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WORLD MARITIME UNIVERSITY
Shanghai, China

**SURVIVAL OF THE FITTEST: THE PORT OF LOS
ANGELES**

By

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A research paper submitted to the World Maritime University in partial fulfillment of
the requirements for the award of the degree of

MASTER OF SCIENCE

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Abstract

The Port of Los Angeles (POLA) is the largest container port in the United States. It serves as the nation's main gateway to the western pacific trade routes. The POLA's significance can be traced back to the 14th century when Juan Rodriguez Cabrillo discovered the Bay of Smokes. This mudflat spotted by Cabrillo would soon become the destination for ships coming from Spain loaded with cargo for the religious missions established along the west coast on the US. As time passed, trade evolved, international economies became more integrated, and globalization flourished so did the POLA. Infrastructure development, technology upgrades, and state of the art facilities and equipment have always been a priority of the port. Keeping up-to-date with the shipping industry and being able to predict future trends in international trade has been the key to the success of the POLA.

Size wise the POLA has 7500 acres of land, 43 miles of waterfront property, and 26 cargo berths that handle all types of cargo including break bulk, Ro-Ro, and containers among others. With a depth of 53 feet the port is capable of handling the largest vessels in the current world fleet. One of the port's proudest achievements is its own police force dedicated to the security of the POLA. It consists of a 300 police staff that provides 24/7 monitoring of the facilities, something that has landed the port among the safest in the world. The Los Angeles Board of Harbor Commissioners does the management and oversight of the port's activities ever since the board's establishment in 1907. To stay current with advances in technology and infrastructure as well as with increases in volumes the POLA needs to invest money. Examples of these investments are the \$127 million project to update one of its main container terminals.

Key Performance Indicators serve to assess the success of the activities undertaken by an organization as well as to bring forth facts that can help point out areas of interest going forward. The KPIs of a five-year span for the POLA certainly prove success; they also show that the strongest trading partner of the US is China. The trading relations between these two nations have been on the rise since they resumed dealings in the

1970s, mutually benefiting in the process. On the one hand China's middle class growth has proven quite beneficial for the US exporter, as they have seen an increase in demand for their products. On the other hand Chinese low cost products have had a positive impact on the American consumer who is now able to afford more. As the trading between the two countries grows and their economies become more integrated so do the political tensions. Experts advocate for both an increase and a decrease in trade with China. Whatever the case the POLA will be paying attention as this represents a big chunk of its business.

Port operations will have a direct impact on the port's business since how well they manage the cargo volumes they receive will ultimately determine how desirable they are as a destination. Operations are often challenged by physical constraints such as land limitations that make ports treat the issue of increase in volumes through infrastructure restructuring for faster and more efficient operations. The POLA is extremely efficient at dealing with high volumes of cargo with constant improvement of its facilities.

By performing a SWOT analysis on the POLA a better perspective is gained of where the port stands and how it should move forward. An evaluation of its strengths, weaknesses, opportunities, and threats highlight the most important aspects to have in mind when formulating a set of strategies to be implemented in the short and long run. These strategies will help the POLA ultimately prevail against its competitors and remain number 1 in the US. The main objective of the initiatives the port will undertake is to focus on the port's strengths such as its infrastructure, technology, and solid workforce to take advantage of the opportunities presented to them with the US – China trade routes for example. If the POLA manages to accentuate its strengths and take advantage of the opportunities in front of them then the port will have no problem facing the threats of the Panama Canal expansion and the improvements of east coast ports to name a few.

The POLA is without a doubt the busiest and most important container port in the United States. Its position at the top has been the result of hard never-ending efforts to strive for excellence. The reward is a growing demand for its services and its world leading position in terms of efficiency and security. There is no doubt the port does face important challenges in the near future, challenges that are new and more threatening than ever before, but by staying true to its history, concentrating on smooth operations, and putting in place the right plan of strategies the POLA will remain at the top.

1. Introduction

Globalization has changed the world forever. International integration as a result of innovations in transportation and communications infrastructure has modified the way we live our lives. Innovations like the Internet, for example, have turned the world into a small and simple market where anything from anywhere is available to anyone. People in Japan can eat chocolate from Belgium that was made with cacao from Venezuela. Millions of people around the world use American designed Apple iPhones manufactured in China. To put it bluntly there are no geographical boundaries when it comes to consumer products. But how do these chocolates and iPhones reach the final consumer from their place of production? The answer is international shipping. International sea transportation accounts for more than 90% of the preferred method of travel for consumer goods around the world. This is quite simply what makes globalization a reality. Of course international shipping is only one aspect of the journey these wide variety of goods undertake in route to their final destination. The gateways into the countries where they will be distributed and ultimately consumed are the ports. It is at the ports where goods, often in the form of containers, are transferred from ship to land. Ports play a crucial role in the logistics chain. Operations for loading/unloading vessels, facilities and equipment, connections to the hinterland are all of the utmost importance in making sure there is a smooth transition from origin to destination and in the United States no port is better at this than the Port of Los Angeles (POLA).

Since the discovery of the Bay of Smokes by Juan Rodriguez Cabrillo in the 14th century the harbor we now call the POLA has played a central role in the history of international trade of the United States. In 1868 Phineas Banning, a businessman of the region, built the first railroad facility to take cargo from the Bay to the city of Los Angeles. In 1885 the port reached the 500,000 tons mark, by the 1920s it had become the west coast's primary port, and in 1959 it received the first shipment of containers marking the beginning of the containerization era at the POLA. Today, the port is the

single most important point of entrance for cargo in the United States. It handles more than 150 million metric tons of cargo per year, it moves more than 7 million TEUs annually, and it generates annual revenues of more than \$400 million, statistics that make it the largest port in the country.

This paper will take a look at all the aspects that make the POLA so important to international trade in the US and why it is the preferred entry point to the country. It is not possible to understand the present without studying the past; therefore, the paper will start with the history of the port. It will give an overview of the port's development from a soft and shallow mudflat to the United States' primary entryway. The developments and improvements to its infrastructure through the years and the key investments that have helped it become the largest port in the country and remain in that position for years will be studied. The paper will also take a look into the Key Performance Indicators of the POLA for a five-year span that will help highlight the port's solidity and good performance as well as pointing out interesting facts and trends. One of the key points the paper will develop further is the US – China trade. The economic ties between these two countries has grown significantly over these past decades and is one of the most notorious in the world. Important points and trends in the integration of the two economies will be explained and their effect on the port's business will also be looked at. A closer look into the POLA's operations will help provide insight as to how the port manages to handle the high volumes of cargo that come through every year in an efficient manner, providing a description of the port's facilities and equipment. Most importantly a SWOT analysis will be performed to study the port's strengths, weaknesses, opportunities, and threats. How the POLA moves forward will determine how strong its position will remain in the future. The SWOT analysis will provide areas the port needs to address and therefore create strategies around them to face the competition threatening its business. Of all the competition surrounding the POLA none poses a bigger risk than the expansion of the Panama Canal, a project that will most likely take some cargo away from the port but that with

the right improvements and new policies the port can fight to come out on top. The POLA's fight to remain the number 1 port in the United States is without a doubt a clear example of survival of the fittest.

