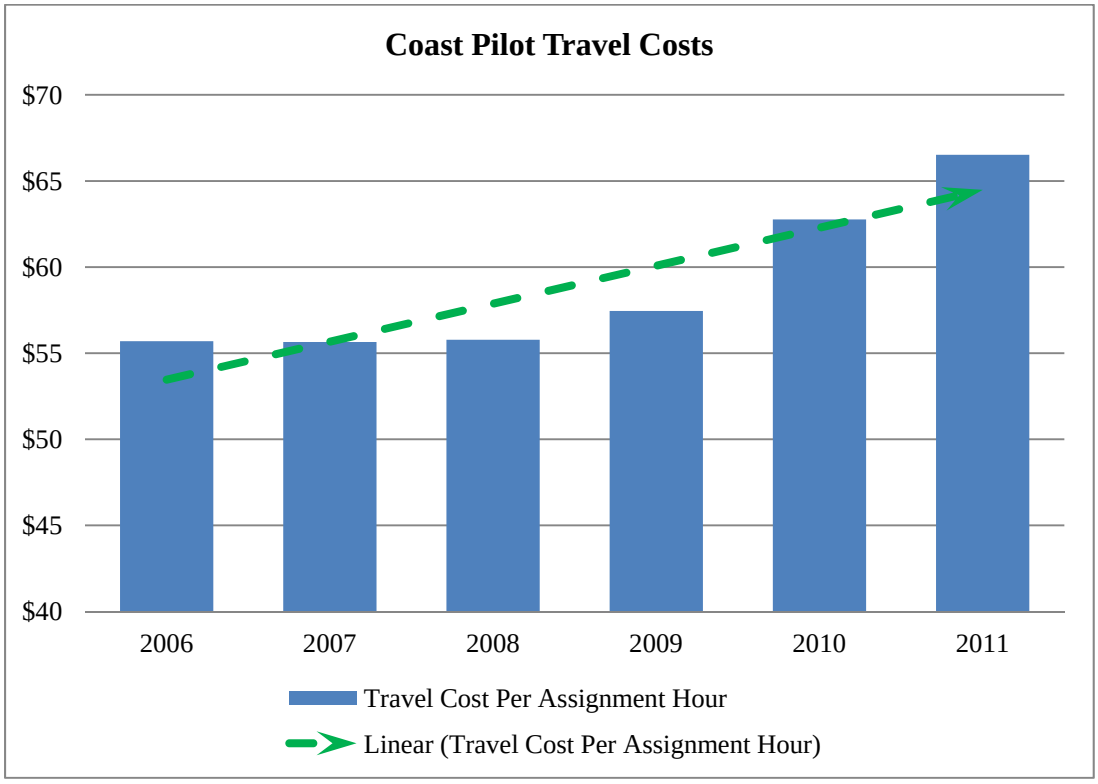
Figure 2.3 Pilot Travel Costs (2006 - 2012)

	2006	2007	2008	2009	2010	2011	2012
Coast Pilot Travel	$4,473	$4,466	$4,346	$4,305	$4,516	$4,998	$5,155
River Pilot Travel	$172	$150	$170	$142	$145	$183	$167
Overall Travel Cost	$4,645	$4,616	$4,516	$4,447	$4,661	$5,181	$5,322

(Source: Pacific Pilotage Authority)

While travel costs have remained steady at 8% of overall revenues year over year, Figure 2.4 shows that the travel costs per revenue-earning assignment-hour for the coastal pilots have gradually increased over the period from 2008 to 2011. The number of revenue-earning assignment hours reduced year over year from 2008 through to 2010 whereas the travel costs stayed more or less the same over the same period. In 2011, while the number of revenue-earning assignment hours increased by four percent, the travel costs increased by eleven percent.

Figure 2.4 Coast Pilots' Travel Costs per Assignment Hour (2006 - 2011)



(Source: Pacific Pilotage Authority)

In summary, while coastal marine pilotage is a necessary service in the waters of British Columbia to ensure navigation, environmental and economic safety, providing a coast-wide pilotage service has many issues, some of the more challenging ones being responsiveness to local needs, keeping costs down and ensuring a sustainable supply of pilots with coast-wide knowledge.

3: Marine Pilotage in British Columbia

Pilotage on Canada's west coast is subject to varying operational problems. The primary causes for these problems, that may be encountered in one area but not in another, are the geographic constraints, current, tidal, climatic, ice and weather conditions that the Pacific Northwest is exposed to. The need for trained mariners, viz. professional pilots, to navigate foreign ships in and out of the British Columbia ports safely, grew along with Canada's industrial and commercial development. Changing times and the expanding economy of Canada forced the pilotage services to adapt (Royal Commission on Pilotage, Bernier, 1968).

3.1 Legislation

Pilotage legislation in Canada has its roots in the 1854 Merchant Shipping Act of the United Kingdom. Prior to confederation, provincial legislation tailored to local needs, regulated pilotage services. When British Columbia joined the federation in 1871, the law in force was the Pilotage Ordinance of 1867. Independent contractors, under the governance of a Pilotage Authority that had regulation-making and pilot-licensing powers, provided pilotage services on a harbour basis.

Between 1867 and 1873, the Federal Parliament gradually took over the legislation of pilotage and eventually passed the first Federal Pilotage Act in 1873. The main tenets of the Act were that pilotage should ensure the convenience of shipping and be provided by independent pilots who were licensed by the Pilotage Authority. Authorities have amended the Pilotage Act a few times since, the most current version being the Act of 1972 as amended in 1985. The Federal Minister of Transport is

responsible for the administration of the Pilotage Act, which is part of the larger Canada Marine Act.

The Pilotage Act dictates the provision of pilotage services and requires the maintenance of four separate Pilotage Authorities; viz. the Atlantic Pilotage Authority (APA), the Laurentian Pilotage Authority (St. Lawrence Seaway), the Great Lakes Pilotage Authority (GLPA) and the Pacific Pilotage Authority (PPA). The four Pilotage Authorities created in 1972 under the Pilotage Act are Crown Corporations. The Act mandates each Authority to provide a "safe and efficient" pilotage service for the area under its control.

3.2 Organization of Pilotage

The Pacific Pilotage Regulations defines the pilotage district of British Columbia. It is the largest in the world and encompasses approximately 15,000 miles of coastline. From an organizational point of view, the district is a self contained, independent, autonomous and decentralized unit under the governance of the PPA. The PPA employs seven pilots for pilotage duties in the Fraser River district and has a contract for services with the British Columbia Coast Pilots Ltd. (BCCP) for the coastal district between the States of Alaska and Washington.

3.2.1 Creation of the Pilotage District

The Colonies of Vancouver Island and mainland British Columbia, established in 1849 and 1858 respectively, were separate and independent of each other. Pilotage was a responsibility of the authorities of the various ports that appointed pilots and fixed service

fees. In the absence of pilotage legislation, neither could vessels be compelled to take pilots nor could appointed pilots supersede persons acting as pilots (Bernier, 1968).

In 1866, the two colonies united and in 1871 became the Province of British Columbia. In 1873, the government implemented a new Pilotage Act. Under this new Act, in 1875, an Order in Council established a Pilotage Authority comprised of five British Columbia citizens and the Pilotage District, which included the entire coast of British Columbia, its rivers and harbours and extended from the shores of Washington in the south to the northern boundary of the province.

In the years to follow, the different Orders in Council successively divided the Coastal District into a number of separate Districts. Disagreements with the pilots resulted in the abolishment of the Coastal District in 1920. Resulting confusion between various groups of pilots necessitated the intervention of the Federal Government, which re-established, in 1929, the pilotage District of British Columbia.

In 1904, the Pilotage Authority created the District of New Westminster. The District encompasses the waters of the Fraser River up to the mouth at Sand Heads and extending outward to Point Grey to the north and the US boundary to the south.

Pilots, licensed by the Pilotage Authority, are local mariners who regularly ply the waters of British Columbia and Fraser River. Pilots have always been, and still are, under the direction of the Pilotage Authority, which falls under the purview of a Minister in the pertinent federal government. The Minister of Transport became the designated Minister for Pilotage Authorities when the federal government created the Department of Transport in 1936.

The Pacific Pilotage Regulations (C.R.C., c. 1270), as amended in December 2009, defines the present-day compulsory pilotage waters of British Columbia (See Appendix A). The District is comprised of five areas:

Area 1 - All waters of the Fraser River and other rivers flowing into it

Area 2 - All waters between Vancouver Island & the south coast of British Columbia

Area 3 - All waters on the west coast of Vancouver Island extending approximately three miles seaward

Area 4 - All waters on the north coast of British Columbia

Area 5 - All waters surrounding Haida Gwaii (formerly known as Queen Charlotte Islands)

3.2.2 The Pilotage Authority

Pilotage Authorities have been the only entities that made operational and administrative decisions for their respective Districts to make them function: among other things, determining the extent of the District, the qualifications required of candidates to be a pilot, remuneration of pilots, tariffs for pilotage services, medical standards, etc. During the early part of the twentieth century, the Pilotage Authority was sometimes a one-man show in the person of the Minister of Transport. The Authority was the sole administrator within the District, and if it acted within the limits of its powers, no one could interfere or revise its decisions, or appeal to a higher authority.

The present Pilotage Act establishes each Pilotage Authority as a body corporate consisting of a Chairperson and not more than six other member directors. The objects of an Authority are to establish, operate, maintain and administer in the interests of safety an

efficient pilotage service within its District. An Authority may contract with a corporate body or employ such employees, including licensed and apprentice pilots, as are necessary for the proper conduct of the work of the Authority.

3.2.2.1 Pacific Pilotage Authority Canada

The Pacific Pilotage Authority is a federal Crown corporation whose mandate is to administer pilotage services in the waters of Western Canada. The Authority complies with the Treasury Board guidelines on corporate governance practices.

The Authority's Board of Directors comprises a Chair, two pilot representatives, two shipping industry representatives and two representatives of the public interest. This structure provides effective channels of communication and represents a good balance among the major stakeholders. The Board has full access to all books, records, facilities, and personnel of the Authority.

The 'President and CEO' who reports to the Board through the Chair manages the Authority. There are seven management employees, seven employee pilots, eleven dispatchers, six administrative and twenty-six launch employees.

3.2.3 British Columbia District (Coast) Pilots

On the coast of British Columbia, the first recorded pilotage services began in 1858 in the ports of Victoria, New Westminster and Fort Langley (BCCP). The British Columbia Pilots Association, created in 1920, was the first pilot association. Subsequent to other short-lived pilot groups, the pilots eventually created the British Columbia Coast Pilots Association in 1929. Further changes to the size of the piloting district and government regulations promoted the creation of the Corporation of the British Columbia

Coast Pilots in 1963 and finally the formation in 1973 of the present day company, the British Columbia Coast Pilots Ltd.

3.2.4 New Westminster District (Fraser River) Pilots

For over a century Fraser River Pilots have been guiding large ships through the narrow, torrent waters of the Fraser River (FRPA). The harbour master was responsible for pilotage services on the Fraser River until pilots began to establish independent associations in the early 1900s. The Pilotage Act of 1972, which established the Pacific Pilotage Authority to oversee pilotage in British Columbia, gave pilots the right to choose whether to work on contract or to become employees of the Pacific Pilotage Authority. Pilots on the Fraser River opted for employee status. The Fraser River Pilots' Association represented them. In 1972, the Society Act of British Columbia incorporated the Association.

The Fraser River extends about 800 miles inland from the gulf of Georgia. Each year millions of tonnes of silt flows down the river after the spring "freshet" (snowmelt), most of which settles in the deep-sea channel of the river. This requires continual dredging to keep the channel clear for ships and constantly updated local knowledge. The river is also home to one of the largest salmon runs in the world and more than 300 species of birds. The role of the pilot on the Fraser River has grown to be extremely important from a navigational safety and environmental point of view.

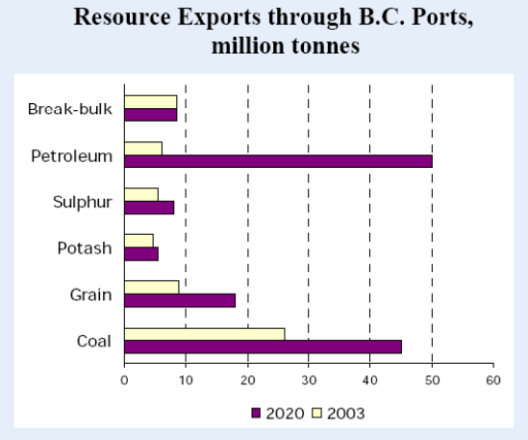
3.2.5 Principal Harbours

Numerous marine terminals cater to ocean-going ships in the Fraser River and approximately thirty harbours along the British Columbia Coast. The most important

harbours have been and still are Vancouver, Victoria, Nanaimo, Port Alberni, Kitimat and Prince Rupert. British Columbia is Canada's Pacific gateway and its ports handle half of Canada's maritime exports and 85% of the western province's marine exports of grain, coal, forest products and, more recently, petroleum and petrochemicals.

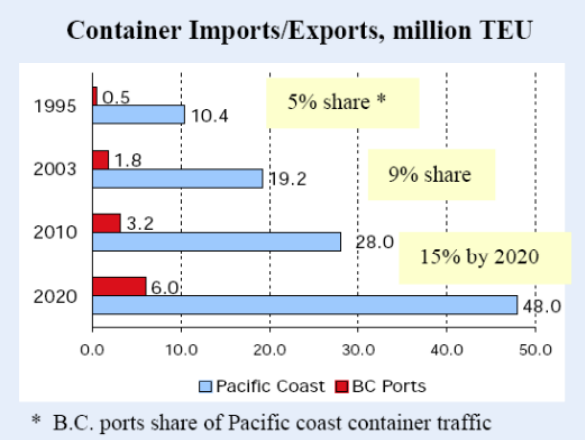
British Columbia's provincial government has designed the *British Columbia Ports Strategy* to make Canada's Pacific ports key components of an efficient, reliable and competitive trading system. Figure 3.1 indicates that the British Columbian government expects its ports to see significant export growth in most resource sectors. In addition, the British Columbia Government has provided $2.5 million property tax relief for port terminal operators, $400 million for road infrastructure in the Lower Mainland and $17 million to create new container handling capacity at the Port of Prince Rupert. The government projects container traffic to grow (see Figure 3.2) at six to eight percent annually to 2020 resulting in a three hundred percent traffic increase (BC Ports Strategy, 2005).

Figure 3.1 Resource Export Growth



(Source: BC Ports Strategy, 2005)

Figure 3.2 Container Shipping Growth



(Source: BC Ports Strategy, 2005)

3.2.5.1 Vancouver

Vancouver is the most important port in British Columbia. Over the last five to six decades, its share has grown steadily from 40% to 70% of all ship calls to the province. Within the harbour, tidal swirls, strong currents and the First and Second Narrows make pilotage services essential to ensure navigational safety and the continuity of economic trade.

The Vancouver Fraser Port Authority (VFPA), also known as Port Metro Vancouver (PMV), comprises of Vancouver harbour, the Fraser River and Deltaport. Port Metro Vancouver, with twenty-eight major marine cargo terminals and three Class 1 railroads, is the fourth largest tonnage port in North America. Its deep-sea terminals offer virtually no draft restrictions and extensive on-dock rail facilities. Port Metro Vancouver serves as homeport for the Vancouver-Alaska cruise industry.

3.2.5.2 Victoria and Esquimalt

Victoria, a Port of Entry, used to be a cargo trading port for coastal and deep-sea vessels. The port has become a destination primarily for cruise and pleasure vessels. Ogden Point, within Victoria Harbour, is home to PPA's busiest pilot launches that transfer pilots to and from ships at the 'Brotchie Ledge' boarding ground just south of the entrance to the port. Esquimalt Harbour is and has been the Pacific base for the Royal Canadian Navy. Esquimalt also accommodates merchant ships in the repair yard.

3.2.5.3 Nanaimo

Situated centrally on the east coast of the island, Nanaimo was and still is the primary port on Vancouver Island. In the past, it served as a Port of Entry for smaller

harbours on neighbouring islands. It has a sheltered harbour and is just over thirty miles from the port of Vancouver. Nanaimo was a busy port in the coal and iron ore trade during the early and mid twentieth century. Nanaimo is currently the largest port on Vancouver Island and caters to project cargo, pulp, lumber and forest product trades to and from the nearby areas. Ships destined to Nanaimo embark their pilots at Brotchie Ledge (Victoria). The port also serves as a pilot boarding station to disembark pilots at anchorage or to embark pilots to ships in transit.

3.2.5.4 Port Alberni

In 1947, the government initially established the Port of Alberni. Subsequently, the Harbour Commission Act of 1964 governed it. On 01 July 1999, the Canada Marine Act proclaimed the Port Alberni Port Authority, which was a continuation of the Harbour Commission.

Located about twenty-four miles up the Alberni Canal, Port Alberni is the principal deep-water port on the west coast of Vancouver Island. Forest products produced in the local mills are the port's primary exports. This consists mainly of lumber destined to foreign markets. Foggy weather, gale force winds and heavy swells have made local knowledge important thereby necessitating pilotage services for vessels calling the Alberni Canal.

3.2.5.5 Kitimat

Situated at the head of Douglas Channel, Kitimat is a Port of Entry that serviced the import and export needs of the Aluminum Company of Canada. Kitimat, an ice-free, deep-water harbour has always enjoyed a steady flow of vessels through the years.

Kitimat has grown to be British Columbia's third largest port. It is attracting large investments from new private proponents in the petroleum, aggregate and LNG industries.

The main pilotage difficulties are fog, wind, strong currents and numerous natural navigational hazards in Caamaño Sound, one of the access routes to the Douglas Channel. Pilots board and disembark from vessels either at Triple Island near Prince Rupert or at Pine Island near Port Hardy. Vessels plying between Vancouver and Kitimat use the inside passage and retain the services of two pilots for the entire route.

3.2.5.6 Prince Rupert

Prince Rupert is almost at the northern extremity of the Pilotage District. It is a Port of Entry. Compared to the other North American West Coast ports, it is ideally situated at the closest great circle distance to the far eastern ports when. Furthermore, a railway network connects the port to Central and Eastern North America. Prince Rupert currently trades in the coal, grain and container segments of the marine industry. It has seeing exponential growth over the last decade.

Pilots embark and disembark from ships at Triple Island which is 25 miles due west of the port. Very rough weather conditions are commonplace at Triple Island. Winds that reach storm force velocities, twenty-five foot tides and cold, freezing rain are prevalent in winter.

3.2.5.7 Other Ports

Tahsis, Gold River, Zeballos and Port Alice on the west coast of Vancouver Island, and Duncan Bay, Texada Island & Port Mellon in the Straits of Georgia have all

seen limited but sufficient activity to attract a few ships on a regular basis. Up until a couple of years ago, the number of ships calling these ports had gradually declined over the decades because of the dying lumber and log trade from the local mills. However, there has been a resurgence of the log trade in the past two years and the demand for pilotage service to these out ports has once again increased.

