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## **A Study of the Impacts of the Panama Canal Expansion on the U.S. Northeast Ports and Strategy of the Port of Boston**

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### **Abstract**

*When it is completed in 2016, the Panama Canal expansion will increase the trade volume and route from Asia to the United States as well as the competition amongst all U.S. ports, creating economic impacts in several areas. East Coast ports will be affected the most due to investments in harbor expansion projects and rise in cargo traffic and imports. The expansion will provide access for the Post-Panamax ships to the East Coast ports. These ships can increase cargo size from 5,000 up to 13,000 TEU's (twenty-foot equivalent unit). It is estimated that 20-25% of import traffic will shift to the East Coast (Regional, 2013). Larger ships will be able to travel faster and carry heavier loads directly to the East Coast ports, thus eliminating the West Coast stop and reducing train transportation of cargo to the East Coast. In this study there will be a comparison of the economic impacts that the expansion of the Panama Canal creates between the Port of Boston and other major Northeast Ports, specially the Port of Baltimore, the Port of Norfolk and the Port of New York and New Jersey. This paper will evaluate the opportunities and strategies for the Port of Boston, utilizing business models of Strategy Canvas and Four Actions Framework in combination with the Port Choice Model.*

### **Introduction**

The Panama Canal Expansion is happening at a critical time when the Panama Canal is facing competition and losing shipping traffic to the larger Suez Canal in Egypt. The eastern ports of the United States, along with Asia, have the most ships using the passage connecting the Atlantic and Pacific through the Isthmus of Panama. In Boston, the canal expansion, combined with a plan to dredge Boston Harbor to accommodate larger ships, could generate thousands of new jobs and more than \$4 billion in new business at Conley Terminal, according to the Massachusetts Port Authority (Johnston, 2014).

The Panama Canal Expansion Project or Third Set of Locks Project will double the capacity of the Panama canal by 2016 by creating a new lane of traffic and allowing more and larger ships to transit. The new lane will be able to handle Post-Panamax ships and be more efficient. The new locks will be 1,500 feet long, 180.5 feet wide, with a depth of 60 feet. Also, the expansion project would widen and deepen existing channels and raise Gatun Lake's maximum operating level<sup>1</sup>. This is one of the largest construction projects in the world and is expected by many in the logistics industry to have significant impact on the global trade and on U.S. ports and inland infrastructure.

### **Purpose and Methodology**

The purpose of this paper is to study the impacts of the Panama Canal Expansion and analyze the strategy for the Port of Boston by addressing the following four questions:

- What are the factors affecting shifts in cargo flows?
- What are the impacts of the Panama Canal Expansion on the global trade and U.S. Northeast ports?
- What are the advantages and infrastructure of each Northeast port?
- What is the strategy of the Port of Boston?

In this study there will be a comparison of the economic impacts that the expansion of the Panama Canal creates between the Port of Boston and other major Northeast Ports. Specially, I will focus on Baltimore Port, Port of Norfolk and Port of New York/New Jersey.

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<sup>1</sup>Panama Canal Authority. "Proposal for the Expansion of the Panama Canal Third Set of Locks Project."  
<http://www.pancanal.com/eng/plan/documentos/propuesta/acp-expansion-proposal.pdf>

Right now, there are few East Coast ports with the depths required to handle Post-Panamax ships. Norfolk, Virginia, has been able to accommodate such ships. The Port of New York and New Jersey can too, but its container terminals on Newark Bay have height restrictions due to the Bayonne Bridge. The port is planning to raise the bridge 64 feet, which will cost \$1 billion and take five years. Baltimore has just completed its 50-foot dredging project and is prepared for the completion of the canal expansion. These two ports are currently at an advantage over the others. If the Port of Boston continues to follow through with a deepening of the harbor, Baltimore and Norfolk will be affected. This will also be true after the raising of the bridge by the Port of New York and New Jersey.

Blue Ocean Strategy including Strategy Canvas and Four Actions Framework is used to compare the ports, and analyze the actions for the Port of Boston. However, the Blue Ocean Strategy is an analysis tool for general business situations. I have created the Port Choice Model applicable for analysis of the port and shipping industry. This Blue Ocean Strategy combined with Port Choice Model is the methodological approach used for this study, making the analysis more meaningful and practical for the Port of Boston.