1.1 Research Background and Significance

The United States is currently one of the biggest trading nations in the world. The sum of its exports and imports amount for more than \$3.5 trillions per year and it continues to grow. As Asia's importance in the global market rose through the 1990's the US' trading relationship with the region grew, especially with China, the country's number 1 trading partner. As trading between the US and Asian countries evolved the Pacific Rim trade route also evolved, growing into one the busiest in the world. Because of its geographical location the Port of Los Angeles was the logical choice as principal destination for the goods arriving from the Far East. As time passed the POLA improved its craft, projects to make the port adept to handle the growing volumes of containerized cargo as well as the growing size of vessels calling at the port were quickly put in place. The port's productivity grew and as time passed the experience and skills needed to work in a industry as dynamic as international shipping also grew to the point where the POLA is the US' largest container port. How the port was able to evolve with time, how it adapted in terms of infrastructure and technology its crucial to the country as its main entryway for incoming cargoes. Looking into the future the threats to its operations are significant so understanding and studying a plan of action to deal with these threats is of paramount importance.

1.2 Literature Review

This research project is focused on providing a single comprehensive study of one of the most important seaports in the United States of America, the Port of Los Angeles. Ocean transport plays a key role in supplying the world's biggest economy with many of its consumer products and the Port of Los Angeles alone handles approximately 40 percent of all the volume.

Since its very beginning the port has been an example of evolution and innovation, growing and improving through time. By conducting research it is hard to find a single academic source that encompasses all aspects of this port's great strive for economic, technological, and strategic supremacy and how since its birth it has managed to stay relevant in an ever-changing maritime industry. In studying the port's early history, its management of the introduction of containers in the shipping industry, the economics of the port, its investment in infrastructure, the challenges it currently faces, and its plans for the future this project aims at providing an academic paper that analyzes all of its components.

For the background and early history of the Port of Los Angeles its official website provides useful in-depth information, presentations, and official studies conducted at different stages in the ports development. The port's website also serves as the main official source for its communications, news, performance data, future projects and decision making processes.

The "Performance Measure Evaluation of Port Truck Trip Reduction Strategies" written by Michael Fisher, Gill Hicks, and Kerry Cartwright gives a good prospect of the strategies put in place to improve infrastructure and operations on the landside logistics. Some of the strategies taken into account are extended gate hours, virtual container yards, and expanded on-dock rail facilities. This will help illustrate how the port is continuing to improve its infrastructure to maintain a good level of competition.

In Hanh Dam Le Griffin study of Assessing Container Terminal Productivity the issue of limited land supply in the case of ports like the Port of Los Angeles is addressed as a challenge to be overcome. Meaning that to increase productivity simply making the port bigger is not the ideal or logical solution. Therefore the port has to work within its physical constraints to improve handling capacity with its existing facilities.

The Industrial, Economic, and Administrative (IEA) Survey Report prepared by Thompson, Cobb, Bazilio and Associates is a three-part survey consisting of risk assessment, targeted review, and reporting. The findings of this report show that the

Port of Los Angeles will face increased competition and pressure in the upcoming years including the opening of the new Panama Canal. It also shows that the marketing strategy needed has to have this increase in competition in mind along with the ever-changing needs of its customers. The report also says that one of the main strengths of port is its workforce as it is the case with any enterprise, without a skillful workforce the port could not reach its goals. Finally, the survey also put emphasis on the importance of financial reporting.

Wayne Morrison from Cornell University has a paper on China – US Trade Issues that is very good at describing the trading relationship between these two countries. It also deals with the trends in their economic links, their trade issues, and some of the legislation passed to regulate it. Almost all experts have differing views on how the US should deal with China, from very loose and liberal approaches to a more strict almost antagonistic dealing with the PRC.

Michael Martin, an Asian affairs specialist, wrote a paper examining the differences in the trade data between China and the US using two different approaches. The first one focuses on the Harmonized System to differentiate between any inconsistencies that may provide a pattern in US – China trade data. The second approach looks at literature written about the difference in trade data.

By taking a good look at the port's KPIs it is easy to see the performance levels over a time span. This helps to determine whether the port has put in place the right strategies and if they produced the desired results. The KPI report produced by a Port of Los Angeles study reveals the evolution of the port through five years and helps to make comparisons of the port's results as well as revealing certain facts about the trade tendencies of cargos going through the port.

Moreover, Hsien-Yang Yeh, Hen-Geu Yeh, and Panchali Choudhury conducted an analysis titled Loading and Unloading Containers: Examining the Efficiency of Goods Movements. This study provides good insight at the loading and unloading operations of the port, looking at its current technology and equipment such as quayside cranes.

The statistical data given brings up areas for improvement and measures that can be taken to enhance productivity can be suggested.

In "Port Dynamic Empty Container Reuse" by Hossein Jula, Anastasios Chassiakos, and Petros Ioannou a new vision of enhanced productivity is looked at by an innovative way of reusing empty containers. With the implementation of simulation models we can see how the Port of Los Angeles can cut costs and reduce congestion by better reuse of empty containers.

One of the problems many seaports around the world are facing is the negative impact their operations have on the environment. The Port of Los Angeles must also deal with ways to reduce this negative impact. Bill Siuru writes an article outlining one measure taken into consideration by the port. The integration of LNG trucks for container transportation will look to reduce diesel emission by about 50 percent and nitrogen emission by 45 percent in the next five years. This is part of the Clean Action Air Plan.

Hence, Sam Bennett of the Los Angeles Business Journal talks about another plan to relieve much of the congestion caused by trucks taking containers to and from the port. He reports about David Alba, a former supervisor at the Port of Long Beach, and his plan to use electric trains to carry the containers from the dock to a convenient location where they could be then distributed into freight trains or trucks. We can see how the Port of Los Angeles keeps looking at ways to stay competitive and doing so by going green.