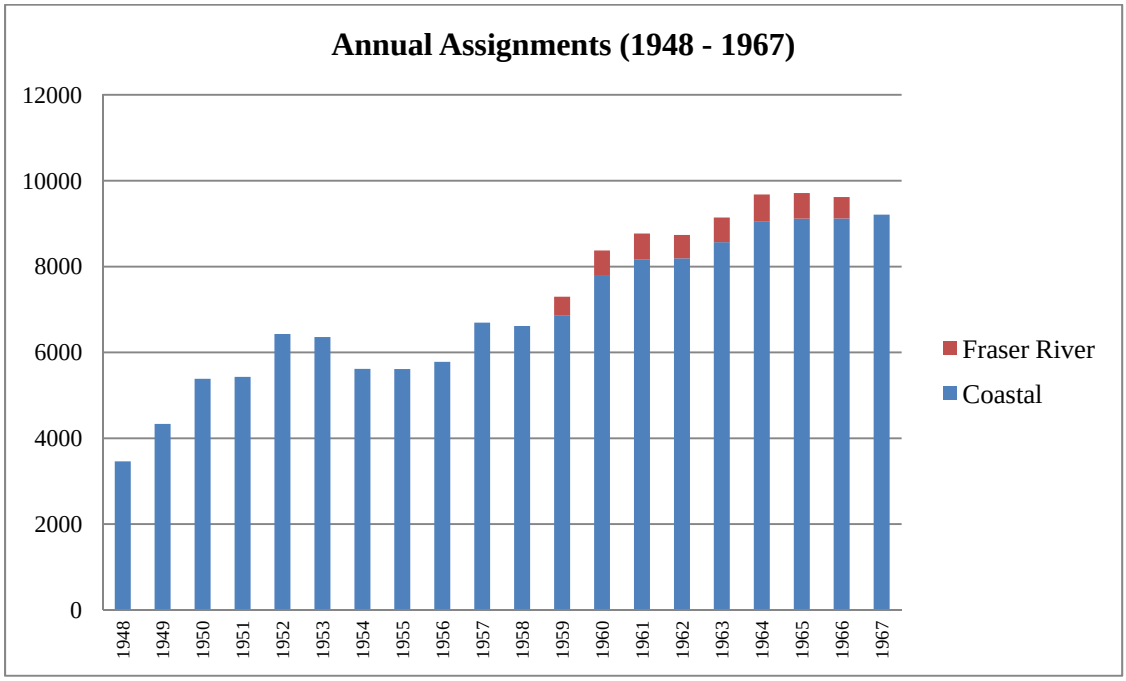
3.3 Pilotage Services

Pilots bring to the ship expertise in handling large vessels in confined waterways and expert local knowledge of the area (Wikipedia). Large ships are very difficult to manoeuver in restricted waters. A slight error in judgment can cause millions of dollars in damage. The most challenging part of a ship's voyage is the passage through the narrow waterways that lead to port and the final docking of the ship.

3.3.1 Pilotage in British Columbia - A Necessary Service

Over the past century and a half, records show that prudent mariners have taken full advantage of local pilotage services to navigate in confined and unfamiliar waters, both for reason of their own safety and to expedite their passage (Bernier, 1968). Figure 3.3 shows the number of incidences when deep-sea mariners calling British Columbia during the latter half of the twentieth century utilized coastal pilotage services. These assignment numbers were significant when compared to the overall traffic numbers. Only two to four percent of all ship calls during the period did not utilize pilotage services (Bernier, 1968).

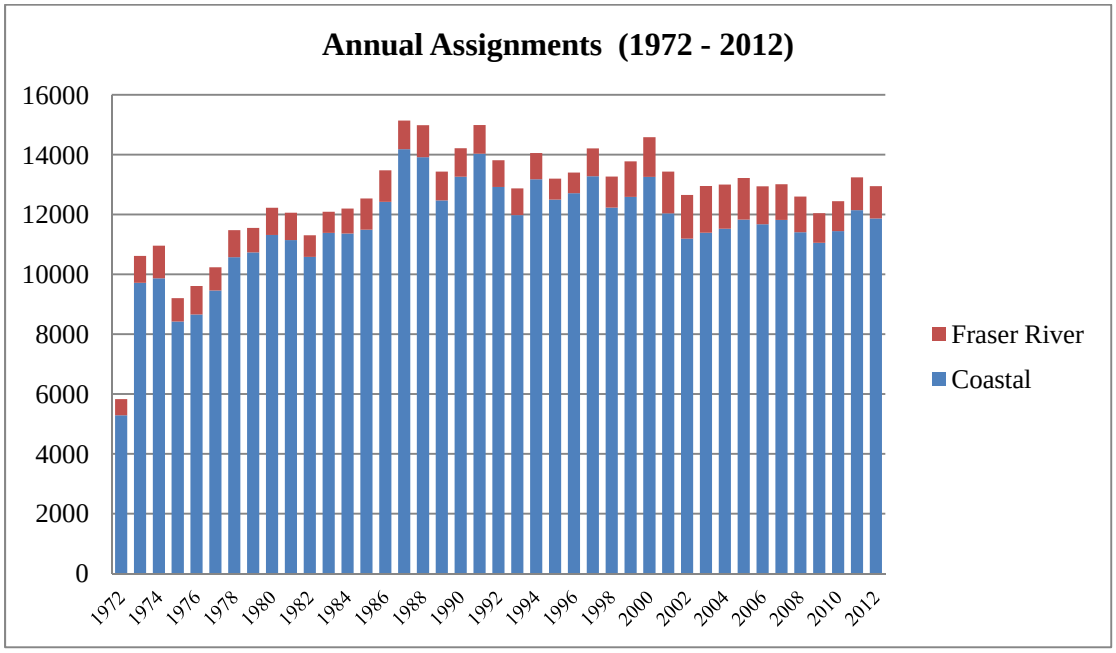
Figure 3.3 Annual Assignments (1948 - 1967)



(Source: Report on the Royal Commission on Pilotage, 1968) (No Fraser River Data 1948 - 1958, 1967)

Present day technology and training have enhanced marine navigation to levels where deep-sea mariners could bring massive ships into port without pilots. Commercial interests would prefer this; however, the business of pilotage continues. Regulations now govern pilotage services, pilots are liable, and financial and environmental risks warrant the employment of pilots in coastal and harbour waters. Figure 3.4 shows pilotage assignment numbers for the Coastal and Fraser River districts since 1972. Presently, pilotage is mandatory on the coast of British Columbia and the Pacific Pilotage Authority provides the services.

Figure 3.4 Annual Assignments (1972 - 2012)



(Source: Pacific Pilotage Authority)

3.3.2 Tariff for Pilotage Services

Pilotage services in British Columbia were unregulated during the early years. There were no Pilotage Authorities, no pilotage franchises, competition was open and rates varied as per the negotiation skills of the ships' masters and the unlicensed pilots. Payment for pilotage services became compulsory in 1949. The pilotage Authority established tariffs, pooled the revenues, licensed the pilots and dispatched them as per a roster system.

The present practice for tariffs includes a gazetting process. The Pacific Pilotage Authority collects pilotage fees and the revenues pay for the services of the contract and employee pilots, PPA's employee salaries, pilot training, pilot launch operations and the administration of the pilotage services. The PPA is a non-appropriated Crown corporation and the design and structure of the tariff ensures its financial self-sustainability.

3.3.3 Pilotage Exemptions

Vessels exempted from using pilotage services are small vessels that are below 350 gross tons, ferries on fixed routes, Canadian government vessels, United States Navy vessels below 10,000 gross tons and the tugs and barges that trade locally.

3.3.4 Pilotage Waivers

The PPA may waive compulsory pilotage in respect of a ship if

- the ship is in distress;
- a person on board the ship requires medical evacuation;
- the ship is engaged in rescue or salvage operations;
- the ship is seeking refuge; or
- a licensed pilot is not available to perform the functions of a pilot

The Authority may also waive compulsory pilotage, on the coast and in the Fraser River; in respect of a ship under 10000 gross tons if all persons in charge of the deck watch have the appropriate certification and meet the sea time criteria as defined in the Pacific Pilotage Regulations of Canada.

3.4 Pilotage Operations

The provision of coastal pilotage services on the west coast of Canada involves the close co-ordination of ordering, dispatching, transporting and transferring of pilots to and from ships. Aside from the logistics of getting pilots to and from ships, the Pacific Pilotage Authority arranges for their periodic training, as per international regulations, to maintain skill and currency.

3.4.1 Dispatching

Ship's captains or their agents order for pilotage services. Dispatchers then assign pilots to jobs. Dispatching pilots to assignments on a coast-wide basis can be challenging. While some assignments may be short trips to and from harbours within close proximity of available resources, others may involve detentions, lengthy transportation times and long pilotage passages to or from remote out ports. Dispatching must be efficient to minimize work force wastage, co-ordinate transportation and to ensure that the pilots get to their assignments on time and without being fatigued. Dispatchers did not strictly follow a roster system during the early years of dispatching pilots. Studies on pilot fatigue, reliable transportation facilities and advances in dispatching technology have helped develop a well-designed roster system. Dispatchers now use this roster system to dispatch pilots.

The Pacific Pilotage Authority currently operates two dispatch offices, one each in Victoria and Vancouver, on a 24/7/365 basis. The dispatchers provide the pilots with their assignments in sufficient time and during normal working hours. This allows the pilots to rest appropriately, prepare for the assignment and then travel to the assigned ship. The dispatchers arrange for the pilots' travel to and from ships, book their flights and hotel accommodation if required and liaise with the tugs, pilot launches and terminal operators to ensure a co-ordinated service delivery.

3.4.2 Pilot Stations and Boarding Grounds

Pilots temporarily await the arrival of an inbound ship at a boarding station. These stations, situated at or near the entrance to a pilotage District, are equipped with pilot

launches. Four pilot stations service the pilotage District in British Columbia. They are located at Victoria, Steveston, Prince Rupert and Port Hardy.

Pilot boarding grounds are areas where pilots embark to or disembark from ships. There are five boarding grounds in the large pilotage district to offer flexibility to ships calling ports in British Columbia. They are:

- Brotchie Ledge, Victoria;
- Sand Heads, mouth of the Fraser River;
- Cape Beale, entrance to Alberni Canal;
- Pine Island, near Port Hardy; and
- Triple Island, Prince Rupert

3.4.3 Pilot Launches

The Authority owns and operates state-of-the-art pilot boats (*see Appendix C*) in Victoria, Steveston and Prince Rupert. A contract boat services the Port Hardy pilot boarding station and a Victoria pilot launch services the Cape Beale pilot boarding station. Transport Canada mandates that only certified personnel operate the pilot launches. PPA's pilot launches are equipped to standards that exceed Transport Canada's regulatory requirements for vessels of their type and size.

In summary, the federal government of Canada regulates marine pilotage in the contiguous waters of British Columbia. There are two mandatory pilotage districts, namely the Coastal district and the Fraser River district. In these two districts, the PPA, a federal Crown corporation, administers the pilotage services in accordance with the Pilotage Act of Canada and its associated regulations. In providing the pilotage services,

the PPA licenses pilots, dispatches them to assignments, operates pilot launches to transfer pilot to and from ships and charges the industry for the services as per a regulated tariff.

4: British Columbia's Shipping Market

Many diversified types of ships call British Columbia's ports every year. Their trade is very dependent on Canada's resource commodities. No single sector is large enough to cause the pilotage business any acute financial distress. The analysis provided below offers an insight into British Columbia's shipping market size, segmentation and areas of growth.

4.1 Pilotage Sector Market Segmentation

The export sector is comprised mainly of coal, grain, petroleum, forest products, potash and sulphur trades whereas the import sector is comprised primarily of the containerized and automobile trade. The cruise sector is seasonal and comparably steady year over year. Table 4.1 shows the sector breakdown of PPA's assignments.

Table 4.1 Annual Pilotage Assignments by Commodity Sector

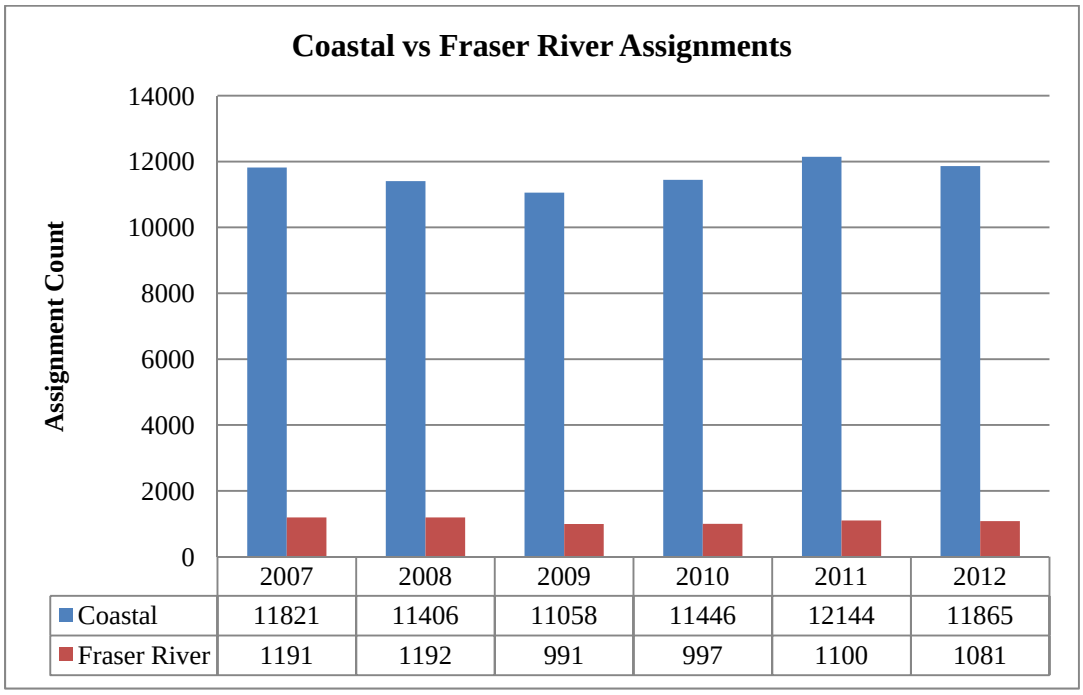
Commodity	Actual 2010	%	Actual 2011	%
Automobiles	972	8%	954	8%
Containers	1650	14%	1838	15%
Cruise	863	7%	878	7%
Coal	897	8%	926	7%
Grain	1530	13%	1657	13%
Petroleum	549	5%	426	3%
Forest Products	1441	12%	1644	13%
Potash & Sulphur	467	4%	547	4%
Anchorage Assignments	1465	13%	1440	12%
Other	1854	16%	2212	18%
Total	**11688**	**100%**	**12522**	**100%**

(Source: Pacific Pilotage Authority)

4.2 Pilotage Sector Market Size

In 2012, the PPA contracted with the BCCP, a partnership of approximately one hundred entrepreneur pilots, who performed 11,865 coastal pilotage assignments. The seven Fraser River employee pilots performed 1,081 assignments. As indicated in figure 4.1, Fraser River assignment numbers have historically been approximately nine to ten percent of coastal assignments.

Figure 4.1 Annual Pilotage Assignments - Coastal vs. Fraser River

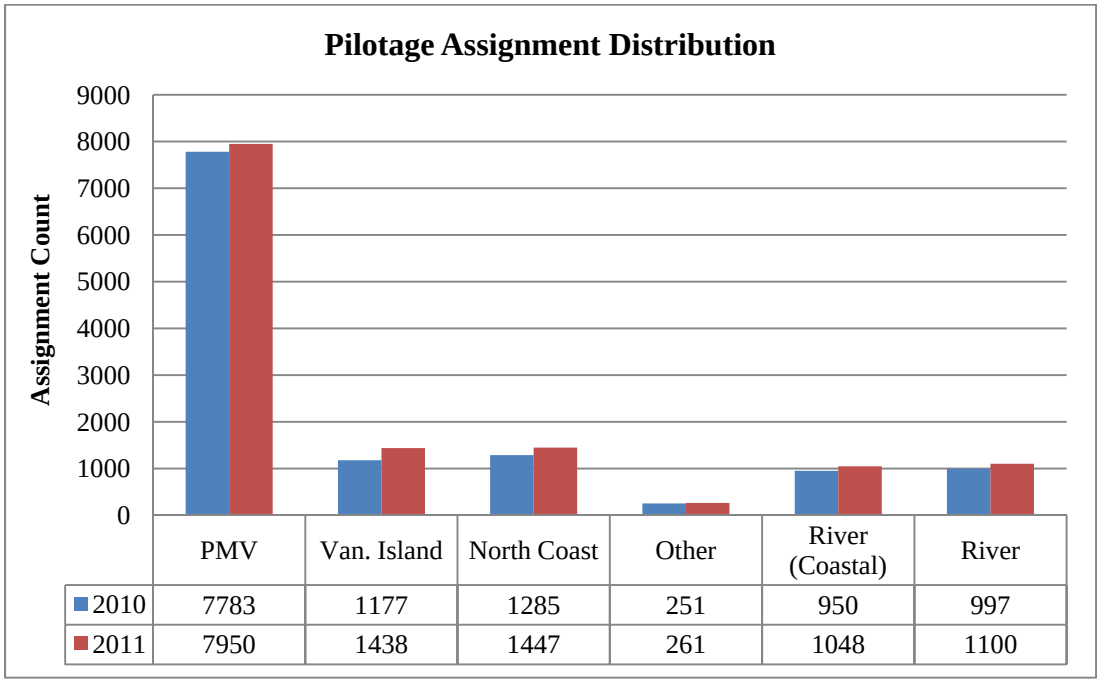


	2007	2008	2009	2010	2011	2012
Coastal	11821	11406	11058	11446	12144	11865
Fraser River	1191	1192	991	997	1100	1081

(Source: Pacific Pilotage Authority)

Notwithstanding the recent increase in trade at the port of Prince Rupert, the pilotage assignment distribution amongst the British Columbian ports has been relatively constant over the years. Figure 4.2 shows the typical assignment distribution for the primary BC ports. Vancouver accounts for about 60% to 70% of all pilotage assignments and the rest of the BC ports account for the balance.