### ***Factors Affecting Shifts in Cargo Flows***

The Panama Canal expansion will bring changes to the size of cargo ships and the infrastructure of the ports, and transform the transportation network in cost, time and reliability. These changes will affect the cargo flows between the U.S. and Northeast Asia. Industry experts say that nearly 80 percent of ships on order are post-Panamax size, and elected officials on the East and Gulf coasts are predicting that if they can expand their ports to accommodate these larger ships, they can capture much of the traffic that currently goes to West Coast ports and reaches the East Coast by rail (Holey, 2012).

Shifts in the movement of goods and cargo flows usually occur in four ways. First, goods moving from a particular origin to a particular destination are rerouted over the available transportation network to take advantage of changes in cost, time, or reliability, for example, through the Panama Canal rather than through West Coast ports and the North American intermodal system of trucking, rail, and barge. Secondly, the transportation network itself changes over time in response to market needs, changes in technology, and changes in other parts of the network, such as the original construction of the Panama Canal and the current Canal's expansion/enhancement of port and inland infrastructure capacity. The U.S. East Coast and Gulf Coast ports will be able to receive large Post-Panamax ships. Thirdly, changes in carriers' business decisions and shippers' distribution strategies may also significantly affect the overall transportation network. Finally, the sourcing of goods and the location of production facilities can be changed in order to take advantage of lowered costs of transportation, materials, traffic and port congestion, or other factors (Panama, 2013).

According to the different situations mentioned above, carriers and shippers make their decisions on one certain transportation network or route over the other, affecting the movement of goods and cargo flows. The volume of trade and cargo flowing through the Panama Canal will largely depend on the U.S. import sourcing needs and trends. China has become the largest sourcing destination for the U.S. imports and will likely to continue grow. In spite of the differences on political and trade issues, China and the U.S. have become business partners and will cooperate even more in the future. If this is the case, Panama Canal will serve as a bridge between China and the U.S. trade, and likely grow in importance for imports through the U.S. East Coasts.

### ***Impacts of the Panama Canal Expansion***

The Panama Canal expansion will primarily change the costs of ocean transportation between U.S. East and Gulf Coasts and Northeast Asia and to a lesser extent the costs of a number of smaller trade lanes involving ocean shipping:

- Between Latin America's West Coast ports and the U.S. and Gulf and East Coasts;
- Between the U.S. West Coasts and ports along the East Coast of Latin America.

These smaller trade lanes can generate good transshipment business for smaller U.S. Gulf and East Coast ports like the Port of Boston. Given that the Panama Canal expansion will enable use of larger ships, potential impacts of expansion on U.S. containerized imports from Northeast Asia include:

- Reductions in transportation costs for goods currently being shipped to U.S. East and Gulf Coast ports through the Panama Canal

- Cost reduction that leads to transportation shifts to U.S. East and Gulf Coast ports of goods currently imported through the West Coast (Panama, 2013).

Trade is an essential benefactor for the United States economy. With the expansion of the Panama Canal, it will increase competition amongst all U.S. ports and create economic impacts in several areas. The East Coast will be affected the most with investments in expansion projects, the creation of warehouses and an increase in imports. The expansion will directly affect revenue and job creation. This can create a multitude of jobs including port workers as well as construction jobs.

The Panama Canal expansion will be a worldwide opportunity. It will add value to the Panama economy and be a port asset for future trade routes. One condition that will cause economic impacts on the East Coast ports is the access that expansion will create for the Post-Panamax ships. These ships can increase cargo size from 5,000 up to 13,000 TEU's. This creates a comparative advantage for some East Coast ports such as the Port of Baltimore and the Port of Norfolk, and increases competition for the West Coast as well. It is estimated that 20-25% of West Coast import traffic will shift to the East Coast (Regional, 2013).