Using newspaper articles from sources like the Huffington Post and the Los Angeles Times help us get a look into real world issues affecting the port and the people working in it and living around it. We can see how the decisions made by the port officials affect the citizens of the city and how the decisions made by the workers of the port can affect an entire economy.

In conclusion, these sources provide good and reliable information that helps prove the point that the Port of Los Angeles is in fact a world leader. The sources will help

develop analysis models and background information into the study of the evolution on the port.

1.3 Research Content and Methodology

The main process of analysis used in this paper will be the SWOT Analysis method. But first, information and data will be collected that will help highlight the importance of the POLA. First, information about the history of the port will be searched. This information will help explain and make clear how the POLA became the key entryway into the United States. This part of the research process will also help in finding information about the investments made by the port's authority to improve the facilities and infrastructure in order to accommodate the growing cargo volumes. A key research area will be the US – China trade which will help prove further how important is that the POLA stays competitive and up-to-date so that it can keep playing a main role in this vital trading relationship. Researching Key Performance Indicators will help shed light on important data such as container volumes and main imports and exports. Finally the SWOT analysis will help lay out in clarity the strengths, weaknesses, opportunities, and threats facing the port. This part of the paper will prove to be the most important as the plan of action of the POLA to move forward will be based largely on the factors discovered in this section. All this shall prove the POLA is adept to facing the coming competition and will keep its position as the US number 1 port.

2. History and Current Situation

2.1 Background

The official documentation of the harbor came by Portuguese explorer Juan Rodriguez Cabrillo on October 8, 1542. In that year, he came across a marshland at the northwest end of the San Pedro Bay. During his first expedition of the area, he notice smoke that rose from a close cliff of Native American hunters, it is then that he names it Bahia de Los Fumas or “Bay of Smokes”. The vast area remained fairly desolated, until 1769 when the Spanish monarchy wanted to colonize the U.S. West Coast. It is then, that commercial endeavors started in San Pedro around the mid-1800s. The rest, as they say, is history (The Port of Los Angeles | History).

As the Spanish monarchy spotted the harbor, they were the first ones to use it as a trade zone. Moreover, Spanish missionary monks, had ships arrived from Spain with supplies for the San Gabriel Arcangel Mission. As for other ships, the American landed the Lelia Byrd ship in 1805 and was the first non-Spanish ship to do so. At this time however, it was illegal to do any business with any other country other than Spain, but due to the vast territory and lack of strong supervision, trade with other countries did succeed. A change of fate for Spain, had the Mexicans take over the territory in 1822, establishing an autonomous government and lifting the ban of trade with other countries. Before and during the Mexican takeover, a significant migration had occurred, with the commercial activity in the area growing tremendously. When California finally joined the Union in 1848, business in San Pedro harbor was booming (The Port of Los Angeles | History).

Phineas Banning is a name that will forever be linked to the Port of Los Angeles. After California became a part of the Union and business started to prosper in the region a number of important politicians and businessmen became key figures in its evolution into the biggest cargo entryway into the United States. His business mind was essential in setting up the port for its success in the future and eventually leading to Banning being known as the Father of Los Angeles Harbor. Another person also mentioned in

the same breath as Banning was California Senator Stephen White, who in 1897 was responsible for making the US Congress declare the San Pedro bay as the official port of Los Angeles, despite severe opposition from other politicians and businesses.

During the 20th century, the city of Los Angeles as well as the Harbor experienced exponential growth. This is why, in December 9, 1907, the city's leadership created the Board of Harbor Commissioners, which marked the official founding of the Port of Los Angeles. And in 1909, San Pedro and Wilmington were included as part of the City of Los Angeles.

The beginning of the 1900s saw the birth of many different industries around the port area that created a significant number of jobs for the growing population of those days. Fishing, oil drilling, shipbuilding, and canneries are an example of the most popular commercial activities at the time. This increase in commerce and population made it a priority for city officials to pay special attention to the development and growth of the port.

By 1912, the dredging and widening of the main waterway allowed larger vessels to call at the port. There was no better evidence of how beneficial this process was than when the Panama Canal opened in 1914. The Port of Los Angeles was perfectly positioned for international trade coming from the east through the Canal as a point loading and unloading due to its proximity to the Canal. Cities further north lost business to the Port of Los Angeles because of this.

World War II had its impact on the entire world and the Port of Los Angeles was not an exception. The US government asked that the port to assist only in wartime efforts and it did so with the upmost diligence. Shipbuilding was at the front of the activities being carried out at the port. Boat repair companies and shipbuilders all helped in the conversion, repair, and construction of vessels for the war. The efforts in San Pedro bay proved not only beneficial for the wartime efforts as shipyards built war ships in the thousands but also to the community as this generated over 80,000 jobs. When the war

was finally over business returned to usual with the focus once again in the growth and development of the port into the future.

Up until the mid 1950s the cargo that came into the port was in the form of pallets, crates, and parcels varying in sizes and shapes. This lack of standardization made the operations at the quay very complicated. Loading and unloading a ship took a very long time and the incidents of cargo being damaged were quite numerous. At last in the late part of the 1950s standardization came into the shipping world with the introduction of the container. Containers could be easily handled; loading and unloading times were reduced significantly. The safety of moving containers between ships, railcars, and trucks also did away with most of the damage done to cargo before. Nowadays over 90% of the world's manufactured goods are transported in containers, there is no doubt it is one of the most important innovations in logistics history.

The Port of Los Angeles is the biggest and most important port in the United States. The Port prides itself of having ultra-modern terminal efficiency and technology, robust intermodal assets and its world-class security operations, which constitute of both Homeland Security operation and the nation's largest port police force. The Port, is also an important and valuable environmental leader in the industry. Furthermore, in 2006, the Los Angeles Port in conjunction with the Long Beach and San Pedro Ports, created the San Pedro Bay Ports Clean Air Action Plan. The initiative, aims at reducing emissions from port related activities by 50% over a five-year timeframe. Additionally, the Port also has invested in a state-of-the-art waterfront for the San Pedro and Wilmington communities along with donating thousands of dollars each year to local community programs. As for job creation, the Port generates 919,000 regional jobs and \$39.1 billion in wages and tax revenues a year. Hence, the Port is self-supporting and does not receive any U.S. taxpayer money. The Port of Los Angeles prides itself for placing high priority on responsible and sustainable growth initiatives, high security, environmental leadership and community outreach. The Port celebrated its centennial

on December 9, 2007 marking the 100th anniversary of the founding of the Los Angeles Board of Harbor Commissioners (The Port of Los Angeles | History).