Figure 4.2 Annual Pilotage Assignments - Area Wise



	PMV	Van. Island	North Coast	Other	River (Coastal)	River
2010	7783	1177	1285	251	950	997
2011	7950	1438	1447	261	1048	1100

(Source: Pacific Pilotage Authority)

4.3 Growth Opportunities

All the pilotage groups along the West Coast of North America operate as monopolies within their own areas of jurisdiction. Comparing the sources of advantage for these pilot groups will not provide any valuable information on opportunities for growth prospects for the PPA. However, comparing the sources of advantages for the North American west coast marine ports, including projected trade growth and development of new facilities, will provide a better picture of the opportunities for British Columbia's shipping industry. Any increase in British Columbia's shipping industry directly benefits the pilotage sector. Table 4.2 indicates the comparative strengths of the Pacific North West ports.

Table 4.2 Comparison of West Coast Ports' Strengths

Relative Comparison of Strengths for West Coast Ports						
Port Names →→→	**Seattle**	**Tacoma**	**Vancouver**	**Prince Rupert**	**Kitimat**	**Stewart**
Proximity to Far Eastern Ports	+	+	+	++	+	++
Pilotage Costs	+++	+++	+++	++	+	+
Tug Costs	+++	+++	+++	+	++	+
Port & Agency Costs	+	+	+	+	+	+
Government Initiatives	+	+	++	++	++	?
New Developments & Expansions	+	+	+	++	+++	+
Existing Number of Facilities	+++	+++	+++	++	+	+
Potential Increase in Number of Port Facilities / Increase in Capacity	+	+	+	+++	+++	+

(Source: Author)

While the ports of Vancouver, Seattle and Tacoma presently enjoy a healthy competition, the future of Kitimat and Prince Rupert look promising. Over the next five to ten years, many proponents have proposed to develop and operate oil and gas terminal facilities in the north coast regions of British Columbia. In addition, present marine terminal operators in the Port of Prince Rupert have plans to expand their terminal throughput capacities. Some of the proposed and in-progress projects include:

- Rio Tinto Alcan's (Kitimat, BC) modernization project that will increase aluminum ingot production capacity by more than 48% to approximately 420,000 tonnes per annum, by 2014;

- Kitimat LNG's plans to build, by 2019, British Columbia's first LNG export facility comprising of a liquefaction plant and marine terminal with a proposed annual capacity of five million tonnes;
- Enbridge's proposed development of a marine terminal and two new pipelines as part of their Northern Gateway Project in Kitimat, BC;
- Shell Canada's proposed LNG export facility project with a start-up by 2020 pending regulatory approvals and investment decisions;
- The proposal by Kitimat Clean Ltd. to commence building in 2014 a large oil refinery in the Kitimat Valley to process crude oil delivered by the Northern Gateway pipeline;
- The British Gas Group's potential LNG terminal at Prince Rupert to ship LNG to Japan, South Korea & China;
- PETRONAS' proposal to build a LNG facility on Lelu Island (Prince Rupert) with an annual capacity of twelve million tonnes;
- Maher Terminal's expansion of their Fairview Container Terminal in Prince Rupert to quadruple the capacity of the facility; and
- Ridley Island Terminal's (Prince Rupert) expansion project to double the annual shipping capacity of their marine terminal;

Over the next decade, the *Asia-Pacific Gateway and Corridor Initiative, BC Ports Strategy 2005* and the *BC LNG Strategy 2012* will boost Canada’s commerce with the Asia-Pacific region, increase the Gateway’s share of North America bound imports from Asia and improve the efficiency and reliability of Canadian and North American exports.

5: Pilotage Sector Analysis

Michael Porter (1979) argues that five competitive forces act simultaneously in any industry. Commonly known as *Porter's Five Forces*, they are buyers' powers, suppliers' powers, competitor rivalry, the threat of new entrants and the threat of substitute products. Highly potent forces reduce the profitability of an industry. The strength of these forces changes over time and varies from one industry to another. Typically, profitable companies enjoy a strong competitive position in a profitable industry.

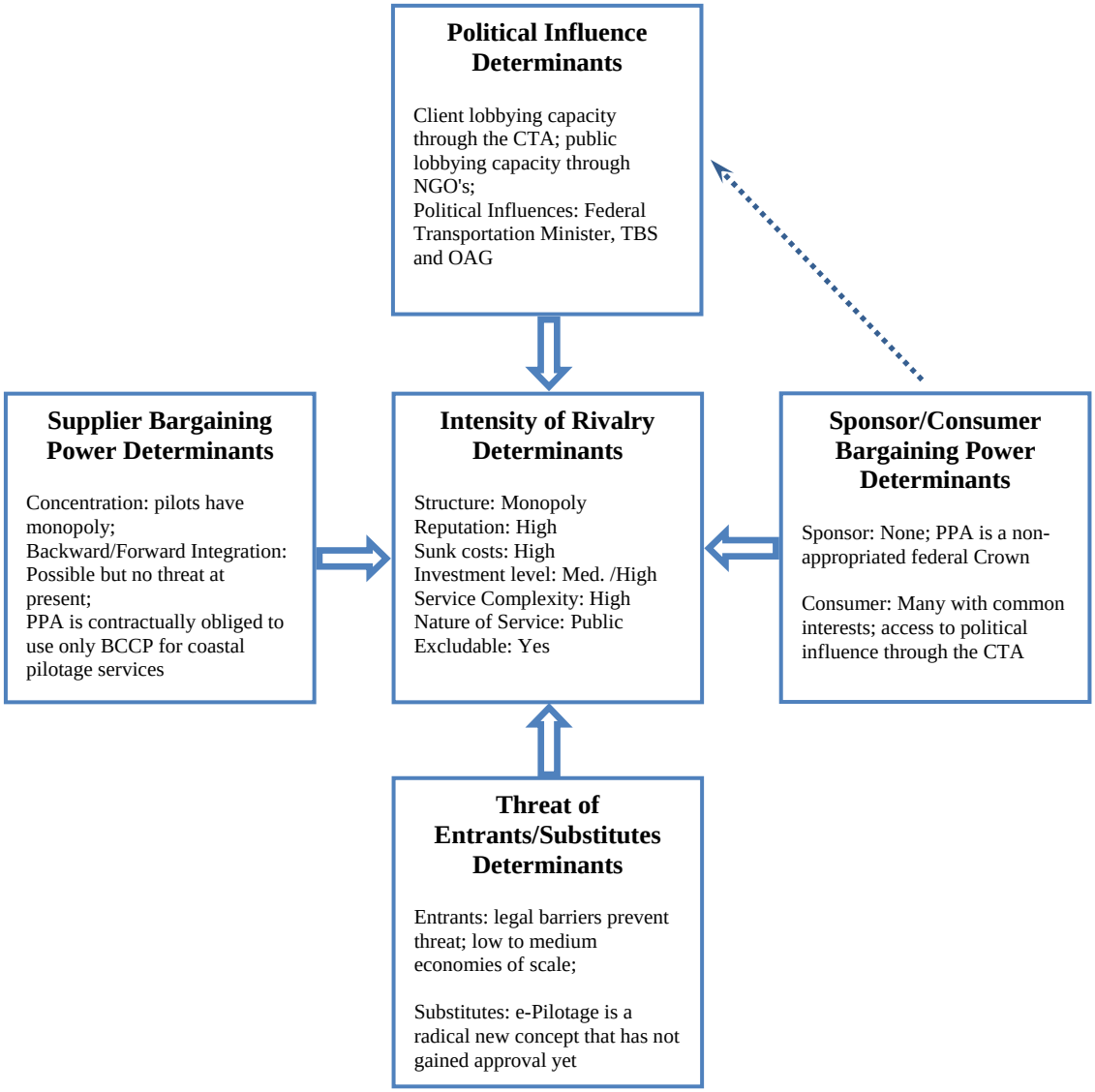
Porter's five forces analytic framework though widely used is better suited to conduct private sector industry analyses. Consequently, in spite of its weaknesses, public agencies appear to use the Strengths, Weaknesses, Opportunities and Threats (SWOT) framework more than other external analysis tools (Flynn and Talbot 1996; Hodgkinson et al. 2005). Is there a better framework for public sector organizations to perform realistic external analyses of their industries? Could a modified Porter's Five Forces framework suit their purpose?

5.1 Public Agency Analysis of PPA

Vining (2011) posits that a more systematic analysis of public agencies can be achieved by modifying Porter's framework to include the influences of political and fiscal (strategic) autonomy and public program goals. Vining's (2011) modified analytic framework for Public Agencies, depicted in Figure 5.1, comprises of five forces: supplier

bargaining power, threat of entrants/substitutes, sponsor/consumer bargaining power, political influence and intensity of rivalry.

Figure 5.1 Public Agency Analysis for PPA



(Source: Vining, 2011)

5.1.1 Supplier Bargaining Power

The power of *suppliers' forces* is directly applicable to PPA's pilotage services. The BCCP provides coastal marine pilotage services in British Columbia under a service

contract with the PPA. Unionized employees provide Fraser River pilotage services, operate the pilot launches, dispatch pilots and perform accounting and administrative duties. Pilots and employees possess high supplier power.

The coastal pilots enjoy a monopoly status and PPA's employees are unionized. Both groups enjoy strong bargaining powers. They capture most of the value for themselves, transferring costs, via the PPA, to the purchasers (customers) of pilotage services. The PPA will benefit from employing strategies that reduce ex ante supplier (pilots and employees) power, thereby allowing for the reduction of post-bargaining opportunism and production costs.

While contracting out usually reduces production costs, the key determinants of its success are task complexity, market contestability and asset specificity (Globerman and Vining, 1996). The pilotage services environment in British Columbia is one of high task complexity, high asset specificity and low contestability. In this worst-case environment for contracting out, the BCCP through a contractual clause have ensured that they will be the sole supplier of pilotage services to the PPA. In addition, all of PPA's employees are unionized, some of whom possess specific skill sets. As a result, they too have high remuneration bargaining powers.

The PPA has secured 'arbitration' and 'no-strike' clauses in all service and collective agreements with its primary suppliers to mitigate the effects of their bargaining powers. The PPA also conducts frequent meetings, encourages open two-way communications and fosters a healthy morale to ensure that the equilibrium of these external forces does not swing in the suppliers favour.

PPA's secondary tier suppliers are transportation, hotel and other miscellaneous service providers. Their collective bargaining power is low due to high levels of competition within their respective markets. The PPA renews service level agreements with these suppliers in a less formal manner as and when required.

5.1.2 Threat from Substitutes and/or New Entrants

The PPA has a mandated monopoly in the pilotage services sector of the shipping industry in British Columbia. No other organization or authority can legally provide pilotage services in the coastal waters of British Columbia. The PPA does not anticipate any legislative changes in the near future; hence, does not anticipate any loss to its regulated monopoly status or changes to its exclusive rights to provide pilotage services in the coastal waters of British Columbia. Threats from *new entrants* are therefore non-existent because of these legal and institutional barriers.

Threats from *substitutes* for pilotage services in the coastal waters of British Columbia are virtually non-existent; however, there is one plausible substitute. Shore-based electronic pilotage, a radically new concept in the international shipping industry has the potential to be a serious threat in the years ahead. Electronic pilotage is a serious threat because of its potentially advanced capabilities and because institutional barriers exist primarily for conventional substitutes.

Technologically advanced electronic navigation systems allow for shore-based marine pilotage, a concept similar to air traffic control in the airline industry. While recognizing the value of better electronic aids to navigation and shore-based support, the International Marine Pilots Association (IMPA) along with pilotage authorities worldwide consistently maintain that the purpose of technological improvements must

always be to **assist** pilots as they discharge their duties, rather than to **replace** them. The PPA and the BCCP participate in e-Navigation seminars to ensure that they stay informed of changing technological trends. Being informed ensures that both organizations will continue to provide marine pilotage services in a manner that safeguards marine property and the environment.

5.1.3 Sponsors/Consumers Bargaining Power

Fixed-run ferries, local tugs and fishing fleets, small pleasure craft and federal government vessels are exempt from using pilotage services. Every other ship over 350 gross tons that is not a pleasure craft and every pleasure craft of over 500 gross tons is subject to compulsory pilotage in the coastal waters of British Columbia. In other words, every ship that falls under the afore-mentioned categories shall avail of and pay for the services of a pilot under normal circumstances.

Consumers may try to strengthen bargaining power by lobbying the Canadian Transportation Agency (CTA). Realizing that buyer power is low, the CTA acts as an economic regulator. It handles complaints on tariffs, tolls, and fees. The PPA, in liaison with the industry and the regulating authorities, develops a reasonable tariff for services that provides value to the customers.

The PPA is a non-appropriated federal Crown corporation. The Pilotage Act of Canada mandates that the PPA be financially self-sufficient. Hence, the consumers of pilotage services (customers) provide avenues for all of PPA's revenue streams. Payment for the services is in accordance with the Pacific Pilotage Tariff Regulations, which the PPA usually updates and gazettes on an annual basis.

5.1.4 Intensity of Rivalry

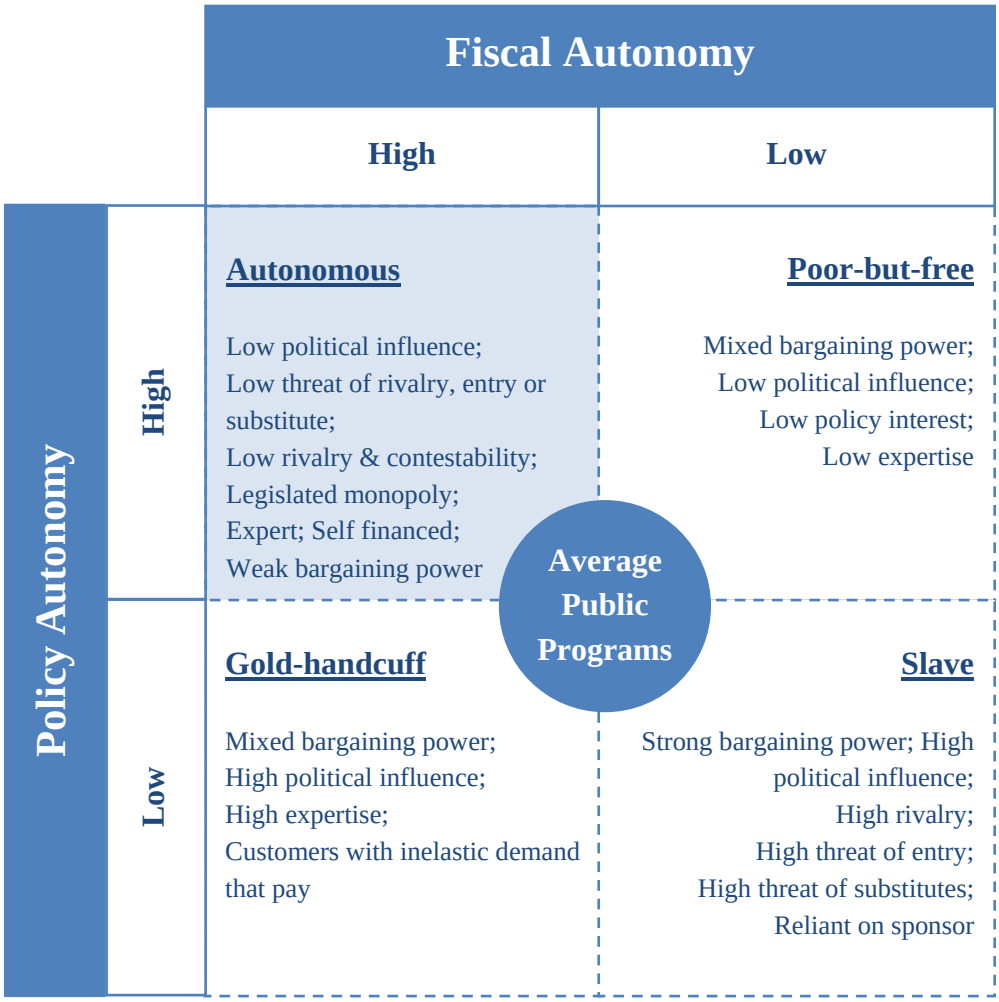
Rivalry is non-existent in the pilotage sector of British Columbia's shipping industry. The Government of Canada has concluded that non-competitive pilotage services best serves public interest and marine safety. Hence, similar to most pilotage districts worldwide, a single pilotage source provides the services. With a *de jure* monopoly and low contestability, the PPA has the exclusive rights to provide pilotage services in the compulsory pilotage waters of British Columbia.

5.1.5 Political Influence

Pilotage in British Columbian coastal waters is a public service. However, it does not fall under the purview of a federal or provincial ministry like how the Postal, Health or other similar services do. Consequently, when the government deemed that marine pilotage services were mandatory, it decided that a corporate structure, though not entirely within the commercial sphere, would be best suited to administer the services. Subsequently, through an Act of Parliament, the government created the PPA to administer pilotage services in the compulsory pilotage waters of British Columbia.

The PPA is a federal Crown corporation and is responsible to the federal Minister of Transportation. It has high policy and fiscal autonomy and enjoys a formal *arm's-length* relationship with the government. This relationship allows the PPA primarily to be responsive to market forces, but also somewhat responsive to political ones. The PPA's asymmetrical information advantage, stemming from its possession of high technical and knowledge expertise, along with its financial self-sufficiency helps reduce political influences. Figure 5.2 demonstrates Vining's (2011) 'Typology of Autonomy' as it applies to the PPA.

Figure 5.2 Typology of Autonomy



(Source: Vining, 2011)

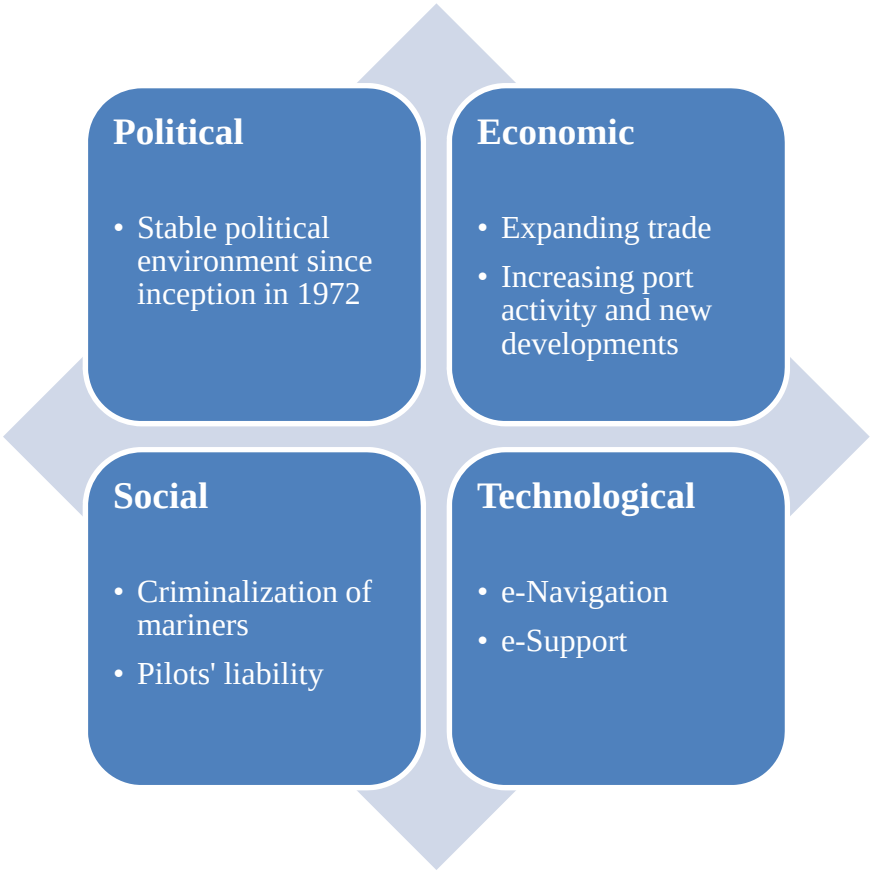
The PPA is not devoid of all political influences. Canada's federal services have been subject to restructuring, downsizing and financial restraint exercises over the past few years. The 2012 federal budget outlined the government's intention to eliminate about 19,200 jobs in the federal civil service. The government expects to reach part of its downsizing target through voluntary retirements and severances. The restructuring exercises have not affected PPA's human resources; however, in an endeavour to restrain government expenditures, the federal Minister of Transportation required the PPA to participate, in spirit, with the Expenditure Restraint Act of 2009.