Cargo will be able to travel much faster, and will reduce the transportation by way of West Coast ports to the East Coast. Until now, the fastest way to get cargo from China to the East Coast of the U.S. has been by ship to the U.S. West Coast (12.3 days for a ship to go from China to the U.S. West Coast) and then to continue by rail (6 days from the West coast to the East coast) for a total of 18.3 days. For this reason, 75% of Asian imports to the East Coast go this way. Only 20% goes through the Panama Canal because of the extra time it takes: an additional 3.3 days of shipping for a total of 21.6 days. The remaining 5% of imports goes through the Suez Canal directly to the U.S. East Coast, a voyage that takes 21 days (Impact, 2010).

Usually, the cargo arrives in California and is then distributed via train and plane. With the expansion, cargo can leave Asia and go directly to the East Coast. This can eliminate stops in West Coast ports. Not only will products arrive faster, but also countries and companies will be able to ship more, increasing revenues in the United States trade industry. Profit margins will increase due to the decrease in transportation costs. Although it is more expensive to transport a large vessel, the cost per unit is lower with the increased quantities of goods and containers on the ship.

Boston is a leading contender for port expansion to receive the Post-Panamax cargo ships. The harbor must be deepened and updated first. The Port of New York and New Jersey is currently undergoing expansion projects as well. It is in the process of planning to raise the Bayonne Bridge which connects Staten Island and New Jersey. It will be raised 64 feet to accommodate the taller vessels (Regional, 2013). In addition, on the East Coast there is the space and availability of land for future warehouses, which will as a result be built for higher quantities of inventory. Ultimately, this will reduce vehicle traffic costs from the West to the East Coast. The Panama Canal expansion is going to positively impact the global economy and U.S.-China trade.

### ***Comparative Analysis of the Northeast Ports versus the Port of Boston***

By the year 2020 it is estimated that the eastern coast ports will have a 50% increase in cargo shipments, while 20% will be directly shifted from the West Coast (Regional & Massachusetts Port Authority, 2013). At this time, The Port of Baltimore is the leading destination for the East Coast when it comes to the Post-Panamax ships. The Port of Baltimore will have the highest return on investment when the canal expansion is complete. This gives the Port of Baltimore the financial competitive advantage. Companies will soon look for port destinations as the Panama Canal expansion comes to an end. As one of two ports and the most northern on the East Coast that can receive the Post-Panamax ships, Baltimore can expect an increase in revenue once again.

The Port of New York and New Jersey is currently under construction putting it just behind Norfolk. Norfolk is the main financial competition for the Port of Baltimore. Baltimore is lacking a feasible railway system to handle the increase in cargo traffic. This will require another investment to deal with the canal expansion. The Port of Norfolk is ready for this increase and Baltimore could face a 50% loss to Norfolk if a project to improve the railway is not put into place (Regional, 2013). This will allow a quicker transition from ship to final destination. If Norfolk receives the benefit from this, the port will most likely see a direct correlation and an increase in revenues during this time.

When the projects are complete, due to population and location interest, the Port of New York and New Jersey will most likely overtake the competition from the port of Norfolk. This will create conflict for the Baltimore port as well when they are no longer the most northern port. Even though Boston may enter the supply chain after the other ports, it is possible the Port of New York and New Jersey will lose cargo to Boston. Shippers and cargo lines are looking to optimize the supply chain, maximize revenues and minimize transportation expenses. The Port of New York and New Jersey is now receiving a large number of import cargo that is transported by railway or truck to New England. The Port of Boston will be able to decrease the additional factor in the supply chain and offer lower transportation costs than the larger port.

The East Coast ports have invested billions of dollars on these expansion projects, creating jobs and the need for investments in funds. This has directly affected the surrounding areas. The Port of Baltimore received a revenue increase in 2011; so it is estimated that other ports willing to deepen the channels will also receive a return on their investment (Regional, 2013). As the Baltimore port produced jobs for the state of Maryland, the other states with the ports can expect the same which also benefits the job market and local economies for the duration of the project. Ports that choose to disregard the expansion will face a decrease in incoming cargo, resulting in a decline in revenue. Eventually the smaller ships will be phased out for the most part. These ports will lose contracts if they do not keep current with the new requirements.