2.2 Infrastructure

The Port of Los Angeles which is located in San Pedro Bay just 20 miles south of downtown Los Angeles is known to be the backbone of Southern California's international commerce. This seaport is known for its competitive edge with cargo operations, security measures and safety measures. This Port is often referred as Los Angeles Harbor Department. The Port covers 7500 acres of land, 43 miles of waterfront and boasts of 26 cargo terminals, including dry and liquid bulk, container, break bulk, automobile and Omni facilities. Combined, these terminals handle more than 162 million metric revenue tons of cargo annually. The Port of LA, founded in the year 1907, has been ranked as the busiest container port in The United States, the 8th busiest container port in the world and the 5th busiest container complex in the world when combined with the neighboring Port of Long Beach. The following two tables list the cranes and the related technical details used at the Port of LA. The port has two kinds of cranes, the customer owned cranes and the Los Angeles Port owned cranes. Table A shows the port of LA owned container cranes and Table B shows the customer owned cranes with technical data.

Table 2.1 Port of LA Owned Container Cranes (Hsieng-Yang, Hen-Geul, Panchali)

Terminal	Manufacturer	Lift Height (ft.)	Back Reach (ft.)	Rail Gauge (ft.)	Set Back (ft.)	Out Reach (ft.)	Inside Spacing (ft.)	Trolley Speed (length/min)	Hoist (HP)	Ship service Capability
209-18	Hitachi	85	50	50	7.3	112.9	55	500	250	13
209-19	Hitachi	85	50	50	7.3	112.9	55	500	250	13
209-13	Paceco	80	50	50	8.6	111.6	50	500	200	13
209-12	Paceco	100	50	50	8.6	111.6	50	500	200	13
209-14	Hitachi	85	50	50	7.3	112.9	55	500	250	13
209-15	Hitachi	85	50	50	7.3	112.9	55	500	250	13
209-16	Hitachi	85	50	50	9.6	110.6	55	500	250	13
209-08	Paceco	78	40	50	7.3	112.9	46	500	250	13
209-34	Paceco	80	40	50	7.3	112.9	46	400	250	13
209-11	ISI	80	40	50	8.6	111.9	50	400	250	13
209-08	ISI	80	40	50	7.3	112.9	50	500	500	13
209-10	ISI	80	40	50	7.3	112.9	50	500	500	13
209-35	Mitsui	90	60	34	8.0	112	55	None	None	13

Table 2.2: Customer owned container cranes (Hsien-Yang et al.)

Terminal	Manufacturer	Lift Height (Ft.)	Back Reach (Ft.)	Rail Gauge (Ft.)	Set Back (Ft.)	Out Reach (Ft.)	Inside Spacing (Ft.)	Electric Power (KV)	Ship Service Capability
Hitachi	Paceco-itsu	100	35	100	7.25	127.75	65	4.16 Bus Bar	13
Trapac	Paceco-itsu	110	35	100	7.25	170.6	65	4.16 Bus Bar	18
Trapac	Paceco-itsu	110	35	100	7.25	165	46.25	4.16 Bus Bar	19
Trapac	Mitsubishi	105	50	100	7.25	137.75	60	4.16 Bus Bar	16
NYK	Mitsubishi	114.5	50	100	7.25	135	55	4.16 Bus Bar	18
NYK	Noell	110	50	100	20.67	160	60	4.16 Cable	19
Maersk	ZPMC	130	74.75	100	20.67	189.3	60	4.16 Bus Bar	22
China Shipping	ZPMC	120	74.75	100	7.75	190	60	4.16 Cable Reel	22

As for the Port's dimensions and capacity: it covers 4,300 acres of land and 3,200 acres of water with a waterfront of 69km. The Port can accommodate the largest container ships in the world with a water depth of 53ft. The automobile terminal (berths 195-199) has a total land area of 85 acres and total berth length of 2,250ft. Alongside depths range from 32ft to 34ft. Berth 100 (west basin container terminal) covers 75 acres. Total berth length is 1,200ft and water depth ranges between 45 to 53ft. The west basin container terminal at berths 121 to 131 occupies 186 acres of land. Total berth length is 3,500ft and alongside depths vary from 35 to 45ft. Total land area of container terminal at berths 135 through 139 is 173 acres. A total berth length of 4,050ft and alongside depths 35ft to 53ft. Berths 206 through 209 are designated as the Port of Los Angeles container terminal. It has a total land area of 86 acres. The total land area of the yusen terminal (berths 212-225) is 185 acres. Its total berth length is 5,800ft and alongside depths 35 to 45ft. The total land area of APL terminal / global gateway south is 292 acres, APM terminals / pier 400 is 484 acres and California united terminals is 91 acres. The World Cruise Center passenger terminal has a total land area of 18 acres, total berth length of 2,850ft and water depth of 37ft. The length of the concourse is 1,102ft and width of the navigational channel is 1,000ft (Hsieng-Yang et al.).

The Los Angeles Port facilities comprise over 7,500 acres of land. The Port consists of: an automobile terminal, two break bulk cargo terminals, nine container terminals, two dry bulk terminals, seven liquid bulk terminals and two passenger terminals (Hsieng-Yang et al.). The West Basin Container Terminal possesses top handlers, side handlers, trans trainers, forklifts and an on-dock rail facility. Moreover, the Trans-Pacific Container Terminal features a 28,000ft² maintenance shop, 546 reefer plugs, 48 grounded plugs, three portable generators, four top-lifts, ten trans trainers, 12 side-handlers and wash system for exterior as well as interior of containers. Lastly, the Yusen Terminal includes a 21,937ft² administration / in-gate building, 23,386ft² maintenance and repair building, and 4,798ft² marine building. California united terminals, APM terminals, APL terminal / global gateway south and seaside terminal

are the other terminals. An important asset of the Port is that all of its container terminals have implemented with Panamax and post-Panamax cranes (Hsieng-Yang et al.).

The Port of Los Angeles is administered and operated by the Los Angeles Board of Harbor Commissioners, since its establishment in 1907. The five-member Board is appointed by the Mayor of the city and overlooked by the City of Los Angeles Council. Moreover, different companies manage the terminals within the Port. The West Basin Container Terminal LLC operates the West Basin Container Terminal. As for the container terminal at berths 135 through 139 are operated by the Transpacific Container Service Corporation (TraPac). The Seaside Terminal at, berths 226 through 236, are operated by Seaside Transportation Services. APL Terminals operates Global Gateway South Terminal; Pier 400 is operated by APM Terminals. Some of the other operators of the port facilities include: Stevedoring Services of America, Pasha Group, Kinder Morgan, ConocoPhillips, Nustar Energy, ExxonMobil and Shell (Hsieng-Yang et al.).