5.2 Political, Economic, Social & Technological (PEST) Analysis

The Pilotage Act of Canada provides the framework for the regulation and provision of pilotage services in Canada. Monopolistic Crown corporations that have negligible contestability provide the services in the compulsory pilotage waters of Canada. The PPA, guided by the Pilotage Act and its associated regulations provides pilotage services in the Coastal and Fraser River pilotage districts of British Columbia.

Figure 5.3 summarizes the PEST forces that affect and influence marine pilotage services on Canada's west coast. Currently, the PPA is experiencing significant changes and activity in the economic and technological domains.

Figure 5.3 PEST Analysis for PPA



(Source: Author)

5.2.1 Political

The PPA has operated in a stable political environment for the past forty years. The Minister, with the approval of the Governor in Council (GIC), appoints the PPA's directors. The PPA, with the approval of the GIC, makes regulations prescribing tariffs for pilotage services. The PPA sets tariffs at levels that permit it to operate on a self-sustaining financial basis.

Through the offices of Transport Canada, the Treasury Board Secretariat of Canada, the Canadian Transportation Agency and the Office of the Auditor General of Canada, the PPA is held accountability to the Minister's office, the public and the industry stakeholders. However, PPA's highly specialized expertise gives it an asymmetrical information advantage that reduces political influence, from an operational perspective, from the various government offices.

5.2.2 Economic

The *Asia-Pacific Gateway and Corridor Initiative, BC LNG Strategy 2012* and the *BC Ports Strategy 2005* are important examples of the Canadian federal and provincial governments' commitment to strengthen Canada’s competitive position in international commerce. British Columbia is Canada's Pacific gateway and its ports handle half of Canada’s maritime exports and 85% of the western provinces' marine exports of grain, coal, forest products, petroleum and petrochemicals. The British Columbian port system handles about $40 billion a year in trade & by 2020 will be able to handle about $75 billion in trade (BC Ports Strategy, 2005). The development of British Columbia's ports and the planned port and terminal expansions in the north coast

regions will continue to be critical to the economic future of Canada and British Columbia.

5.2.3 Social

For better or worse, the criminalization of maritime accidents has become an unpleasant fact for ship owners, operators, managers, crewmembers and marine pilots around the world (Chalos & Parker, 2011). The recent international trend to criminalize mariners, subsequent to untoward incidents, has changed career attitudes and the emphasis on safety within the realms of marine pilotage. Ever increasing liabilities and the real possibility of prison time (for mistakes) require that marine pilots now walk a fine line between keeping commerce moving while still safeguarding the environment. Pilots and regulators strive to develop a strategy against criminalization that resonates with the public, regulatory and judicial agencies worldwide.

5.2.4 Technological

Advances in technology have allowed for the development and use of highly accurate and precise navigational equipment called Portable Pilotage Units (PPU). These units are lightweight and small. The pilots used the PPUs in addition to and independent of the ships' navigation equipment to determine accurate position and three-dimensional motions in a dynamic seaway.

PPA has an aggressive IT development culture. The development of purpose-built software systems has allowed the PPA to achieve more efficient dispatching, accounting and record keeping. In addition, the software allows clients to interface with the system, through the internet, to place orders and seek navigational and other information relevant

to their vessels' assignments. PPA's website receives about 45,000 hits every month, both from users directly related to the operation of the ships and those indirectly related to the business of the ships while they are in port.

5.3 Summary of Public Agency & PEST Analyses of PPA

The PPA currently operates with financial security and political stability in an expanding business environment. There is no anticipated change to PPA's monopoly status in the pilotage sector and the options for growth outweigh the challenges within PPA's scope of operation.

5.3.1 Challenges

The primary challenges that the PPA is faced with are from three different fronts and very independent of each other. They are supplier power, criminalization of mariners and radical pilotage substitutes arising out of technological advances.

5.3.1.1 Supplier Power

The BCCP is an absolute monopoly and PPA's employees are unionised. Both groups enjoy high bargaining power. Executive controls along with common interests helps reduce the strength of these forces.

5.3.1.2 Criminalization of Mariners

The recent trend within the maritime world to criminalize mariners for not exercising due diligence is causing them to cross over from being professional operators to safe, and perhaps over-cautious, ones. The PPA ensures that all the pilots are well trained and operate in a manner that always exercises due diligence. The PPA and the

pilots are independent of the ships' operators and should not let economic pressures blindside navigational safety.

5.3.1.3 Technological Advances

Electronic navigation has been around for a decade or more. The thought of using e-technology to replace pilots is almost disruptive. The PPA & the pilots closely monitor the development of the e-pilotage initiative and provide their input, nationally and internationally, to ensure that the e-technology will be complementary and not compromise the safety of assets and environment. The PPA also invests in technology training to keep pilots current and familiar with e-Navigation advances.

5.3.2 Growth

The ports in British Columbia are a primary gateway for trade in Canada. The business of marine pilotage will continue to exist as long as trade and commerce continue to exist. Growth opportunities for the PPA and the marine pilots lie mainly in the north coast of BC, i.e. the ports of Prince Rupert and Kitimat. New projects, some of them controversial, will bring larger ships to British Columbia that will increase business, generate higher revenues and create opportunities for the PPA to tout its image, brand and exemplary safety record. While taking advantage of the opportunities to expand business revenues in northern British Columbia, PPA's strategic task is to monitor the external forces, especially suppliers' power, to ensure they remain in a benign equilibrium.

Finally, even though the external analysis of BC's pilotage sector places the PPA in a strong market position, it does not provide any foresight or direction to address the challenges of providing a coast-wide pilotage service. The PPA will need to identify its sources of value and seek opportunities from within the organization to increase efficiency and local responsiveness and to develop recruitment and training strategies to address the human resource demands of a growing shipping industry.

6: Organization Analysis

Canada's federal government regulates marine pilotage in the waters of British Columbia. The PPA has the exclusive rights to provide pilotage services in the waters of British Columbia and operates on a self-sustaining financial basis. The objectives of the PPA are to establish, operate, maintain and administer a safe and efficient marine pilotage service, and other related services, within designated coastal waters of British Columbia, including the Fraser River. In compliance with the Pilotage Act, the PPA structures the tariff for pilotage services to be fair and reasonable.

The PPA provides its services by working in partnership with licensed marine pilots, employees, the business communities within which it operates and the shipping industry. The British Columbia Coast Pilots Ltd. provides coastal marine pilotage services under a service agreement and employee pilots provide the Fraser River pilotage services.

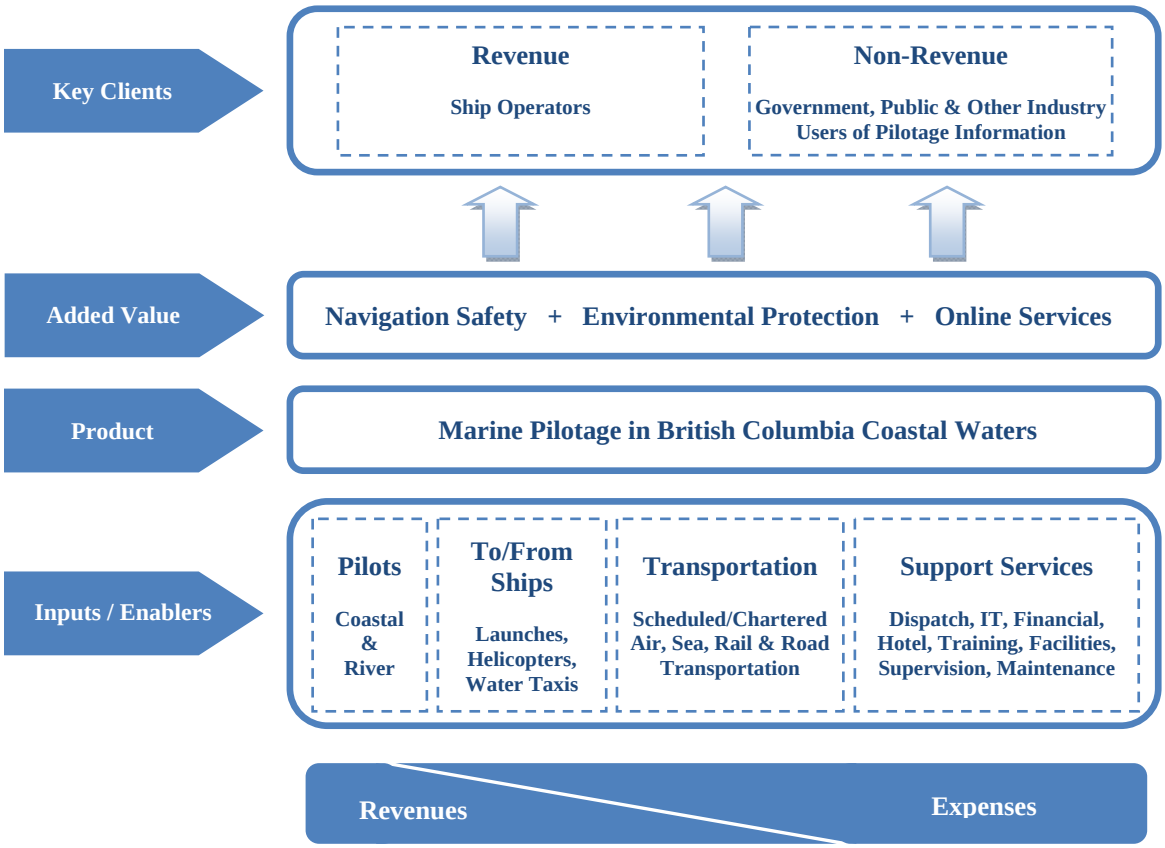
It is imperative that the PPA achieves the mandate of the federal government and ensures that customer trust and confidence replaces profits. The main stakeholders of the PPA are the British Columbia Chamber of Shipping and its membership, the citizens of Canada and the federal Transportation Ministry. The Chamber of Shipping's membership pay for and depend on a safe and efficient pilotage service, the citizens of Canada depend on the pilots to keep BC's shorelines environmentally safe while keeping the wheels of commerce turning and the government requires that PPA's operations be aligned with its strategic objectives for the country. The organizational analysis below provides an overview of PPA's systems, functionality, finances and customers' preferences. The objective is to identify whether the PPA meets its mandate for pilotage services.

6.1 PPA's Value Chain

Value chains, popularized by Michael Porter (1985), are strings of activities that an organization performs to deliver a product or service. They are models that show how an organization adds value to raw inputs by putting them through various processes.

PPA's value chain design, shown in Figure 6.1, ensures high employee engagement with the various input segments. The reduced vertical extent of the value-chain also provides for heightened interactions between the PPA and its suppliers with direct control over operations and costs. This allows for close monitoring of the services provided & high customer satisfaction levels.

Figure 6.1 PPA's Value Chain



(Source: Author)

6.2 Key Clients

PPA's clients comprise of two groups: those who request and pay for the mandatory services and those who demand for the economic and environmental benefits that result from the service.

6.2.1 Revenue Clients

Ship owners/operators are persons or companies who equip and exploit ships, usually for delivering cargo at certain freight or hire rate. Ship operators typically hire a licensed crew and captain, perform technical management of the vessels and are responsible for all operational expenses, including port and pilotage costs.

6.2.2 Non-Revenue Clients

The primary objective of Canada’s pilotage system is to achieve the government's mandate of keeping Canada's economy (marine sector) in motion and its environment protected. Non-revenue clients also include dock workers, ships' agents, tug operators, port authorities, industry analysts, etc., all of whom have come to rely on the information services provided by the PPA.

6.2.3 Customer Preferences

PPA's revenue-paying customers prefer low price, safety, flexibility, timely service on a 24/7/365 basis and online tools to ease their administrative workload. The non-revenue customer base, i.e. the public and the Government of Canada, are mainly interested in keeping the wheels of commerce turning & preventing environmental pollution. Table 6.1 shows the primary preferences of PPA's pilotage services customers.

Table 6.1 Customer Preferences for Pilotage Services

	Ship Operators	Public	Government
Navigational Safety	✓		✓
Environmental Safety	✓	✓	✓
Uninterrupted Commerce	✓	✓	✓
Flexibility in Service	✓		
Value-for-Money Tariff	✓		✓
24/7/365 Service	✓		
Administrative/Support Tools	✓		

(Source: Author)

6.3 Added Value

Pilotage services are more than just local mariners piloting ships to and from port. Added benefits, arising out of enhanced navigational and environmental safety, include lower insurance premiums for users of the service and the enhancement of social licenses for the carriers of dangerous cargoes. In addition to PPA's online information services, the pilots also provide the ships' crews with up-to-date navigational, local weather and other pertinent information.

6.3.1 Navigational, Operational & Environmental Safety

Although the captains of ships are familiar with their vessel and crew, they are not necessarily familiar with every port their vessels visit. They require the local expertise of marine pilots to ensure that the ship, its crew, passengers and cargo arrive at the intended berth in a safe and efficient manner. In their liaison between the ship's officers and the local authorities, radio traffic personnel and tug operators, pilots reduce communication barriers thereby enhancing operational safety as well.

6.3.2 Online Services

PPA's IT systems provide for online ordering, promulgation of pilotage information to industry stakeholders, calculation of tidal windows for deep-drafted ships, pilotage pro forma calculations, electronic invoicing and other relevant information on ship locations and arrival times. Not only do these value-added services ensure that clients have information readily available, they also free up the PPA's employees to perform other tasks.

6.4 Inputs/Enablers

6.4.1 Pilots

In BC, the first recorded pilotage services began in 1858 in the ports of Victoria, New Westminster and Fort Langley. The British Columbia Pilots Association, created in 1920, was the first pilot company. Further changes to the size of the piloting district and government regulations promoted the creation of the Corporation of the British Columbia Coast Pilots in 1963 and finally the formation in 1973 of the present day company, the BCCP.

The Fraser River is an integral part of 'Port Metro Vancouver'. For over a century Fraser River pilots have been guiding large ships through the narrow waters of the river. Constant infilling of silt means the depth and contours of the river are constantly changing. The Fraser River pilots bring local knowledge and expert ship handling abilities to every ship that transits the river safely and efficiently.

6.4.2 Pilot Transfers to/from Ships

Normally, a pilot joins incoming ships at sea via a pilot boat (Figure 6.2) and disembarks from outgoing vessels to a pilot boat, which returns the pilot to shore. On rare occasions, the pilot may embark and/or disembark via a helicopter (Figure 6.3) which lands on the ships' decks. Pilots use water taxis to get to/from assignments that originate or end at an anchorage location.

The PPA owns and operates specialized pilot launches at three pilot boarding stations. It also contracts the services of water taxis for pilot transfer services within the various ports on the BC coast. Helicopters perform marine pilot transfers in the out ports on the west coast of Vancouver Island.

Figure 6.2 Pilot Transfer via Pilot Launch

Figure 6.3 Pilot Transfer via Helicopter

(Source: Author)

6.4.3 Transportation

One of the more challenging aspects of a pilot dispatcher's job is the coordination of the complex travel arrangements that apply to most assignments. Pilots need to travel to where the ships are located and/or get back home from the port where the ship is

destined. Transportation logistics involves the use of commercial airline flights, charter flights, floatplanes, trains, helicopters, ferries, public transit and personal vehicles.

6.4.4 Support Staff and Services

Unionized employees operate the pilot launches, perform accounting duties and dispatch pilots. The pilot launch and dispatch departments operate 24/7/365. The dispatching software platform provides data input to the accounting system and feeds the various data systems on the website and client login sites. Contracted specialists perform repair and maintenance tasks on the pilot launches, support PPA's online IT platform and provide for other administrative services. An eight-member management team provides supervision, governance and strategic oversight for all operational & IT functions, including liaison with the industry and the government.