The Port of Boston currently cannot receive larger cargo ships. However, the port is still responsible for 34,000 jobs and an annual \$2 billion contribution to local, regional and national economies. This port supports cruise lines, containerized cargo, fishing fleets as well as gas and petroleum terminals which satisfy more than 90% of Massachusetts fuel needs. The Conley Terminal supports three out of the world's top ten cargo lines while the niche market includes importing and exporting over 70,000 cars per year (About Massport).

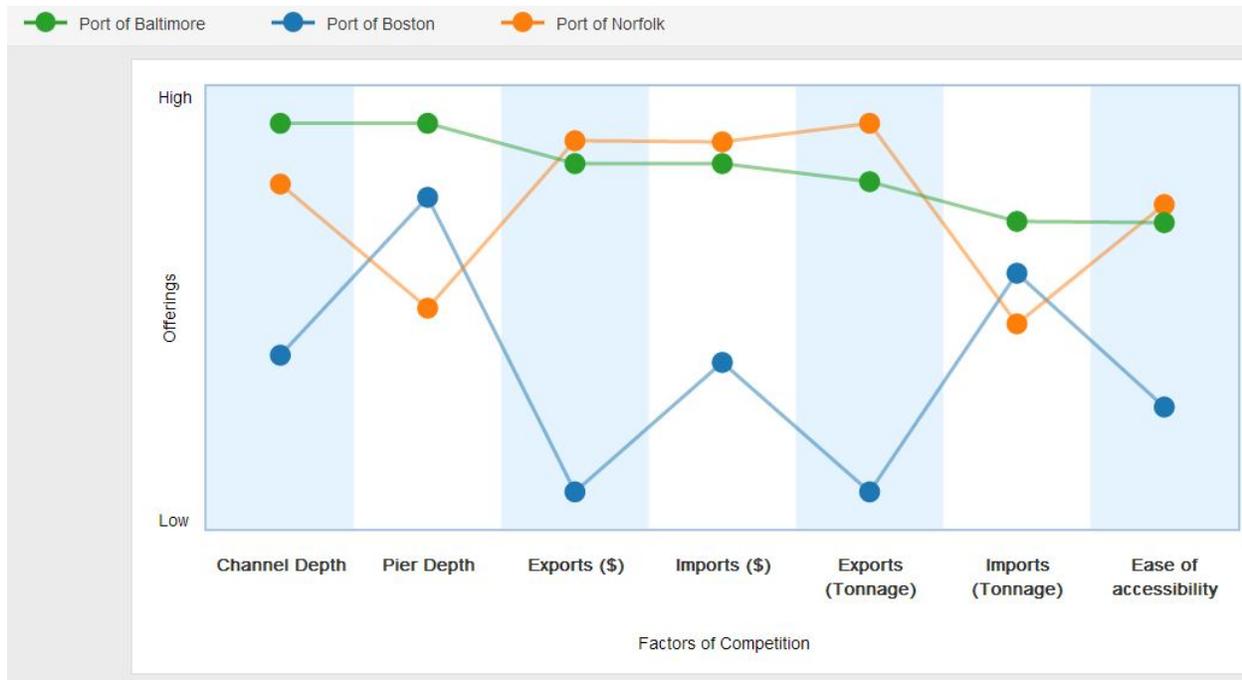
Boston faces the possibility of an economic threat if the plan to deepen the harbor is not put into action quickly. The economic impacts on the surrounding area will diminish success from the Port of Boston and leave importers and exporters with a need to find more economically resourceful ways to deal with shipments. The Port of New York and New Jersey is very close to Boston and a leading contender for the Northeast. Importers and exporters currently using the Port of Boston due to lower costs will switch, as the smaller ships phase out if Boston does not join the other ports in expansion.

Lately, there has been good news for Port of Boston for the port expansion project. The \$310 million project to dredge Boston Harbor received federal funding when President Obama signed the Water Resources Reform and Development Act, legislation that authorizes \$12.3 billion for water projects throughout the country. "This bill gives a green light to 34 water infrastructure projects across the country, including projects to deepen Boston and the Port of Savannah and to restore the Everglades", Obama said before signing the act into law (Luna, 2014).