The Port of Los Angeles is praised as one of the safest seaport in the world. It relies on a 300-member Port Police force, which ensures security by monitoring waterfront and land-based facilities with a 24-hour, 7 days week threat detection, prevention and incident management systems (Hsieng et al.).



Port of Los Angeles Terminal Map (Port of Los Angeles Terminal Facilities Map 2013)

2.3 Investments and Improvements

The Port of Los Angeles has remained as the most important port in the United States for many reasons, one of them being the investments constantly being made to make sure its infrastructure remains current with the changes in the industry. At the 105th annual meeting of the NTIL in November of last year held in Anaheim the Port announced even more infrastructure upgrades. The Los Angeles Board of Harbor Commissioners has approved construction contracts totaling more than \$127 million for two major projects that advance modernization of the marine container terminal operated by longtime tenant, TraPac, Inc.

Moreover, the renovation projects have started in January of 2013, and they are important because they represent the Port's overall capital improvement program. Hence, the Port is investing an overall of \$1.2 billion in a span of five years in order to maintain its competitiveness globally (Burnson, 2012).

The contract for new buildings and state-of-the-art truck entrance and exit gates at TraPac's rear Berths 136-139, constitute the first contract awarded to Costa Mesa based S.J. Amoroso Construction Co., Inc. and it reaches the \$71.5 millions mark. This project includes a new administration building, which is designed to meet the criteria of the U.S. Green Building Council's Leadership in Energy and Environmental Design Gold standard. Moreover, it also includes a new yard operations building, truck scales and a pedestrian bridge. The project also includes infrastructure improvement to Berths 145-147. The projects, which are due to be completed by mid-2015 will generate around 540 one-year equivalent construction jobs (Burnson, 2012).

The second contract totals \$55.7 and it was granted to Sacramento based, MCM Construction, Inc. The project entails a grade separation; the South Wilmington Grade Separation includes building an elevated 4,100-foot roadway that will connect Harry Bridges Boulevard, Pier A Street and Fries Avenue to TraPac's new entrance, being

build in the first project approved and which separates truck from rail which will generate more efficient and safer traffic. Furthermore, these projects constitute a total of \$365 million expansion of the TracPac terminal, which will be completed in 2016. The deal was signed in 2009, between the Port, TraPac and Mitsui O.S.K. Lines, Ltd. (MOL), it established a 30-year lease that have secured the way to constant modernization that will raise the port productivity, green initiatives and a great boost to the local economy with generation of thousands of jobs (Burnson, 2012).

3. Economics

3.1 Key Performance Indicators

When you take a look at the POLA it is easy to notice that the port is a world leader when it comes to the global maritime industry. The POLA's endless efforts to build and maintain facilities with the latest advances and technologies with a vision towards future growth in volume alongside California's unparalleled networks of inland distribution as well as vast array of logistical assets makes the port shine above the rest. The economic impact the port has on the region is undeniable. The regional economy is among the county's strongest and with over one million jobs for local residents ranging from dock duties to all other industry related areas the port enjoys of strong support from its community.

The POLA assets and qualities speak for themselves. The port spends about one million dollars per day in development plans. The port takes advantage of more than 640 hectares of container terminal hinterland to carry out the operations of its fifty plus terminals employing about seventy gantry cranes. With a depth of 53 feet the port can accommodate the world's largest vessels and with over 110 miles of rail facilities onsite that use 100 trains per day along with about 170,000 hectares of warehousing facilities in and around the port handling the great volume of cargo that goes through the port is not a problem. To prove the POLA's solidity the port created a report with a five-year comparison of Key Performance Indicators. Below are some of the most relevant ones:

* All tables in this section are from “The Port of Los Angeles: Key Performance Indicators”

Table 3.1: Annual Gross Revenue

Year	2005	2006	2007	2008	2009
Totals (\$ millions)	369	412	423	426	402
% Change		11.7%	2.6%	0.9%	-5.7%

Table 3.2: Total Annual Tonnage

Year	2005	2006	2007	2008	2009
Import	39,639,547	42,180,600	38,230,670	38,047,358	28,885,478
Export	13,170,630	14,609,433	15,279,021	12,291,392	12,714,751
Total	52,810,177	56,790,033	53,509,690	50,338,750	41,600,229
% Change		7.5%	-5.8%	-5.9%	-17.4%

Table 3.3: Annual TEUs Total

Year	2005	2006	2007	2008	2009
Totals	7,484,624	8,469,853	8,355,038	7,849,985	6,748,995
% Change		13.20%	-1.40%	-6.00%	-14.00%

Table 3.4: Total Ship Calls

Vessel type	2005	2006	2007	2008	2009
Container	1508	1651	1601	1472	1472
Tanker	386	420	374	219	220
Passenger	272	263	256	265	162
General Cargo	131	100	103	82	73
Dry Bulk	152	221	132	99	79
Roll-On-Roll-Off ships	71	72	70	78	59
Total	2520	2727	2536	2215	2065

Table 3.5: Value of Trade by Region

Region	Cargo Value*	% of Total Trade
Asia	\$180,730	92.4%
Europe	\$6,090	3.1%
Latin	\$4,945	2.5%
Africa	\$588	0.3%
Other Areas	\$3,313	1.7%
Total	\$195,666	100.0%

Table 3.6: Value of Imports by Country

Rank	Region	Cargo Value*	% of Total Trade
1	China	\$92,482	55%
2	Japan	\$22,290	13%
3	Taiwan	\$7,366	4%
4	Korea, South	\$5,710	3%
5	Thailand	\$5,202	3%
6	Vietnam	\$5,074	3%
7	Indonesia	\$4,530	3%
8	Malaysia	\$4,227	3%
9	Phillipines	\$1,786	1%
10	India	\$1,536	1%
11	Others	\$17,450	10%
	Grand Total <i>(All countries)</i>	\$167,653	100%

Table 3.7: Top 10 Import Commodities

Rank	Commodities	TEUs
1	Furniture	370,867
2	Apparel	338,042
3	Auto Parts	246,966
4	Electronic Products	214,713
5	Footwear	139,126
6	Toys And Sporting Goods	128,213
7	Computers And Peripherals	116,191
8	General Cargo	107,334
9	Houshold Appliances	102,217
10	Plastic Products	89,858