6.5 Finances

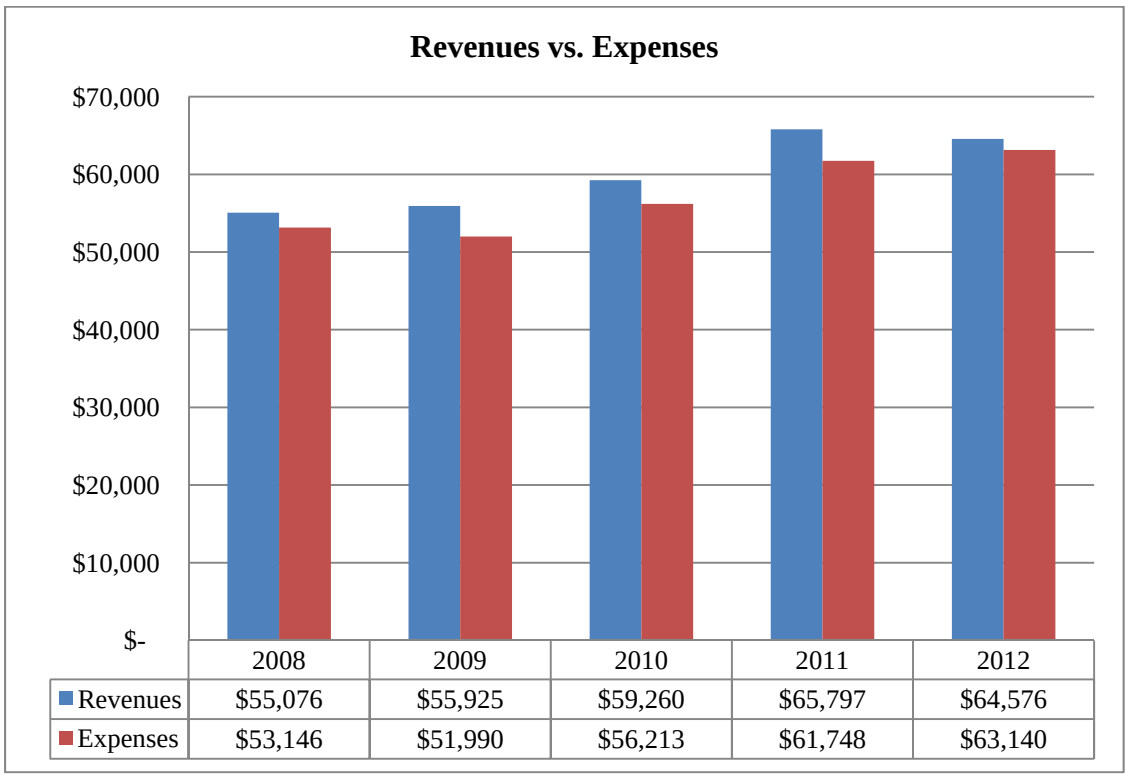
Since inception in 1972, the PPA has structured its finances in order to maintain financial self-sufficiency. The PPA uses a forecasted annual assignment count of 11,500 to develop its financial model and tariff for services. Once the assignment count exceeds this threshold value, the net income becomes positive. The PPA performs its financial accounting and reporting in accordance with International Financial Reporting Standards (IFRS). The Office of the Auditor General of Canada performs financial audits of the PPA every year. Some of PPA's financial performance indicators are as follows:

- Invoice disputes resolved in under ten days;
- No single account holder has payables of significant amounts;

- Accounts receivable invoices under thirty days are maintained at less than 10%; and
- Overhead costs are maintained under 8.5% of revenue

Figure 6.4 shows PPA's revenues versus expenses over the last five years. In 2011, the PPA increased its financial reserves by $2.2 million and paid off a long-term bank borrowing of $3.6 million. The PPA ended the year debt free with $5.2 million of financial reserves held in low risk, Government of Canada bonds. In 2012, the PPA recorded revenues of $64.6 million and a net income of $1.4 million.

Figure 6.4 Revenues & Expenses by Year



	2008	2009	2010	2011	2012
Revenues	$55,076	$55,925	$59,260	$65,797	$64,576
Expenses	$53,146	$51,990	$56,213	$61,748	$63,140

(Source: Pacific Pilotage Authority)

Table 6.2 Historical Financial Summary (thousands of dollars)

Financial Results	2007	2008	2009	2010	2011
Revenues	$52,738	$55,076	$55,925	$59,260	$65,797
Expenses	$51,227	$53,146	$51,990	$56,213	$61,748
Net income (Loss)	**$1,511**	**$1,930**	**$3,935**	**$3,047**	**$4,049**
Current Assets	$7,006	$7,572	$10,216	$12,418	$12,428
Current Liabilities	$8,282	$10,065	$9,181	$9,552	$6,740
Working Capital	**-$1,276**	**-$2,493**	**$1,035**	**$2,886**	**$5,688**
Net Capital assets	**$8,884**	**$11,187**	**$10,629**	**$11,282**	**$10,477**

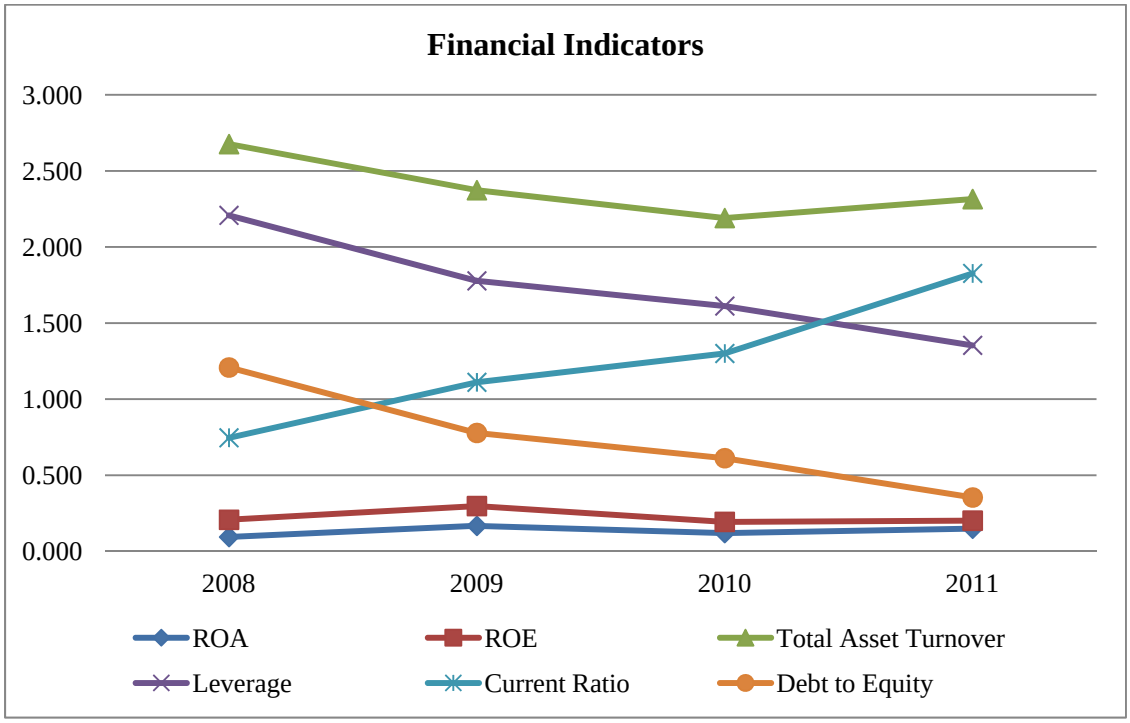
(Source: Pacific Pilotage Authority)

Though profitable, the PPA is not in the business to make profits. Table 6.2 highlights some of the positive aspects of PPA financial status over the period from 2007 to 2011. They are:

- Increasing net income in absolute value and as a percentage of revenue; and
- Increasing working capital resulting from an increasing trend in current assets along with a reducing trend in current liabilities

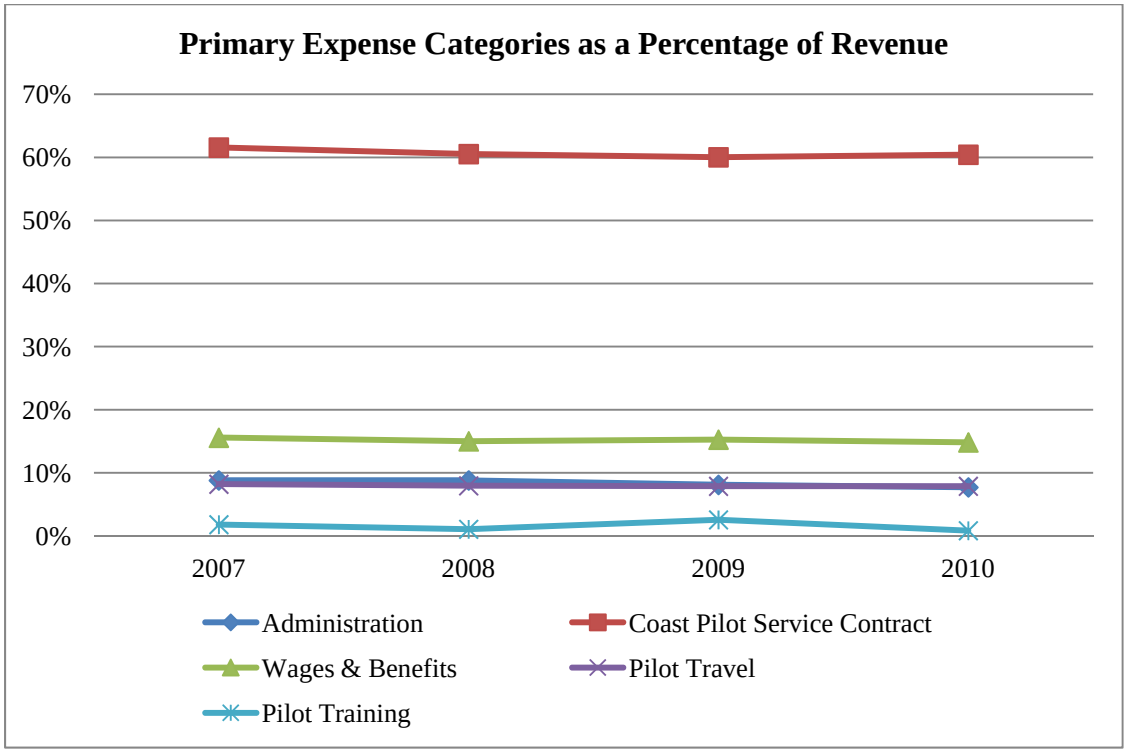
Figure 6.5 highlights PPA's financial ratios over a four-year period from 2008 to 2011. The PPA maintains profitability and efficiency ratios at constant levels. Financial risk ratios are healthy and have trended downward over the past four years. The liquidity ratio has trended upward during the same period and was at an acceptable level at year-end 2011. Figure 6.6 shows that PPA's various expense categories, expressed as a percentage of revenue, are virtually constant.

Figure 6.5 PPA's Financial Indicators - Ratios



(Source: Pacific Pilotage Authority)

Figure 6.6 PPA's Financial Indicators - Expenses Expressed as a Percentage of Revenue



(Source: Pacific Pilotage Authority)

In summation: The PPA utilizes the services of unionized employees and contracted pilots to administer pilotage services in the waters of British Columbia. In exchange for navigational and environmental safety, ship operators procure mandatory pilotage services from the PPA for their vessels that ply in British Columbian waters. The PPA is in good financial health and meets the mandate of the Canada's federal government.

7: Value Creation

7.1 Generic Strategy

The PPA operates in a very narrow competitive scope, i.e. it provides a primary product (marine pilotage) for a fee along with complementary navigational information free of charge. The PPA generates its value through internal drivers. Figure 7.1 shows that PPA's value generation lies in the realms of cost focus and differentiation focus.

Figure 7.1 PPA's Generic Strategy

		Value Generation	
		Lower Cost	Differentiation
Competitive Scope	Broad Target	*Cost Leadership*	*Differentiation*
	Narrow Target	*Cost Focus*	*Differentiation Focus*

(Source: Porter's Generic Strategies, 1985)

Marine pilotage services for the various ports along the West Coast of North America only appear to be similar in nature. The PPA offers pilotage services on a *financially self-sustaining* basis and not on a *for-profit* basis. Furthermore, the PPA provides marine pilotage services for the entire BC coast (one-stop shop). This model of pilotage is in contrast to most other coastal areas of the world where different ports have different pilotage entities and coastal pilotage services do not exist.

Using innovative software and the internet, along with a customer-focused culture, the PPA also provides its customers with prompt information on ports, berths,

local marine navigation, pilotage, tidal window times, pro forma, statistical data and advice during the development of new projects. Other beneficiaries of PPA's online data are ship agents, dockworkers, tug operators, ship chandlers, etc.; all of whom have come to rely on the available information to benefit their cause.

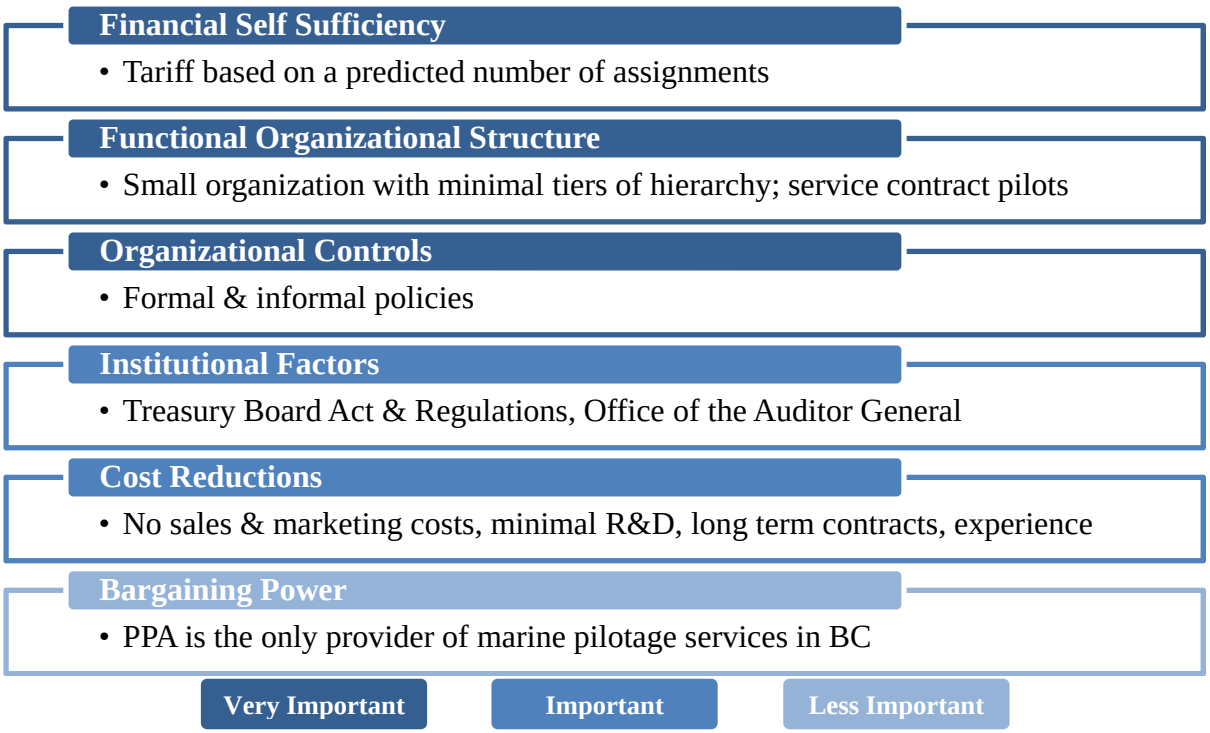
7.2 Creating Value

PPA creates value through cost containment and customer utility measures.

7.2.1 Sources of Value - Cost Containment

The PPA is a small organization that derives cost containment value through organizational and institutional policy control (Figure 7.2). In addition, being a monopoly organization the PPA does not spend monies in competitive and marketing endeavours.

Figure 7.2 PPA's Sources of Value Creation - Costs



(Source: Author)

7.2.1.1 Financial Self Sufficiency

On an annual basis, using information gleaned from the marine business entities that trade or operate in BC ports, the PPA estimates the number of pilotage assignments for each year. The PPA then compares the estimate with statistical data to check for accuracy. Based on the predicted number of pilotage assignments and taking all expenses and the costs to provide the pilotage services into account, the PPA develops an annual tariff for pilotage services in partnership with the local shipping industry representatives (Chamber of Shipping BC). The Minister's office then gazettes the tariff and develops the tariff regulations. This process ensures that the PPA remains financially self sufficient and that the industry is agreeable with the tariff. Historically, actual assignment numbers have always been marginally higher than predicted, resulting in higher-than-forecasted revenues.

7.2.1.2 Functional Organization Structure

The PPA is a small entity, has a functional organization structure and offers only one type of service product - marine pilotage. The functional organization structure ensures that the departments share cost reduction practices and coordinating efforts to pursue a common strategy. The launch operations, finance and pilot dispatch departments report directly to top management, thereby reducing lag times and promoting faster action. The functional structure, which also ensures that all of PPA’s resources are easily accessible, maximizes performance by allowing each unit to reach its greatest potential and prevents over-use of limited resources. This results in reduced operational and salary costs.

The PPA through a contracted service agreement with the British Columbia Coast Pilots (BCCP) provides coastal pilotage services. The annual service contract payout to the BCCP is approximately 60% of revenue. The contracted service set up for coastal pilotage, as compared to having a hundred employee pilots on its payroll, ensures that the PPA does not suffer financial difficulty during times of economic recession. In other words, if the numbers of pilotage assignments are down for the year, the BCCP takes an 89% hit for the reduced revenue. In addition, not being employee pilots, the PPA does not have to worry about coastal pilot salaries during poor economic conditions.

7.2.1.3 Organizational Controls

The PPA has policies in place to align behavior with the interests of the organization and the Treasury Board of Canada regulations. Credit, spending, purchasing and operational policies ensure that the PPA has a very healthy cash flow and ample reserves for capital investments, thereby alleviating the need for debts and associated interest payments.

7.2.1.4 Institutional Factors

The Treasury Board Secretariat vets the annual tariff for pilotage services. The Minister signs off the tariff on completion of the vetting process. The PPA has to exercise due diligence in its prediction of assignment numbers and explain to the Minister, the effect on revenues if assignment numbers are higher or lower than predicted. Lastly, the Office of the Auditor General performs financial audits to ensure that the PPA is not gouging the industry because of its monopoly in the pilotage service industry.

7.2.1.5 Cost Reductions

The PPA has no competition in the local pilotage services market, i.e. under the current legal conditions no other organization can offer marine pilotage services in the compulsory pilotage waters of British Columbia. As a result, the PPA does not spend any monies on marketing and advertizing.

The PPA has been in existence since 1972. Over the years, having gained a lot of experience, the PPA has achieved levels of efficiency that can boast of cost savings for the industry. Long-term contracts that ensure minimal labour unrest, experienced labour and the mastery of complicated and technical processes all drive towards lowering costs. Collectively they are a value generating source.