### ***Comparative Analysis: Blue Ocean Strategy – Strategy Canvas***

The Blue Ocean Strategy is a tool used to analyze a business by comparing their performance to that of their competitors and is depicted in a line graph. This model was created by Professors W. Chan Kim and Renee Mauborgne of Harvard Business School in their book *Blue Ocean Strategy* (Ferrell & Hartline, 2014). Strategy Canvas is a part of the Blue Ocean Strategy and compares similar competitors in a market with comparable factors of competition. The horizontal axis represents the factors on which the firms compete, and the vertical axis represents the level to which each firm offers these factors. In this instance, it is used to compare the three ports.

Figure 1



The above three East Coast ports: the port of Boston, the port of Baltimore, and the Port of Norfolk are compared with the port information prior to the latest port expansions. The Port of Baltimore has the deepest shipping channel of any of the three at 46-50 feet, followed by the Port of Norfolk with a depth of 41-45 feet, and Boston with 36-40 feet (World Port Source, 2013).

The pier depth allows for ease of access to the pier, which allows for ships to dock and undock quickly. In dollar terms for exports, both Norfolk and Baltimore rank in the top 36 ports of the US in exports, Norfolk ranked 6<sup>th</sup>, and Baltimore 9<sup>th</sup> while Boston ranks 36<sup>th</sup>. Massport needs to work with the Massachusetts Department Economic and Community Development to attract more export oriented companies to the State, and promote export business with Massachusetts companies and industries. There are many high tech and biotech industries located in the Boston area. It would be beneficial to the region if they could use the Port of Boston as their international business and shipping port. In terms of imports, which are the most affected by the inclusion of the Pan-Max ships, Norfolk ranks 8<sup>th</sup>, Baltimore 9<sup>th</sup>, and Boston ranks in at 23<sup>th</sup>.

Now looking at the amount of tonnage that gets imported into all ports, Baltimore ranks at 19<sup>th</sup>, Boston at 20<sup>th</sup>, and Norfolk at 22<sup>th</sup>. Norfolk, which actually imports the most in terms of cash, actually ranks last amongst these ports in terms of the amount of raw tonnage that it brings in. It is important that the Port of Boston keep the import tonnage and at the same time increase the cash value of the imports. In exporting tonnage, Norfolk ranks 3<sup>rd</sup> and Baltimore 8<sup>th</sup> while Boston doesn't even rank in the top 36 (Foreign Commerce Statistical Report).

Looking at this data, it's pretty obvious what Port of Boston is lacking in comparison to the other two ports. It lags behind in the cash value of its imports and its exports. If Boston expands its port to accommodate Post-Panamax ships, it could see a massive influx in terms of imports, and most likely exports would begin flowing into Boston to head out as well. In terms of ease of access, both Baltimore and Norfolk provide much easier access to big ships, while Boston is lacking in this area. With increasing revenues from imports and exports in all ports, Boston is at a disadvantage in revenue compared to the others. With the Post-Panamax capability, the Port of Boston is expected to see a return on the project investment.

**Table 1**

<b>Exports</b>				
<b>Value (\$ Millions)</b>				
<b>Rank</b>	<b>U. S. Port</b>	<b>2013</b>	<b>2012</b>	<b>% <math>\Delta</math>13/12</b>
2	New York/New Jersey	\$ 50,947	\$ 55,325	-7.9%
6	Virginia Ports	\$ 35,236	\$ 34,234	2.9%
9	Baltimore	\$ 20,847	\$ 21,805	-4.3%
36	Boston	\$ 1,234	\$ 1,318	-6.4%

(Foreign Commerce Statistical Report 2013)

**Table 2**

<b>Exports</b>				
<b>Short Tons</b>				
<b>Rank</b>	<b>U. S. Port</b>	<b>2013</b>	<b>2012</b>	<b>% <math>\Delta</math>13/12</b>
3	Virginia Ports	64,024,145	61,663,547	3.8%
8	Baltimore	19,396,073	23,734,091	-18.3%
9	New York/New Jersey	19,028,472	23,861,967	-20.3%
N/A	Boston	N/A	N/A	N/A

(Foreign Commerce Statistical Report 2013)