Table 3.8: Value of Exports by Country

Rank	Region	Cargo Value*	% of Total Trade
1	China	\$7,775	28%
2	Japan	\$4,703	17%
3	Singapore	\$2,051	7%
4	Korea, South	\$1,948	7%
5	Taiwan	\$1,888	7%
6	Australia	\$1,447	5%
7	Hong Kong	\$1,378	5%
8	Thailand	\$994	4%
9	Indonesia	\$737	3%
10	Malaysia	\$667	2%
11	Others	\$4,424	16%
	Grand Total <i>(All countries)</i>	\$28,012	100%

Table 3.9: Top 10 Exports Commodities

Rank	Commodities	TEUs
1	Paper & Paperboard, Incl Waste Paper	279,867
2	Mixed Metal Scrap	166,497
3	Resins	93,242
4	Grains	89,154
5	Cotton	85,559
6	Animal Feed	78,277
7	Foam Waste & Scrap	55,924
8	Soybean & Products	50,519
9	Automobiles	34,756
10	General Cargo	31,290

3.2 US – China Trade

The Key Performance Indicators we saw on the section above not only serve the purpose of demonstrating the POLA solidity and good performance but they also show an interesting fact: China is without a doubt the United States strongest trading partner. When China and the US restarted trade relationships in the beginning of the 1970s American investment in Mainland China grew rapidly. Industries such as manufacturing, hotels and resorts, restaurants, and petrochemicals are the ones where most of the investments are focused in. To date there are around 20 thousand ventures, with different legal structures, between American companies and Mainland China. The relationship goes deeper with about 100 American companies establishing a physical presence within China and total investments of over \$45 billion. It is no secret that this is one of the most important trade relationships in the world. Both countries benefitting a great deal from it, China is now the third biggest importer of American finished goods while US investments in China are at an all time high. However, the trade imbalance on the US side is quite visible rising from \$10 billion in the beginning of the 1990s to about \$270 billion in 2010. That imbalance with China was the largest the US had that year, including the combination of imbalances with groups like OPEC and of all 27 European Union countries together. The fast evolution of the trading connection between both countries has like it was mentioned before benefited both parties but the complexity of the relationship has grown substantially.

China's population is growing and so is its purchasing power; this has made China a very attractive market for American exports. This has been true for the past ten years where American exports have seen an increase in demand unrivaled by that of any other nation. For example in the year 2010 Chinese imports of American goods totaled \$90 billion approximately, that represents an increase of about 30% from the previous year. This trend is also visible when you compare American exports to China with total American exports, while in the year 2000 China represented around 2% of total exports it now represents about 7% of total exports. According to experts China's demand for

American goods could even continue to grow exponentially over the upcoming years as the country continues to be listed as one of the fastest growing economies, a growth that seems to be showing no signs of slowing down. One contributing factor to demand increase for American goods and services is the fact that China has the desire to improve its local industries and infrastructure and bring modernization to its rural sector. China's potential is unmatched by any other country as highlighted by a report from the Boston Consulting Group where it is stated that in China there are about 148 million middle class consumers, a number that is expected to grow to 415 million by the year 2020, that would make China's middle class consumers more than the entire US populations (Morrison, 2011).

On the other hand the low cost products made in China and imported to the US have been of great help to the American consumer who has seen its own purchasing power go up. Chinese imports rose over 20% in comparison to the previous year in 2010, and when compared to total imports the growth is much more significant. In the year 2000 Chinese goods accounted for approximately 8% of imports into the US and now they represent almost 20% of total imports. American companies using China as the country of production and/or supplier of manufacturing parts for their local production in the US benefit from lower production costs that allows them compete more efficiently at a global scale by having lower prices. Yet the complexity grows even more.

China's purchases of U.S. Treasury securities (which stood at nearly \$1.2 trillion at the end of 2010) help keep U.S. interest rates relatively low. On the other hand, many analysts argue that growing economic ties with China have exposed U.S. manufacturing firms to greater, and what is often perceived to be "unfair" competition from low-cost Chinese firms. They argue that this has induced many U.S. production facilities to relocate to China, resulting in the loss of thousands of U.S. manufacturing jobs. Some policymakers have also raised concerns that China's large holdings of U.S. government debt may give it leverage over the United States (Morrison, 2011). As these two economies grow ever more interconnected the benefits to both countries will continue to

grow as well, however, tensions have also emerged in recent years. American analysts claim that some of China's trade and economic policies have a negative impact of US interests in China. One of these policies is China's currency policy. Unlike most nations with an advanced economy like the one China has they do not allow their currency, the Renminbi (RMB), to float freely in the market. For example, starting in 1995 the RMB was fixed to the dollar at an exchange rate of about 8.20 RMB per USD. This stood for approximately 10 years when the Chinese reassessed their strategy, and in 2005 they formed a pool of a number of strong foreign currencies, including the US dollar, and allowed their RMB to float according to this controlled pool. The resulting exchange rate was about 6.80 RMB per USD. Critics claim that this sort of manipulation acts as an aid from the government towards Chinese companies as it keeps their products considerably cheaper than those manufactured in the US, which in turn makes US companies look to China for less costly production costs in order to keep up with the competition coming out of that region.

US – China trade will continue for years to come and as it has grown continuously in the past it will continue to grow even more in the future. As both countries and its economies evolve so will the nature of their dealings but one thing is clear: whatever happens between these two powerful nations the POLA will be paying very close attention. As highlighted by the KPIs China provides a significant amount of cargo volume for the port so what happens in terms of politics and trade and economic policies/trends is of great relevance to POLA business. Also important to notice is the fact that US imports of Chinese goods are expected to increase and this means an increase in business as well so the POLA has to continue to provide its customers with excellent service and continue to evolve its infrastructure and technology to remain at the top.

4. Port Operations

From its beginning, the history and development of the prominent world ports have been driven by multiple factors. The geographic location and physical characteristics, along with its relation with urban areas and transportation systems has been key. However, even as these factors are still important, in a globalized world and versatile economy, other factors have become critical too. The dynamic processes, such as containerization, modern logistics (Le-Griffin, 2008), as well as the modernization of ports with up to-date technology in order to meet the increasing needs in the shipping industry, is also playing a role in the competitiveness at a world stage. Moreover, from a time span of around two decades, the world has seen a surge in trade relationships of all kinds, hence, the shipping industry has had to shift and adapt to the new dynamics and congested distribution channels. The shift and adaptabilities have to do with trade volume, in-transit inventory management and efficiency of cargo handling systems (Le-Griffin).