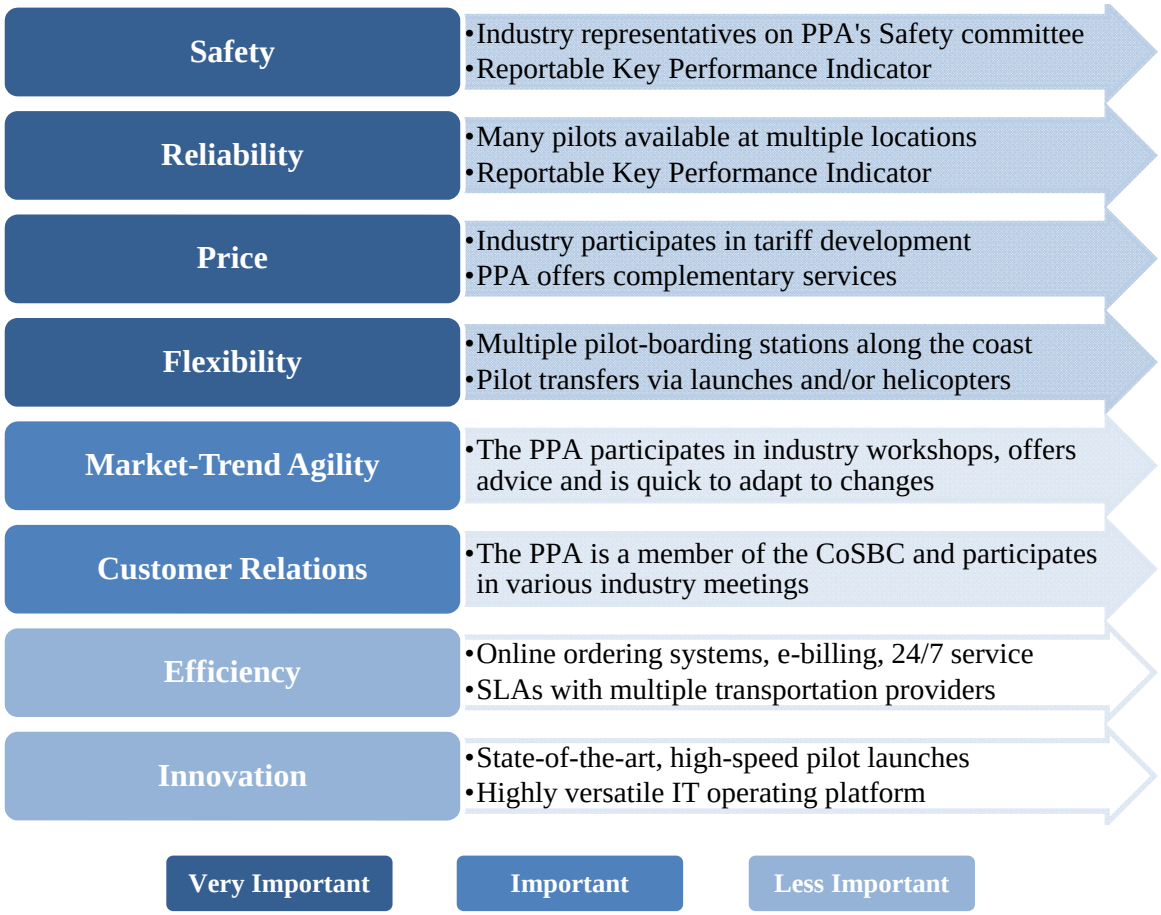
7.2.1.6 Bargaining Power

The PPA has the power to influence the price (tariff) for pilotage services. However, the PPA does not use this advantage to drive profits upwards, but instead uses it to ensure that the tariff for pilotage services will keep the PPA financially self-sufficient, in compliance with the Pilotage Act of Canada. The PPA works with the shipping industry to arrive at a tariff that they support, one that pays appropriately for the services rendered.

7.2.2 Sources of Value - Customer Utility

Figure 7.3 identifies PPA's sources of customer utility. While safety and reliability have been the pillars of value creation, PPA's close partnership with its shareholders helps generate trust and confidence. In addition, PPA's effort to differentiate services is beginning to prove beneficial as well.

Figure 7.3 PPA's Sources of Value Creation - Customer Utility



(Source: Author)

7.2.2.1 Safety

The PPAs safety record is among the highest for marine pilotage, 99.94% to 99.98% of the incidents being incident free. The 0.02% to 0.06% incident rate comprises of minor occurrences of negligible consequences The PPA reports this performance indicator quarterly to the board and annually to the Minister. A high level of navigational safety keeps the repair and maintenance costs of clients' assets very low and allows for better insurance rates for North American areas of trade.

The *Safety & Operations Review Committee*, chaired by a PPA Board member, has two industry representative members. The committee, which also has pilots as

members, meets every two months to discuss and address safety concerns of the pilots and industry.

7.2.2.2 Reliability

The PPA boasts a 99.99% reliability rate. Usually, pilots make it to ships on time for their assignments. On an annual average, two in twelve thousand assignments account for marine pilot delays. Inclement weather conditions that prevent pilots from reaching northern communities by air travel are invariably the causes of these delays. To enhance reliability, pilots are located at Vancouver, Victoria, Nanaimo and Prince Rupert. In addition, the PPA may hold in-transit pilots at their destination if deemed necessary.

The PPA also has primary and standby pilot launches at each of the pilot boarding stations, thereby eliminating launch related delays. In addition, on the west coast of Vancouver Island, the PPA uses helicopters to conduct marine pilot transfer operations by landing on and taking off from the decks of moving ships.

7.2.2.3 Price

The Chamber of Shipping BC is aware of the costs associated with providing a safe and reliable pilotage service and participates in the process of developing the annual tariff. The industry members of PPA's board of directors and the audit committee (Board sub-committee) ensure that the tariff is a fair representation of the costs for service provided and are at levels that ensure the PPA stays financially self sufficient.

As part of their services, the pilots also provide navigational advice to the industry during the building of new marine terminals, channels and waterways and the development of guidelines and best practices.

7.2.2.4 Flexibility

The compulsory pilotage waters of BC stretches along the entire coast from Alaska to Washington. To cater to vessels that call these waters from different directions, there are multiple pilot boarding stations located along the coast, viz. Victoria, Nanaimo, Cape Beale (off Alberni inlet), Pine Island (Port Hardy), Triple Island (off Prince Rupert) and Sand Heads at the mouth of the Fraser river. To reduce vessel deviations and save time and fuel, the PPA also dispatches pilots to vessels in Seattle and the surrounding areas to ride along and take over the conduct when the vessel enters Canadian waters. Lastly, if a vessel is helicopter compliant, a pilot may board a vessel anywhere along the west coast of Vancouver Island.

7.2.2.5 Market-Trend Agility

The PPA is quick to adapt to changes in the local and international industry. As an example, when the industry requested the pilots to consider moving deeper loaded tankers through Vancouver Harbour, it was not long before the PPA, in consultation with industry specialists and relevant authorities, developed safe operating guidelines and provided tethered-tug training to the pilots to cater to the industry's commercial need.

7.2.2.6 Customer Relations

The PPA visits at least 20% of its customers on an annual basis. The PPA also participates in industry and government meetings, is active in local trade fairs and is an associate member of the Chamber of Shipping, which represents the local marine industry. The PPA responds to all information requests immediately and endeavours to resolve all complaints within eight days.

7.2.2.7 Efficiency

Over the many years of being in operation, the PPA has developed service level agreements (SLA), both formal & informal, with most of its service providers. These include hotel facilities, transportation service providers, launch maintenance companies, shipyards and IT service providers. While the industry may not directly see the benefits of these SLA's, the PPA rarely finds itself wanting for any of the ancillary services, thus keeping the pilotage services running without any glitches, delays or unnecessary expenses.

7.2.2.8 Innovation

The PPA is very proactive in advancing technology in its operations. The pilot launches owned and operated by the PPA have the newest technology for navigation and propulsion (jets), meet the Californian standards for emission and are equipped with safety systems over and above the requirements of Transport Canada Marine Safety.

The IT platform (Klein Systems) that supports the pilot dispatching system is very robust and versatile. Users can access the system from wherever an internet connection is available. Ships' agents, berthing tugs, launch crew and even dockworkers find the information therein beneficial to their individual operations. The system also supports sophisticated, purpose built programs to calculate tidal windows and pro forma invoices for services, online pilot ordering and other features for the direct use by the industry.

A Portable Pilot Unit (PPU) is a highly accurate electronic navigation system customized for use by the coastal and river pilots. The PPU comprises of a laptop, navigation software, electronic charts, rate of turn indicators and a DGPS receiver, all of which collectively provide for highly accurate navigation.

7.3 Mapping Customer Preferences with Sources of Value

The PPA defines utility as the satisfaction that a consumer derives from the consumption of its services. PPA's sources of value appropriately position it to meet the utility requirements of the industry and at the same time address its own future challenges. Safety, reliability and value pricing are very important. The PPA, along with the industry stakeholders, addresses these challenges on a continual basis. Moving forward, the PPA should strive to address the industry's needs as they relate to uninterrupted commerce and enhanced service levels. Table 7.1 maps PPA's sources of value as they relate to the customers' preferences.

Table 7.1 PPA's Sources of Value vs. Customer Preferences

Customer Preferences →→→ / Sources of Value	Safety	Uninterrupted Commerce	Service Flexibility	24/7/365 Service	Value-for-Money Tariff	Administrative & Support Tools
Reliability		✓	✓	✓	✓	
Flexibility		✓	✓	✓		
Market-trend Agility		✓	✓	✓		
Efficiency	✓		✓		✓	
Innovation	✓					✓
Safety	✓					
Price					✓	
Customer Relations						✓

(Source: Author)

7.4 Sustainability of Value Sources

7.4.1 Exclusive Rights

The federal government of Canada has appointed the PPA to provide pilotage services in the coastal waters of British Columbia. There is no competition for the PPA as the Pilotage Act of Canada gives the PPA exclusive rights to provide marine pilotage services on Canada's west coast.

7.4.2 Ownership of Capital Equipment (Sunk Costs)

The PPA has no owed dues on its purpose-built pilot launches. They have a replacement value of approximately $20 million. Competing with the PPA only for launch operations will be difficult as very few organizations will be willing to invest large sums of money on boats that are not versatile or multi-purpose in utility.

The purpose built dispatching software and electronic navigation systems developed exclusively for the PPA have also been paid for & will cost more than $5 million to duplicate.

7.4.3 Access to Intellectual Properties

The next source of sustainable competitive advantage that the PPA enjoys is the extensive coastal knowledge that the marine pilots possess. The PPA examines, trains and licenses coastal and river pilots. The BCCP is the only coastal pilotage company in British Columbia and offers its services solely to the PPA. The BCCP in turn does not face much competition with the marine industry for human resources. Most mariners consider a piloting job to be a pinnacle in their sea-going career and look forward for opportunities as pilots after gaining sufficient navigational experience on the coast.

7.4.4 Financial Strength

The PPA uses a system of fund accounting to stay apprised of its resources in relation to the specific tasks that it needs to accomplish. The PPA designs the tariff for pilotage services in a manner that ensures annual expenses are fairly close to revenues. When the PPA finds itself generating a large surplus (profit), it usually takes steps to lower the tariff burden for its customers. Access to working capital, a low financial risk and the ability to meet short-term obligations are some of the strongest sustainable competitive advantages for the PPA.

In summary, the PPA is a small and functional federal Crown corporation that derives value primarily from safety, reliability and cost containment. Records show that the PPA excels in these categories of service. The PPA is also beginning to create new value and raise customer satisfaction levels by providing innovative and differentiated pilotage services through innovation, differentiation and staying customer focused.

8: So Where Does the PPA Stand?

Looking ahead at the next decade and the challenges it offers, success for the PPA will be about being more efficient, building/retaining its work force for the future and operating with a culture that is customer focused. In being more efficient, the PPA should not merely cut costs as this may negatively influence the quality and safety of its services and affect its ability to be financially self-sufficient. Instead, the PPA must design its human resource strategies to ensure the efficient use of pilots to reduce future work force demands and adapt operations strategies to be more responsive to the customers (ports and users) needs.

The PPA is in great shape. It is efficient and financially and strategically autonomous. However, it can do even better if it strives to increase its responsiveness to local customer needs, reduce pilots' non-revenue earning travel time, improve economies of scope and scale and validate travel and training costs.

PPA's generic strategies for operations and service provision have been cost-focus in nature. Technological advances in its IT systems have allowed the PPA to provide administrative and informational value to its customers via the internet. The services of resident pilots in Prince Rupert have alleviated the operational concerns of the industry and the marine terminals to a certain extent. These small successes indicate that the PPA can derive further value with strategies of differentiation focus in addition to the existing ones on cost focus.

9: Options Analysis

Organizations achieve value by providing stakeholders with what they want or need (Ipsos MORI, 2009). The options that PPA generates should focus on the needs of its revenue and non-revenue clients, maximize the utilization of its pilot resources, provide services at the lowest possible cost and not compromise safety and quality.

9.1 Options Identification

Table 9.1 shows the suggested strategic options for PPA to evaluate and consider. They are 'Status Quo', a 'Port-Based Pilotage Model' and a 'Hybrid Pilotage Model'.

Table 9.1 Strategic Options

Status Quo	• continue to provide coast-wide pilotage services as per current service model
Port-Based Pilotage Model	• provide port-based pilotage services and exclude coast-wide pilotage services
Hybrid Pilotage Model	• in addition to coast-wide services, provide rotational resident-pilot services at all sufficiently busy ports

(Source: Author)

9.2 Options Evaluation Criteria

Option evaluation criteria for marine pilotage services must serve the purpose of increasing value holistically, i.e. for customers, suppliers, employees, government and safety (navigation and environment). Table 9.2 identifies the evaluation criteria for PPA's

suggested strategic options. Customers value economical fees, flexible and uninterrupted services and higher local responsiveness, hence would like to see localized pilotage at affordable prices. The pilots spend approximately 45% to 50% of their assignment time travelling; they would like to trade some of this non-revenue time for revenue time. PPA's employees value having satisfied customers because it allows them to dedicate their time to the job as opposed to resolving issue and complaints. Lastly, the government and public see value in environmental and economic safety and require that PPA provide the services in compliance with the Pilotage Act and its regulations.

Table 9.2 Strategic Options Evaluation Criteria

Customer Satisfaction	• increase responsiveness to port and user needs
Coast Pilot Travel Time	• reduce non-revenue travelling hours
Future Work Force Demand	• reduce future demand on pilots
Travel Costs	• reduce overall travel costs & average cost per assignment
Training Costs	• validate training costs
Environment	• coast-wide safety maintained
Navigation	• coast-wide safety maintained
Compliance	• in accordance with the Pilotage Act and its Regulations

(Source: Author)

9.3 Strategic Options Evaluation

The PPA currently touts an excellent safety record. However, excellent safety does not increase local responsiveness, reduce pilot travel time or reduce future work force demand. Hence, for the sake of evaluating options with a view to address the identified challenges, the author has set a lower weighting for the safety goals as compared to the weighting for the goals on customer satisfaction, pilot travel time and demand on future work force. Travel and training costs have a low weighting, as their affect is not overly critical in the grand scheme.

Table 9.3 Evaluation of Strategic Options

	Weight	Status Quo	Port-Based Pilotage Only	Hybrid Model Pilotage
Customer Satisfaction	25%	**3** LR stays the same	**5** LR increases	**5** LR increases
Coast Pilot Travel Time	20%	**2** Increases in the future	**5** Decreases	**4** Decreases
Future Work Force Demand	20%	**2** Increases in the future	**5** Decreases in the future	**5** Decreases in the future
Navigation Safety (coast)	10%	**3** Nav. safety unchanged	**1** Coastal nav. safety reduced	**3** Nav. safety unchanged
Environment Safety (coast)	10%	**3** Environ. safety unchanged	**1** Coastal environ. safety reduced	**3** Environ. safety unchanged
Travel Costs	10%	**2** Increases in the future	**5** Decreases	**4** Decreases
Training Costs	5%	**2** Increases	**4** Decreases	**4** Decreases
Compliant with Regulations	Yes / No	Yes	No	Yes
Totals	-	**2.45**	**4.15**	**4.25**

(Source: Author)

Table 9.3 shows the evaluation of the three strategic options. Score values tending toward '1' indicate a detrimental effect of the strategic option on the goal and values tending towards '5' indicate a favourable effect of the strategic option on the goal. Regulatory compliance is valued on a ‘yes/no’ basis. Table 9.3 shows that the PPA will benefit by implementing a hybrid pilotage model of services.

9.4 Hybrid Pilotage Services and the Strategy Clock

Hybrid strategies seek simultaneously to achieve differentiation, lower prices and provide services that offer benefits that are widely valued by buyers (Bowman and Faulkner, 1996). The Bowman-Faulkner Strategy Clock (1996), shown in Figure 9.1, expands Porter's three strategic options to eight options under three strategic groups. The three strategic groups are *Low Price Strategies*, *Differentiation Strategies* and *Failure Strategies*. Each of the eight options under the three groups have cost and perceived value combinations.

A hybrid model of pilotage, whereby resident-based pilotage services are offered along with coast-wide pilotage services, falls under option '4' of the Strategy Clock. Any price premium that the PPA charges for the hybrid pilotage services will be perceived by all stakeholders to have sufficient added value. The customers will view the hybrid model of pilotage services as a success because it will meet their preferences. The pilots will view the reduced travel times and demand for future man power requirements as a success. They will stand to gain by providing additional services with reduced strength in numbers. Focused differentiation to further customizing pilotage services for inelastic customers will generate higher service fees and will tend toward option '5' on the Strategy Clock.

With a 'status quo' strategic option, the PPA offers its standard pilotage services with increasing prices year over year. As a cautionary reminder, this option lies within the group of failure strategies, specifically being option '6' on the strategy clock. The option is doable only in a monopoly but not always valued by the customer. To provide a valuable service to its customers, the PPA should endeavour to remain within the *Differentiation* group when conducting strategic planning exercises for the future.

Figure 9.1 Strategy Clock

(Source: Bowman and Faulkner, 1996)

9.5 Suitability, Feasibility & Acceptability of Strategic Option

A hybrid model of pilotage services will address the identified challenges better than a status quo option would basis the increasing future demand in the north coast ports of British Columbia. The PPA will achieve some economy of scale. The service model also meets all current regulatory requirements.

The PPA has the operational and administrative resources to offer the hybrid model of service. It will obtain its financial resources through an appropriate tariff structure. The PPA also possesses the experiential knowledge gained from its experiences of providing a quasi hybrid service in the port of Prince Rupert.

PPA's customers will gladly welcome a hybrid model of pilotage service as localized pilotage invariably increases local responsiveness. Acceptability by the coastal pilot group will be dependent on additional benefits they stand to gain, either through additional compensation for being away from home or through lower pilot numbers sharing pooled revenues.

The option is not devoid of risk. Future shipping trends or world economic imbalances may reduce business volumes to and from British Columbia’s remote ports. However, the immediate future does not pose any significant risk and pilotage services can always revert to the current model should any real threat materialize.

9.6 Strategic Option Implementation Insights and Suggestions

To address the challenges highlighted earlier in this report the PPA should implement the hybrid model of pilotage services. In providing a resident-based pilotage service in addition to the coast-wide pilotage service, the PPA will meet the regulated requirements and the local requirements of British Columbia's ports and their users. In

the sections below, the author provides some insights and considerations for providing quasi resident-based pilotage services together with coast-wide pilotage services.

9.7 Time Spent on Assignments and Travel and Training Costs

The pilots, PPA's primary service providers, enjoy high supplier powers. They successfully bargain to receive the highest levels of training at no cost to them. Their ample remuneration compensates for their many non-revenue hours spent travelling. Lastly, they prefer to travel to and from assignments instead of residing at remote ports in British Columbia. Rather than deal with these three issues individually, the PPA should address them collectively and monitor its marine pilotage services, by using an appropriate measure of productivity.

9.7.1 A Measure of Productivity

Productivity is an overall measure of the ability to produce a good or service (Plenert, 2001). The measure of productivity for PPA, described hereunder, is a suggested method to compare the quantity and quality of the total annual output (pilotage revenue-earning hours) with the total annual input (travel + on the job) hours and travel & training costs. The measure of productivity is demonstrated using PPA data for the years 2006 through 2010.