**Table 3**

<b>Imports</b>				
<b>Value (\$ Millions)</b>				
<b>Rank</b>	<b>U. S. Port</b>	<b>2013</b>	<b>2012</b>	<b>% <math>\Delta</math>13/12</b>
2	New York/New Jersey	\$ 145,590	\$ 149,596	-2.7%
8	Virginia Ports	\$ 37,413	\$ 35,748	4.7%
9	Baltimore	\$ 31,745	\$ 32,086	-1.1%
23	Boston	\$ 9,929	\$ 10,144	-2.1%

(Foreign Commerce Statistical Report 2013)

**Table 4**

<b>Imports</b>				
<b>Short Tons</b>				
<b>Rank</b>	<b>U. S. Port</b>	<b>2013</b>	<b>2012</b>	<b>% <math>\Delta</math>13/12</b>
3	New York/New Jersey	52,795,990	58,351,195	-9.5%
19	Baltimore	10,877,441	12,933,871	-15.9%
20	Boston	10,639,278	10,992,357	-3.2%
22	Virginia Ports	10,057,538	9,176,235	9.6%

(Foreign Commerce Statistical Report 2013)

After the Strategy Canvas analysis, I conclude that deepening all the suggested harbor channels to allow Boston to handle the Post-Panamax ships will create a positive economic impact for the area. Currently, Boston ranks below the top 36 ports of the U.S. in terms of exports. In imports, Boston currently ranks lower than both Norfolk and Baltimore which are the only Northeast ports that can provide docking access for the Post-Panamax ships.

### ***Strategy Recommendations: Blue Ocean Strategy – Four Actions Framework***

The Four Actions Framework is a series of four questions that are asked to analyze the industry and the needs of the market segment to determine what a company should do going forward. It is used to shift the Strategy Canvas to reorient the focus of the firm. This model was also created by Professors Chan and Mauborgne in Blue Ocean Strategy (Ferrell & Hartline, 2014). This table is used to demonstrate the four actions the Port of Boston needs to take in order to achieve their strategies.

Table 5

**Four Actions Framework Boston**

<b>Reduce</b>	<b>Create</b>
Port operation costs Port fees and charges Customs clearance and wait time Cargo transit time Cargo expenses	A 50-foot deeper channel Opportunities with carriers Opportunities with shippers Sister Port relationship Transshipment from Panama Employment and jobs
<b>Eliminate</b>	<b>Raise</b>
Trouble and travel time for New England customers Port bureaucracy Port inefficiency	Government subsidy Port marketing activities Port operation efficiency Awareness of \$20 million parcel of land for future expansion and warehouse Massachusetts Harbor Maintenance Tax Credit Reliability

**Reduce:** In order to attract more port use, the Port of Boston can reduce the port fees and charges, which can be made possible through cutting the operation costs. The customs clearance and wait time is already shorter than the neighboring Port of New York and New Jersey. If the clearance and wait time can be reduced even further, it would encourage more companies to use the port, resulting in the increase of port import and export volume. The total transit time for the carriers and shippers is reduced if the Port of Boston can provide the quicker and better clearance service. General expenses will be reduced because larger amounts of cargo can enter the port and save transit time.

**Create:** The deepening of the harbor will increase cargo traffic in Boston. It will create jobs and generate revenue for Boston and surrounding areas. The port has access to major high ways and railroads. The main problem now is only having a 40-foot depth channel that lacks the capacity to handle the bigger opportunities of the larger ships. 50-foot depth channel will bring in more cargo and make trade much easier. The factors affecting the port choice are the carrier characteristics and shipper characteristics. The decision-making of carriers to use the port or increase use of the port differs from company to company. Some carriers' decisions are dictated by their governments, such as China Ocean Shipping Company known as COSCO. Some carriers are more sensitive to their costs, but some are more sensitive to reliability or transit time. This is also true of the shippers who are represented by freight forwarders. It is essential that the Port of Boston discover the characteristics of carriers and shippers and customize services to their needs. The three terminals or ports in Colon, Panama are operated separately by Manzanillo International Terminal-Panama, S. A., Hutchison Whampoa Limited of Hong Kong/China, and Evergreen Line of Taiwan. Carriers of different countries may choose to use any of these ports for their transshipment business. It would be beneficial to the Port of Boston when the terminals and Ports, such as Manazillo are called on to establish relationships in case of transshipment from Asia and Latin America.