One of the challenges ports face continuously, is the necessity for physical expansion but with limited available land. The POLA faces this challenge. The challenge of physical expansion of the port concerns local authorities for its complications in regards to costs, urban areas and environmental issues. Currently, POLA has concentrated its efforts on improving existing infrastructure, expanding its container capacity and volume and productivity within the already existing land constraints. Regarding environmental issues, all the projects and developments are being done in conjunction with environmental regulatory authorities in the United States.

Hence, POLA operators and authorities face many on-going challenges, but the port characteristics and facilities along with commendable management have generated smooth port operations.

Before the analysis of productivity and capacities, a brief overview of the port facilities, characteristics and assets will be discussed. This analysis extends to many segments of

the Port; productivity indicators and challenge areas, port authorities and operators views and areas of improvement.

Parting from the most basic information, a container terminal is the transfer and storage of containers. For port operators, productivity is measured in the amount of time it takes for them to transfers containers from ship to shore to container yards (hereinafter CY). According to a Metrans Applied Research Project, on Container Productivity, the performance indicators commonly use to measure port's productivity are classified in two groups: Group 1 includes indices that measure terminal facility utilization; and Group 2 measures terminal operational performances. Most common indices used to measure annual average facility utilization include berth utilization—TEUs per meter (or foot) of container quays; crane utilization—TEUs per quayside container gantry crane, and terminal land utilization—TEUs per acre of terminal space. The reason to use these specific measures is because they serve as indicators of how well investment capital with respect to productivity is being used.

Moreover, the different aspects of container terminal productivity is influenced by an array of factors, but many of these, are controlled by the terminal operators (Le-Griffin, 2008). These factors include: labor productivity, capital investment and land use arrangements (Le-Griffin, 2008). The factors out of the control of terminal operators include: disruptions in other transportation systems, such as rail system, and trading and shipping patterns.

In the United States, POLA established itself as the busiest and most important port. In the world, it is also among the top 10 busiest ports. The capacity of POLA extends for both containerized and non-containerized cargo. But, from a PMA statistic in 2006, 76% of the cargo handled, came from containerized cargo. A Port Statistic of that same year, reports that around 78% of that cargo was inbound.

At POLA, most of the cargo being handled stays in the U.S. even though some makes it to Mexico and Canada. Hence, this is why POLA falls in the category of an origin-destination port and not like Hong Kong or Singapore that are the biggest transshipment

ports. For these type of ports, its productivity and operational analyzes is based on its capacity to handle cargo and its capacity to landside operation and physical infrastructure for cargo handling.

As stated before, handling of container productivity is directly related to how well transfers of a container terminal and all the procedures that follow. In regards to other ports in the U.S. POLA is performing within the same levels as the rest. However, POLA faces some challenges. Currently, it is performing under many of the international ports. However, one of the mains reasons is because ports handling higher transshipment containers have higher levels of productivity since the operations are simpler. Furthermore, POLA has different labor regulations than other international ports and this is one of the other reasons comparatively speaking, is under their numbers. At POLA, 3 to 4 cranes work at the same time, while in the international ports, are allowed to use up to 8 at the same time. Also, regarding productivity of the land utilization which is measured by TEUs/acre per year, POLA has fallen behind Asia and Europe, in part because Asian ports operate on a 24 hours, 7 days a week system. In regards to falling behind Europe and some Latin American countries, the issue has to do with having lack of flexibility in laws, operations and utilization of the CY.

For the analysis of capacity utilization, a port that has theirs at 75% to 85% is accepted. Those who rise above 85% to 100% undergo the risk of over utilizing and excessive congestion. For POLA, especially from the year 2005 onward, due to higher container volume worldwide, it experienced increased percentages in regards to its capacity utilization. Based on this, POLA has announced different expansion and development measures in order to more effectively deal with its cargo handling more effectively.

Moreover, terminal operators have also identified changes that have helped the operations of the port run more effectively. They identify expanding port operations, increasing utilization of dock rails, decreasing dwell times and fluid movement of containers (Le-Griffin, 2008) as successful measures. Moreover, POLA projects will not involve more land expansion, hence, it will operate under the same acreage and thus

it is crucially more important that port operations run ore efficiently. In order to do this, POLA will have to secure and improve its horizontal capacity, since this will maximize the processes of storage density and less storage times.

For the time being, increasing POLA’s acreage is not a practical or viable option. Moreover, to increase the functionality and productivity of the Port, certain projects have taken place and more are also being executed. In order to increase its productivity, POLA has to administered and execute more plans to expand cargo-handling capacity within the acreage. For the demand forecast that exists for the next decade or so, POLA has to raise significantly its productivity levels. Even though projects are constantly concentrating on different areas of improvement, there are some issues need to be surpassed. Some of these concerns, such as labor rules, allowed technologies usage and incremental costs of certain of regulatory agencies.

Broadly speaking, all the elements presented on Table 4.1 serve as indicators when analyzing productivity at a port. However, in order to produce a consistent, on-going and reliable analyzes of the terms of productivity in the port, its port operators and authorities would have to release number figures that they consider to be of their concern only. While developing this study, a continuous challenge was finding port and terminal performance data in order to analyze in detail productivity.

Table 4.1: Common Productivity Measures of Container Terminals (Le-Griffin, 2008)

Element of Terminal	Measure of Productivity	Measure
Crane	Crane Utilization Crane Productivity	TEUs/year per Crane Moves per Crane-Hour
Berth	Berth Utilization Service Time	Vessels/year per Berth Vessel Service Time (hrs.)
Yard	Land Utilization Storage Productivity	TEUs/year per Gross Acre TEUs/Storage Acre
Gate	Gate Througput Truck Turnaround Time	Containers/hour/lane Truck Time in Terminal
Gang	Labor Productivity	Number of Moves/man-hour

Moreover, when doing comparative studies between ports, it is important to take into

account that different productivity gaps mean different physical characteristics, laws and institutions along with different operational procedures. Hence, by doing a cross examination and taking into account just these performance measures is inaccurate and often leads efforts to be misplaced when better productivity wants to be achieved. The evaluation could also be misleading since it does not take into concern economic efficiency in the system. For example, when taking the land productivity indicator, which is the number of TEUs, handled per acre in the terminal, a lower figure is often misinterpreted as being a less productive port (Le-Griffin 2008). As for a fair interpretation of the figure, its analysis comes from the many aspects in the economics of the container port and terminal and the costs of its operations. Additionally, if we take the example of any given port that has a high land productivity percentage, it is deduced that the land is expensive but the labor is cheap.