9.7.1.1 The Product: "Marine Pilotage"

Marine pilotage is one of the oldest, least-known professions, yet it is one of the most important in maritime safety. A **pilot** is a locally experienced mariner who guides ships through dangerous or congested waters. Beyond the experience and training of regular ship's captains, pilots also receive special, ongoing training to stay on top of their

profession. Normally the pilot joins incoming ships at sea via helicopter or pilot boat and disembarks from outgoing vessels to a helicopter or pilot boat which returns the pilot to shore after the ship has successfully negotiated coastal waters. The economic and environmental risk from today's large cargo ships makes the role of the pilot essential. The PPA provides safe and efficient pilotage services through employee pilots for the Fraser River and a contracted service with the BCCP for the BC coast.

9.7.1.2 Output - Pilotage

The PPA provides pilotage services for approximately 11,000 to 13,000 assignments, that total anywhere between 75,000 to 90,000 pilotage revenue-hours per annum (see Table 9.4).The PPA uses two criteria to measure the quality of the pilotage services provided, viz. incident-free and delay-free pilotage services. The actual numbers of incidents or delays have been less than ten per criteria per dataset year.

Table 9.4 Coastal Pilotage Services Output

	Quantity		Quality	
Year	**Coastal Pilotage Assignments**	**Coastal Pilotage Revenue Hours**	**Incident-Free Assignments**	**Delay-Free Dispatches**
2006	11673	80311	0.99939	Not recorded
2007	11821	80254	0.99946	Not recorded
2008	11406	77920	0.99969	0.9994
2009	11055	74934	0.99950	0.9960
2010	11446	71947	0.99984	0.9998
2011	12144	75137	0.99962	0.9997

(Source: British Columbia Coast Pilots & Pacific Pilotage Authority)

9.7.1.3 Input - Pilotage

The measurable input items (see Table 9.5) specific to the quantity and quality of the pilotage-service hours may be broken down as follows:

Training Costs: The PPA pays for all pilot training, whether mandatory or deemed necessary by the Pilot Training and Examination Committee (PTEC). This commitment ensures the provision and maintenance of a high level of safety and currency with technology and best practices in the pilotage services.

Travel Time & Costs: Depending on a ships origin and destination within the pilotage district, the marine pilots may have to travel extensively before and after assignments. The PPA bears the costs for all pilot travel requirements. The PPA should endeavour to adapt its pilot dispatching software system to record accurate pilot travel times to establish a continuous ratio between hours spent on assignments as compared to total hours spent on travelling plus assignments.

Table 9.5 Coastal Pilotage Services Input

Year	Coastal Pilots' Travel + Revenue Hours	Coastal Pilots' Travel Costs	Coastal Pilots' Training Costs
2006	153292	$4,473,000	$591,000
2007	157510	$4,466,000	$837,000
2008	148336	$4,346,000	$960,000
2009	145162	$4,305,000	$593,000
2010	138290	$4,516,000	$1,495,000
2011	147942	$4,998,000	$504,000

(Source: British Columbia Coast Pilots & Pacific Pilotage Authority)

9.7.1.4 Productivity - Pilotage

Pilotage services are labour intensive. Only skilled labour (marine pilots), not machines (at least not yet), can accomplish the assignments. Customers availing of pilotage services usually evaluate productivity in terms of the quality of services provided (no incidents and no delays) at an acceptable cost. The PPA should view productivity as outcome based rather than quantity based, and define it as the ability to provide a quality service that meets the expectations of customers at reasonable cost.

The proposed measure of productivity for pilotage services may be determined as below:

$$\text{Service Productivity} = \frac{\text{Quantity of Output} \times \text{Quality of Output}}{\text{Quantity of Input} \times \text{Cost to Ensure Quality of Input}}$$

$$= \frac{\text{total revenue hours} \times \text{incident-free \%} \times \text{delay-free \%}}{\text{Total hours (travel + revenue)} \times \text{total cost (travel + training)}}$$

Raising the numerator relative to the denominator or reducing the denominator relative to the numerator will increase productivity, i.e. achieving more output for the same input or same output for a lesser input.

In the numerator (output) above, the revenue hours for a voyage, the time it takes a ship to go from point 'A' to point 'B', is dependent solely on the ship's capabilities. The only control that the PPA has on the numerator is to ensure that the quality component (incident-free and delay-free criteria) preferably stays at 100%, in any case not below 99.5%. In the denominator (input), the PPA has reasonable control over travel time and travel costs and full control over training costs.

The PPA should reduce travel hours and costs by endeavouring to set up a residential pilot system at ports where the volume of service required warrants such a system and innovate ways to reduce time and costs for all travel that is required.

Compromising pilots' training usually has an inverse effect on the quality components of the service (numerator) provided. Training costs should be allowed-for and the annual budgeted amount should vary depending on the number of new-pilot intakes, periodicity of recurrent training, number of senior pilots taking advanced training and the introduction of new technology.

9.7.1.5 A Critical Evaluation of the Productivity Measure

A suitable measure of productivity lies within a range based on the varying number of quality assignment hours & fixed high ($70) and low ($63) total cost/hour values. The higher the productivity value, the better the measure of productivity. For the best (impossible) value to be achieved, the quality components in the formula will need to be at 100% and travel time, travel costs and training costs will have to be zero.

Table 9.6 shows calculated productivity ranges for 2006 to 2011. A productivity value outside the acceptable range does not necessarily infer the compromise of the qualities of inputs. Pilot travel times and costs in any given period will increase if the number of *distant* assignments, within the same period, increases. Higher than normal training costs, especially training associated with the introduction of new technology and procedures will result in a lower productivity value in the short run. In the end, the effects of all training costs are seen in positive light as the quality components of the measure tends towards 100%. Lastly, increases in the pilotage hours (output) in any given period will not necessarily indicate an increase in productivity if the increases are a result of

delays caused by factors outside of the pilots' domain, e.g. slow steaming of ships due to faulty engines, terminal delays causing ships to depart much later, after the pilot has boarded, etc.

In summation, a productivity measure within the acceptable range provides a general guide on the quality and efficiency of pilotage services. Any radical changes in the measure over the short term or gradual but pronounced changes over the long term will require the PPA to perform a detailed analysis of the various components of the formula to identify true changes in productivity levels.

Table 9.6 Measure of Productivity of Pilotage Services

	A	B	C	D = A x B x C	E	F = A + E
Year	**Assignment Hours**	**Incident Free Rate**	**Delay Free Rate**	**Quality Assignment Hours**	**Travel Hours**	**Total Hours** Assign. + Travel
2006	80311	0.99939	1.0000	80262.0	72981	153292
2007	80254	0.99946	1.0000	80210.7	77256	157510
2008	77920	0.99969	0.9994	77849.1	70416	148336
2009	74934	0.99950	0.9960	74596.9	70228	145162
2010	71947	0.99984	0.9998	71921.1	66343	138290
2011	75137	0.99962	0.9997	75085.9	72805	147942

G = D / F			H	I = G / H		
Ratio of Quality Hours to Total Hours	**Cost/Assignment Hour**			**Productivity Measure**	**Acceptable Productivity Range**	
	Travel	**Training**	**Total**		**Low**	**High**
0.52359	$55.70	$7.36	$63.05	0.0083	0.0075	0.0083
0.50924	$55.65	$10.43	$66.08	0.0077	0.0073	0.0081
0.52482	$55.78	$12.32	$68.10	0.0077	0.0075	0.0083
0.51389	$57.45	$7.91	$65.36	0.0079	0.0073	0.0082
0.52007	$62.77	$20.78	$83.55	0.0062*	0.0074	0.0083
0.50754	$66.52	$6.71	$73.23	0.0069	0.0073	0.0081

* *Enhanced training (tethered tugs and portable pilot units) provided to pilots due to industry requests to navigate deeper drafted vessels through restricted waterways. Deeper draft means more freight earning capacity per vessel.*

9.8 Responsiveness to Local Port Requirements

The pilotage model in British Columbia has been coast-wide since inception. The marine pilots commute up and down the coast, using all available means, to and from assignments. The PPA dispatches pilots in a manner that allows them to arrive at assignments without causing delays to vessels that arrive or depart from the various ports on the British Columbia coast. The coast pilots reside primarily in Vancouver, Victoria & Nanaimo and they commute to and from every job that either begins or terminates at a port or anchorage somewhere on the coast.

9.8.1 Coast-wide Integration vs. Local Port Responsiveness

Another challenge with a coast-wide model of pilotage is being integrative coast-wide yet being locally responsive to the demands of the many smaller but rapidly growing ports on Canada's west coast. Some of the more remote ports in northern British Columbia and on the west coast of Vancouver Island are seeing renewed trade growth. The ports of Prince Rupert and Kitimat have also experienced substantial growth over the past few years. Because of the number of pilotage assignments at the port of Prince Rupert and the long commute times for pilots to and from the Lower Mainland to Prince Rupert, the PPA introduced a quasi-resident pilotage model for the port a few years ago. The marine pilots rotate themselves through the port, two at a time on a weekly basis. They reside locally and cater to all local assignments. The PPA is currently trialling three resident pilots on a weekly rotational basis in Prince Rupert to cater to the additional volume of business that the Asia-Pacific Gateway Project is generating.

The PPA continues to meet the requirements of the industry; however, local representatives of the ports that are seeing growth would like to see the pilotage model

include port-based resident pilots in addition to the coast-wide system currently in effect (see Figure 9.2).

Figure 9.2 Coast-wide Integration - Commuter Pilots vs. Resident Pilots

	Commuter Pilots	Resident Pilots
Localized Pilotage	Prince Rupert	Industry's wishes for all ports
Coast-wide Pilotage	Entire BC Coast	N/A

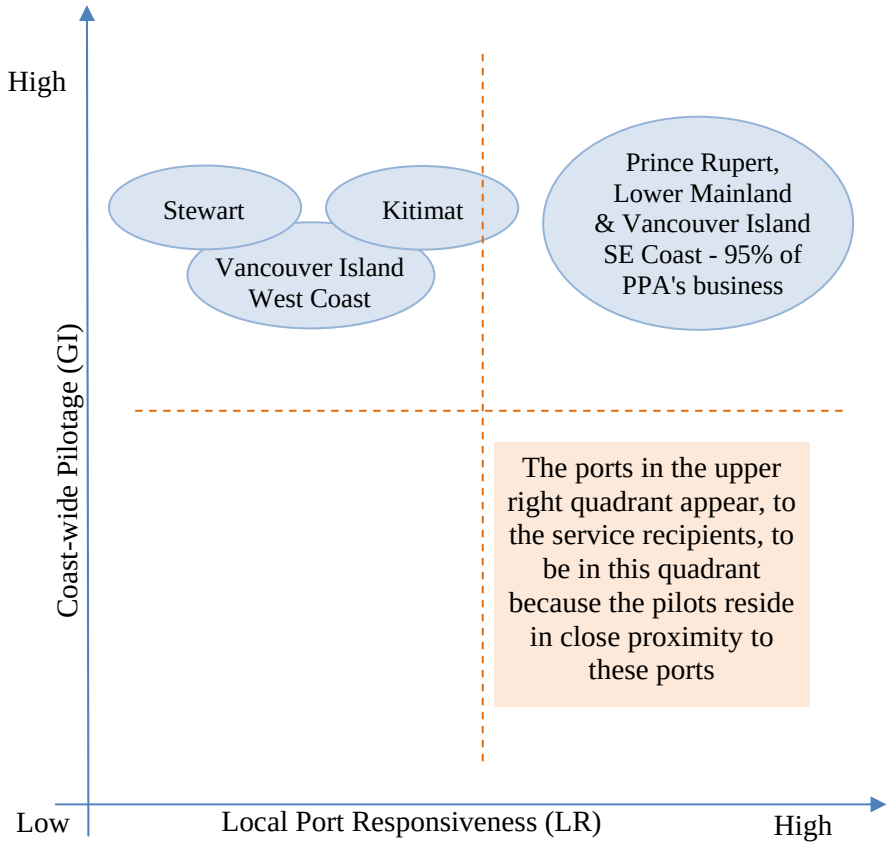
(Source: Author)

Situations at the port and terminal levels influence local responsiveness requirements. However, the perspectives of the government of Canada warrant coast-wide pilotage. The pilotage services offered by the PPA will continue to be coast-wide in nature to meet the requirements of the Pilotage Act. Furthermore, the coast-wide model offers flexibility to the industry because it licenses the pilots for the entire coast and does not restrict them to any one geographic area or port. Figure 9.3 demonstrates where on the GI-LR framework PPA's services at the various ports are situated. For the few ports that are in the upper left quadrant of the GI-LR framework, the PPA goes out of its way to mitigate some of their concerns; however, the PPA cannot address all the issues of these ports, as their low volume of business does not make high local responsiveness financially feasible.

To balance the demands of coast-wide pilotage with local responsiveness, the PPA must remain sensitive to local dynamics and impediments, participate on new

shipping projects in the area, monitor international trading patterns and heed the demands of the BC shipping industry.

Figure 9.3 Coast-wide Pilotage vs. Local Port Responsiveness

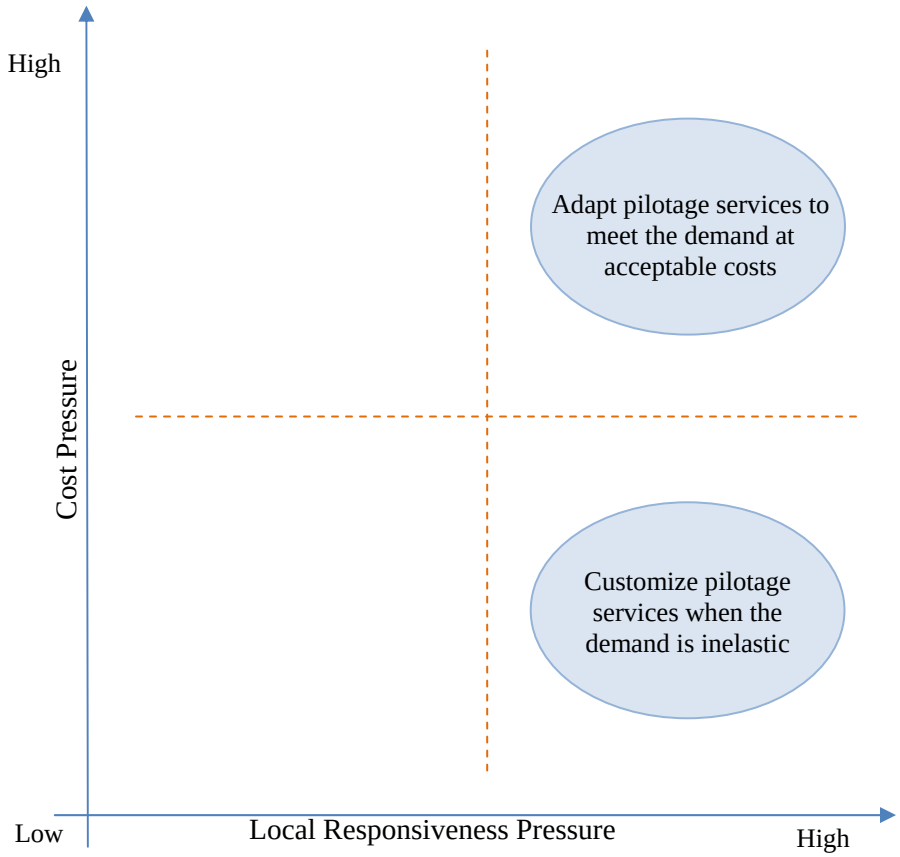


(Source: Developed by Author basis Framework by Doz & Prahalad)

In 2011, Port Metro Vancouver was Canada's busiest port, the port of Prince Rupert experienced an increase of 21.4% in marine tonnage handled and the total tonnage handled at Port Alberni rose sharply by 34.8% (Statistics Canada, 2011). The *BC Ports Strategy 2005* forecasts these growth trends to continue into the next decade. Furthermore, new-project proponents estimate that an additional 500 to 800 large ships will call the Kitimat & Prince Rupert regions if the proposed oil and gas terminals for the area come into existence.

The projected trade growth in BC's ports over the next five to ten years will increase the demand for pilotage services by about ten to fifteen percent over current levels. The PPA should develop strategies to adapt its pilotage services to the growing demand in the existing cargo sectors and/or customize pilotage services to meet the local demands of the highly lucrative oil and gas shipping sectors (Figure 9.4). Increased access to pilots through a quasi resident-based model or increased costs for a customized service: the industry will be open to either option if they are to benefit from increased local responsiveness along with the established enhanced levels of safety.

Figure 9.4 Cost Pressure vs. Local Responsiveness Pressure



(Source: Developed by Author basis Framework by Doz & Prahalad)

9.9 Future Supply of Pilots

Records at the PPA indicate that potential pilot candidates gain their experience mainly from the local tug and tow industry, the local fishing industry, British Columbia Ferry Services Inc. and the Canadian Coast Guard. While these sectors continue to be sources for marine pilots, the PPA anticipates some challenges with recruitment and retention in the future.

9.9.1 Pilot Recruitment & Licensing Process

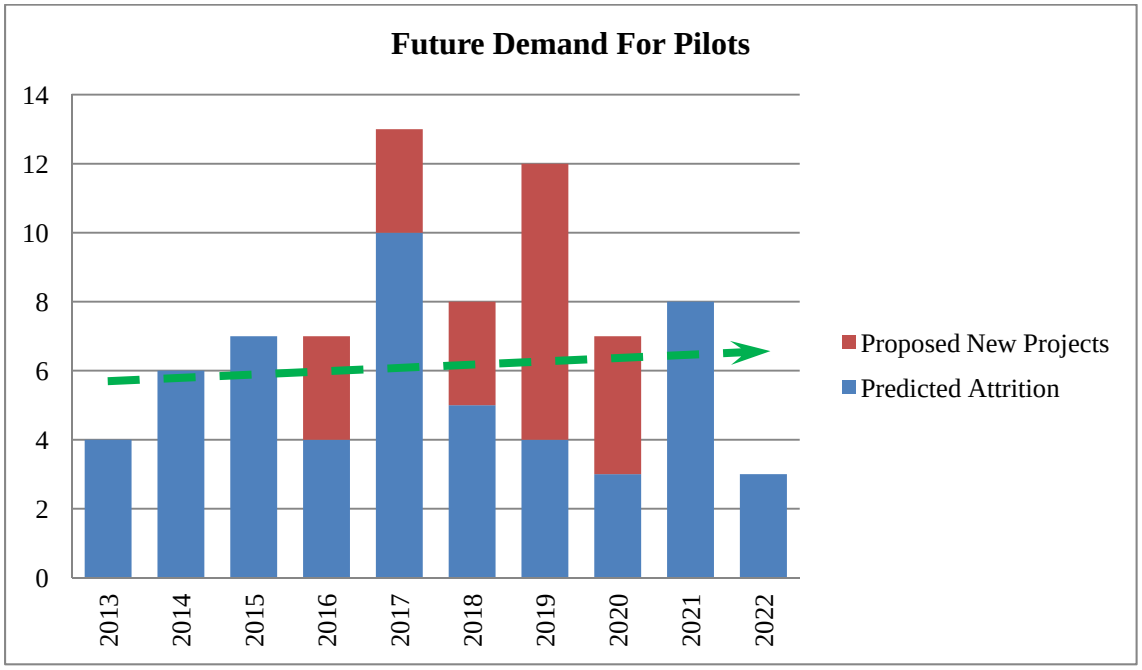
A two-year pilot familiarization program allows potential candidates to acquire a better knowledge of the pilotage areas and pilot duties before challenging the pilot examination process. The PPA maintains an eligibility list of candidates who successfully complete the qualifying examination process and meet the requirements of the General Pilotage and Pacific Pilotage Regulations. New pilots undergo an apprenticeship program consisting of fifty assignments over a three-month period in the Fraser River and eighty assignments over a six-month period in the coastal areas. Candidates receive a Class II pilot licence after completing the apprenticeship program. In their second year of piloting, the PPA upgrades the Class II license to a Class I license if the pilot's performance has been satisfactory. To obtain an unrestricted license status, pilots needs approximately six years to perform duties on all sizes and types of ships.