**Eliminate:** The Port of Boston is a leading port in New England serving six states. In the immediate area, importers and exporters have access to a multitude of public highways, other ships and a railway system for easy transportation to a final destination. Logistically, it would be troublesome for New England customers to go through the traffic and use the Port of New York/New Jersey. Travel time between the port and their facilities would be reduced if they use the Port of Boston. The Port of Boston needs to watch the port operations closely to eliminate inefficiency and bureaucracy in the operation process.

**Raise:** Under the legislature of the Water Resources Reform and Development Act, the federal government will fund \$216 million, or about two-thirds, of the Boston project. The State and the Massachusetts Port Authority will split the additional costs (Luna, 2014). The Port of Boston needs to raise more funds for the port expansion, increase its marketing activities and operations efficiency to increase the reliability and exposure of the Port. It should be made aware to the carriers and shippers that there is a \$20 million parcel of land available for expansion of the port and the construction of warehouses.

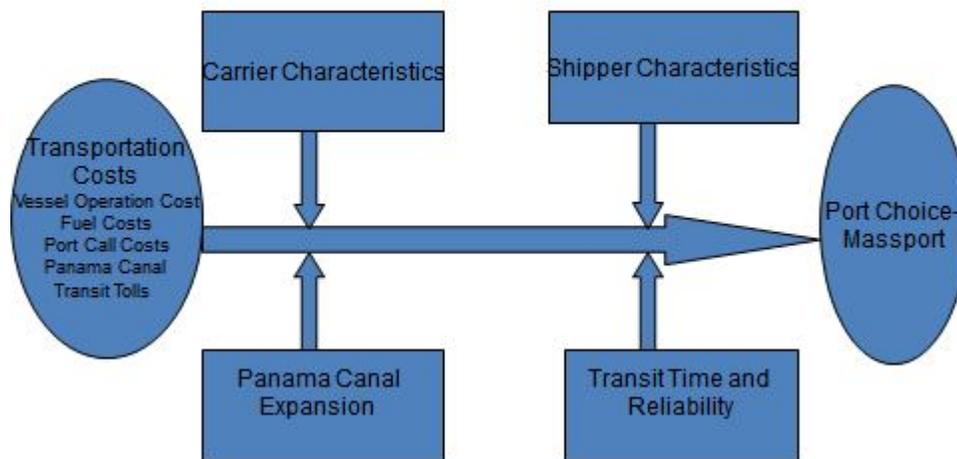
The Massachusetts Harbor Maintenance Tax Credit is an incentive for the users of the Port of Boston. If possible, the port can further promote and raise the tax credit to attract more carriers and shippers.

### ***Port Choice Model and Conclusion***

The following Port Choice Model is the qualitative and strategic model discussed by Adams Steven and Thomas Corsi in their paper (Steven & Corsi, 2012). I modify and add to supplement and correspond with the Blue Ocean Strategy for the purpose of analyzing the situations of Northeast Coast ports and strategies for the Port of Boston.

**Figure 2**

## Port Choice Model



The Four Actions Framework is a great tool for general analysis of the specific actions for any strategy. The qualitative model is used for analysis of the port industry with the Panama Canal expansion. The Port Choice Model is a practical tool not only for the Port of Boston but also for any port to utilize the strategy analysis with combination of the Strategy Canvas and Four Actions Framework. The factors of transportation costs, carrier characteristics, shipper characteristics, Panama Canal Expansion and transit time and reliability are so essential and must be considered into the strategy analysis for the Port of Boston. With Massport managing Post-Panamax ships, cargo numbers will increase by decreasing the cost per unit with respect to transportation. This also opens up an opportunity for companies to directly ship their cargo to Boston rather than relying on truck or rail transport to New England from the Port of New York and New Jersey, the Port of Baltimore or the Port of Norfolk. Analyzing the factors in the Port Choice Model and improving the port to prepare for the Panama Canal Expansion, Boston will see an increase in cash flow similar to the projections of Baltimore and Norfolk; they are roughly triple that of Boston. Expanding the port would have a direct and positive impact of the local and regional economy.

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