9.9.2 Future Human Resource (Pilots) Requirements

PPA's pilot recruitment requirements over the next ten years depends on the predicted pilot-attrition rates and the coming to fruition of the many proposed oil and gas marine terminal projects in northern British Columbia. The predicted attrition rate, based

on a retirement age of sixty-five, indicates that over fifty percent of the current pilot force will retire within the next ten years. In addition, terminal expansions and proposed marine projects in the northern British Columbian ports will increase the demand for pilots. Figure 9.5 shows an increasing trend in the requirement for additional pilots with some years seeing a requirement to recruit ten or more pilots.

Figure 9.5 Future Human Resource (Pilot) Requirements

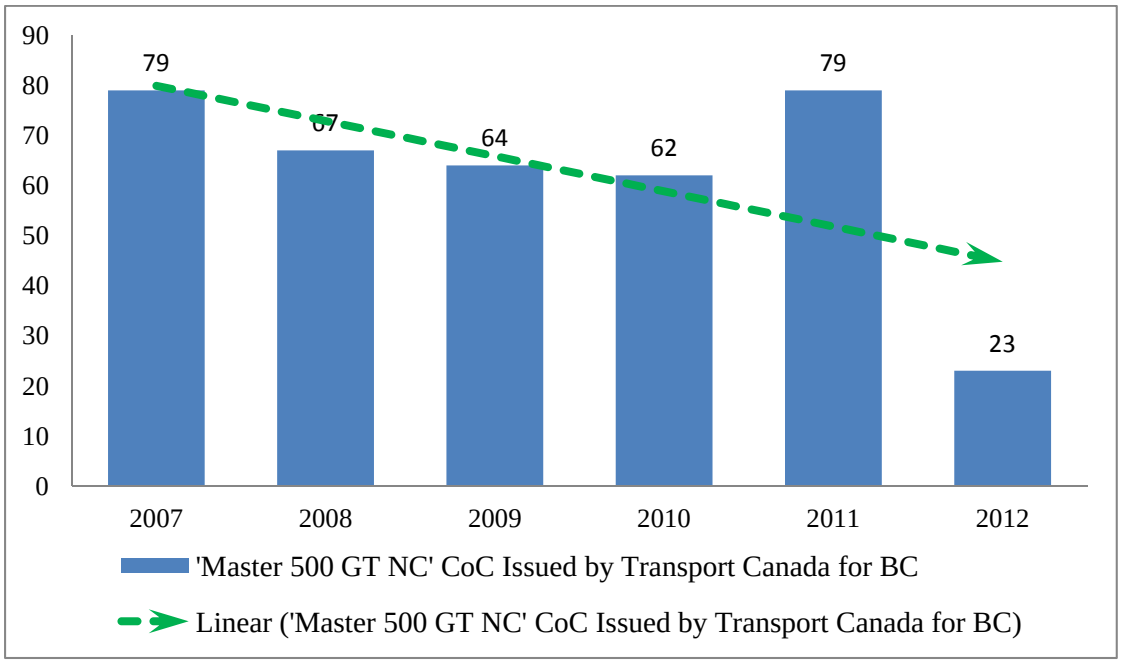


(Source: Pacific Pilotage Authority)

Local shipping trends, basis operational areas and vessel size requirements, indicate that more and more local marine navigators are opting to secure the *Master 150 Gross Ton Near-Coastal* certificate of competency. As per the Pacific Pilotage Regulations of Canada, the minimum level of certification required to be eligible for a pilot's job in British Columbia is the *Master 500 Gross Ton Near-Coastal* certificate of competency. Figure 9.6 shows a graphical representation of Transport Canada's records,

which indicate that the number of candidates in British Columbia achieving this level of certification on an annual basis has gradually declined over the past six years.

Figure 9.6 'Master 500 GT NC' CoC Issued by Transport Canada for BC



(Source: Transport Canada Marine)

Due to predicted attrition rates, a diminishing pool of eligible candidates and future project demands, the decade ahead will see increased human resource demands placed on British Columbia's coastal pilot group. Dr. Kunin warns, "Unless we do something very soon, we will not have the people with the skills necessary to manage, populate and operate our existing marine industry let alone a substantially expanded one" (2007). Perhaps it is time now for the PPA to implement operational changes that will address future work force requirements - changes that will reduce demand by increasing the efficiency in pilots' time usage.

9.10 Bench Marking

Third party service providers intervene in firm-to-firm transactions only on the basis that they are able to deliver advantage or value; and that, in so doing, they also enjoy advantage (Robinson, 2010). The benefits gained through the use of more efficient services across the entire shipping industry will make British Columbia ports a more competitive choice for doing shipping business. More specifically, vessels will call British Columbian ports if the total cost to route sea borne goods to and through a Canadian West Coast port is cheaper than it is at a US West Coast port.

The operating authorities of British Columbian marine ports perform competitive analyses with the US West Coast ports based on collective industry services (tugs, pilots, port facilities, agency, etc.). The PPA has no direct competition in the local market for pilotage services; however, as an individual entity, it can make strategic operational choices that will assist in making British Columbia's marine ports more attractive to worldwide shipping customers. To assess the success of its strategic choices, the PPA should continue to benchmark its pilotage services with similar service providers in the US West Coast ports of Seattle & Tacoma.

Table 9.7 provides a comparison between PPA's current coast-wide pilotage prices and other Pacific North West American ports' prices for Handymax, Panamax and large container sized vessels. PPA's prices for large container vessels calling Vancouver, BC are comparable to Seattle and Tacoma, in value and annual price change (percentage). To determine the efficacy of a hybrid model of pilotage services, if implemented, the PPA must continue to conduct benchmark comparisons of this nature

regularly, especially for vessel types that are proposed to cater to the expanding shipping businesses in British Columbia's marine ports.

Table 9.7 Comparison of Pacific Northwest Ports' Pilotage Costs

Comparison of PNW Ports' Pilotage Costs in US Dollars - 2012			
Vessel Size →→→	**Handymax**	**Panamax**	**Large Container**
Seattle, WA	$2203 (-0.7%)	$3553 (-0.4%)	$6007 (-0.3%)
Tacoma, WA	$2680 (-0.5%)	$4105 (-0.4%)	$6675 (-0.2%)
Vancouver, BC	$4696 (0.0%)	$5508 (0.0%)	$6670 (0.0%)
Prince Rupert, BC	$6176 (-1.6%)	$6988 (-1.4%)	$8515 (-1.2%)
Kitimat, BC	$12013 (-0.8%)	$12825 (-0.8%)	$10463 (-1.0%)
Stewart, BC	$16401 (-0.6%)	$17213 (-0.6%)	$15034 (-0.7%)

Comparison of PNW Ports' Pilotage Costs in US Dollars - 2011			
Vessel Size →→→	**Handymax**	**Panamax**	**Large Container**
Seattle, WA	$2218 (+4.0%)	$3568 (+3.8%)	$6023 (+3.5%)
Tacoma, WA	$2696 (+3.8%)	$4120 (+3.6%)	$6691 (+2.6%)
Vancouver, BC	$4696 (+2.3%)	$5508 (+2.4%)	$6670 (+2.5%)
Prince Rupert, BC	$6276 (+3.7%)	$7088 (+3.6%)	$8616 (+3.5%)
Kitimat, BC	$12113 (+3.0%)	$12925 (+3.0%)	$10563 (+3.2%)
Stewart, BC	$16501 (+3.0%)	$17313 (+3.0%)	$15134 (+3.1%)

Comparison of PNW Ports' Pilotage Costs in US Dollars - 2010			
Vessel Size →→→	**Handymax**	**Panamax**	**Large Container**
Seattle, WA	$2131	$3438	$5822
Tacoma, WA	$2597	$3977	$6519
Vancouver, BC	$4591	$5380	$6510
Prince Rupert, BC	$6053	$6843	$8328
Kitimat, BC	$11761	$12555	$10235
Stewart, BC	$16025	$16814	$14677

(Source: Pacific Pilotage Authority)

10: Conclusion

The Pacific Pilotage Authority Canada is in the envious position of having strong finances, a very capable work force with many years of experiential knowledge and good relationships with its many stakeholders. In addition to being a monopoly in the marine pilotage sector of British Columbia's shipping industry, good governance, strategic decision making, operational and safety excellence and transparency have been key factors in the organization's success. Moving forward, the PPA will need to adapt to the changing business environment of British Columbia's shipping industry and innovate ways to utilize its resources productively and efficiently.

British Columbia's ports will experience increased traffic levels due to unprecedented trade growth stemming from the provincial and federal governments' initiatives, i.e. the BC Liquefied Natural Gas Strategy 2012, the BC Ports Strategy 2005 and the Asia-Pacific Gateway and Corridor Initiative. Rapid advances in technology, ship sizes and types, and the emergence of a more integrated transportation system based on performance and accountability will characterize the future. The PPA is positioned to be a positive contributor to the marine industry within this environment.

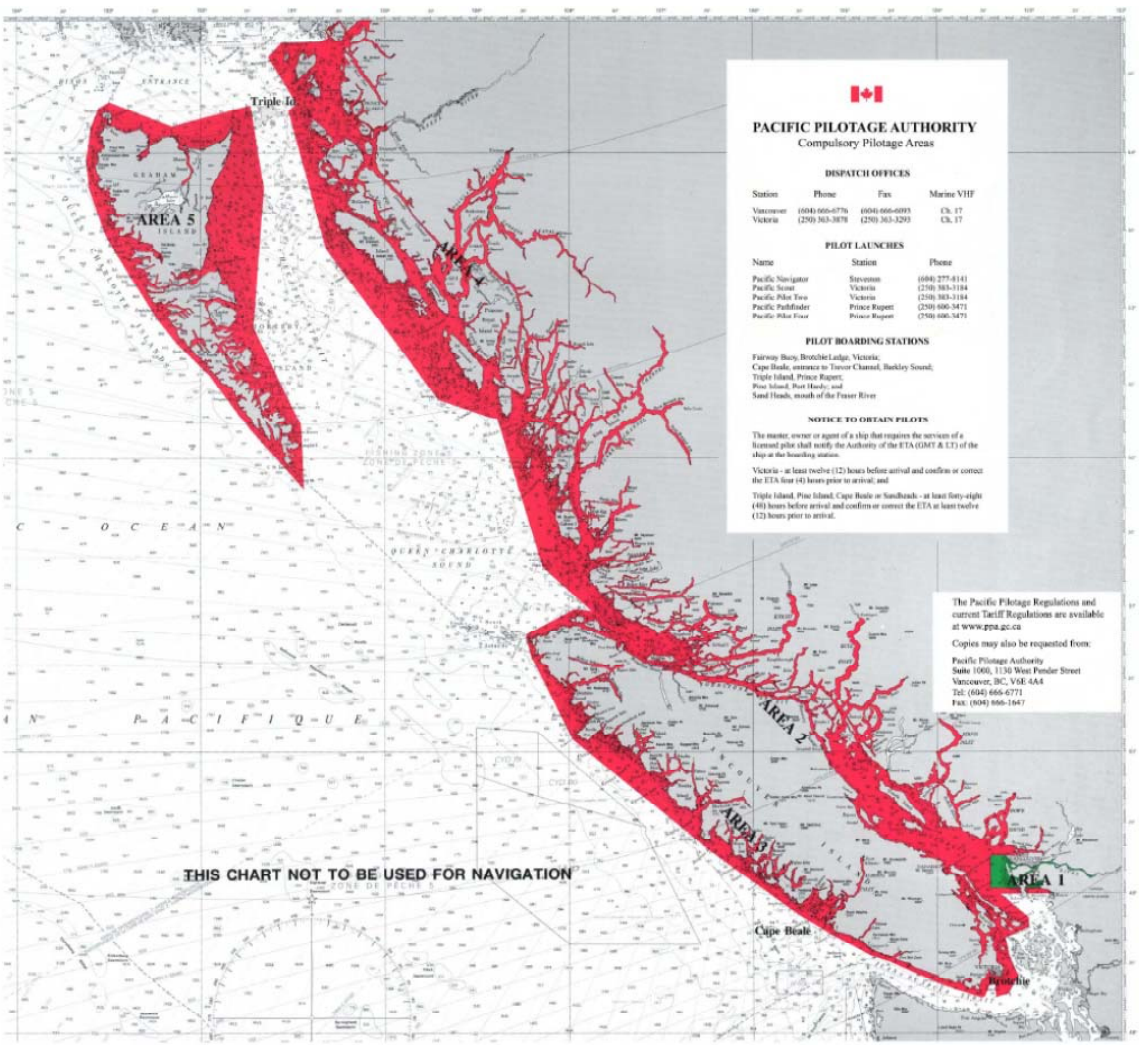
Reciprocity and collaboration between the many actors, upstream and downstream, in the shipping industry create value (Vitsounis & Pallis, 2010). Marine pilotage in British Columbia is an invaluable link in British Columbia's shipping value chain and must continue to be so. The PPA must continually strive to create value for its customers and strategically match these values with the customers' changing preferences.

By continuing to improve communications with all its stakeholders, cooperating with its business customers and participating in working groups to identify common business objectives, the PPA will ensure that it achieves collaborative and productive outcomes.

The future of British Columbia's shipping business is extremely robust and the Authority looks forward to playing an important role in facilitating the safe and efficient movement of vessels along the entire west coast of Canada.

Appendices

Appendix A: British Columbia Marine Pilotage District



(Source: Pacific Pilotage Authority)

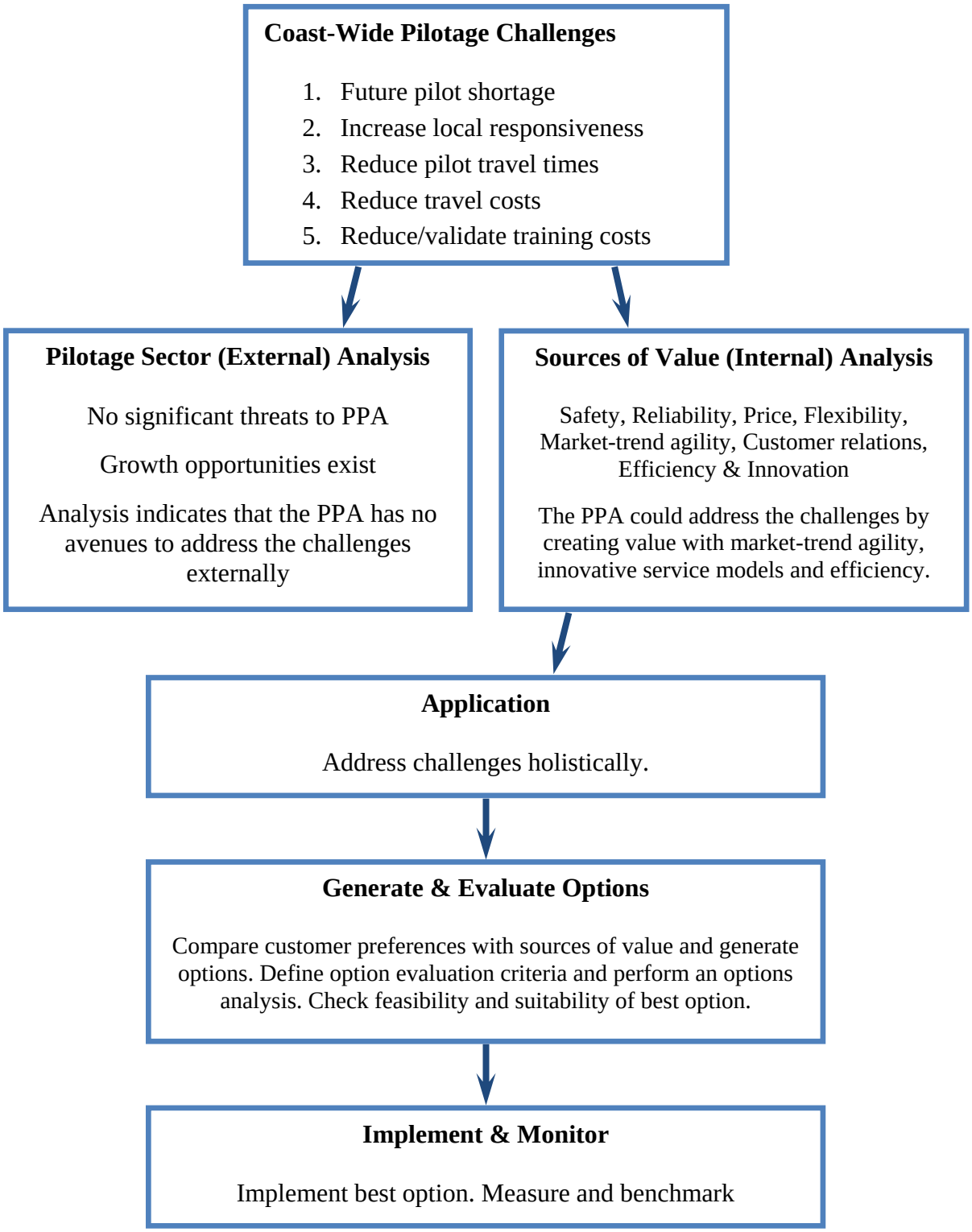
Appendix B: Manned Model Training Ships

(Source: Author)

Appendix C: Pilot Launches

(Source: Author)

Appendix D: Options Analysis Flow Diagram



(Source: Author)

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