Additionally, to use the TEUs/acre indicator better, it could be analyzed in terms of how any port could raise its accommodation capacity. Moreover, for any port, the industry has the average of 6,500 TEUs/acre which is a figure used for capacity available.

Hence, for example a port that performs at 3,500 TEUs/acre, is actually performing at nearly 50% below the industry. This is to say that when taking into account these figures, other elements should be taken into account for productivity such as labor costs and land. For studies cross-examining different ports, usually public available data is used. Such data includes, physical resources and characteristics, annual throughput demand. Specifics include for example: number of berths, terminal acreage and total length handling and volume handled in TEUs. Moreover, when using these figures in comparisons, different patterns of trade, cargo details and different vessel types and sizes is important since they characterized what type of specific port it is.

There are however, some important indicatives/data that are rarely publically available and lack consistency. Collection of performance measures such as moves per crane-hour and service time of a vessel vary among ports.

The physical characteristics of POLA as a container terminal are shown on table 4.2. Number of container berths, total terminal acreages, total quay length and number of quays cranes is all data from 2006. The two West Basin Container Terminals are count as one terminal. As for the existing container handling facilities POLA utilization level was compared with those of other US, Asian and European port in the same year.

Table 4.2: Physical Characteristics of POLA/POLB Terminals (Le-Griffin, 2008)

	Container Terminal	No. Container Berths	Total Terminal Acreage	Quay Length (ft)	No. Quay Cranes
POLB	Terminal 1	3	170	3600	10
	Terminal 2	2	57	1800	3
	Terminal 3	2	125	2100	5
	Terminal 4	3	105	2750	7
	Terminal 5	5	246	6379	19
	Terminal 6	5	256	5500	13
	Terminal 7	4	380	5000	14
		24	1339	27129	71
POLA	Terminal 8	5	257	5000	11
	Terminal 9	5	173	3050	11
	Terminal 10	5	185	5800	10
	Terminal 11	3	195	4700	8
	Terminal 12	4	292	4000	12
	Terminal 13	6	484	6500	14
			28	1586	29050

The result of the comparative summary in table 4.3 analyzes land utilization (based on TEUs/acre per year), quay productivity (based on TEUs/foot of berth per year) and quayside container crane productivity (based on TEUs/crane per year).

Table 4.3: Facility Utilization of Major US and International Container Ports (Le-Griffin, 2008)

Port	2006 Volume (‘000 TEUs)	Gross TEUs/Acre	TEUs/berth ft	TEUs/Crane
POLB	7,290	5,444	269	102,676
POLA	8,470	5,340	292	128,333
Vancouver	2,208	5,686	236	116,211
Seattle	1,987	3,950	176	79,480
Tacoma	2,067	4,210	229	89,870
Oakland	2,391	3,150	109	62,921
NYNJ	5,128	4,773	209	111,487
H.Road	2,046	2,092	185	81,840
Savannah	2,042	1,450	125	113,444
Charleston	1,987	5,030	203	94,619
Singapore	24,792	25,798	643	210,102
Shanghai	21,719	26,487	1052	212,931
TPT	4,700	15,825	398	174,074
Hamburg	8,862	6,623	292	121,397
Rotterdam	9,690	8,022	293	142,500
Mexico*	659	10,138	254	164,750
Panama*	2,366	9,389	247	102,870

Interestingly enough, POLA’s quay productivity is definitively higher than that of other American ports and competitively with European and Asian ports. However, in terms of average utilization of quayside container cranes, POLA’s position is lower than some other American ports and lags behind ports in Asia, Europe and the Americas as well.

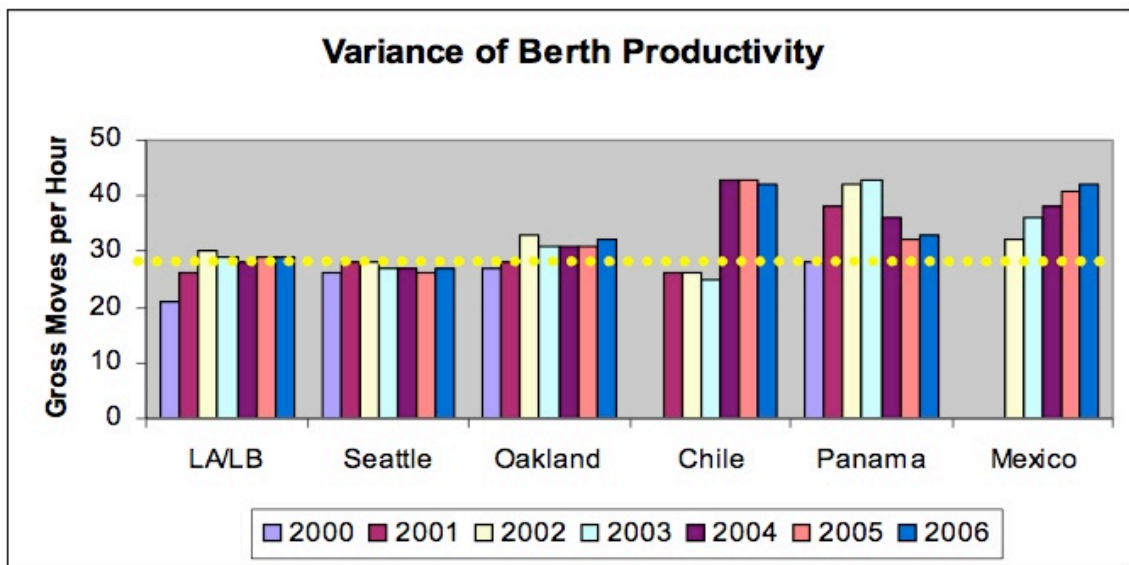
Nevertheless, recent investments in infrastructure have led to faster cranes, which now serve larger vessels. The importance of larger cranes is due to an increase use of larger containerships and higher demand to have these ships mobilized once at port, as quickly as smaller ships.

Moreover, productivity is maximized in those ports with deep-sea characteristics. Also, those ports that have a large percentage of transshipment volumes.

Additionally, the handling productivity figures in ports are directly associated with the transfers of a container, including the measure of berth productivity. Figure 4.1

demonstrates comparatively how the level of berth productivity, measured by the average gross moves per hour at different US and world ports. Within the United States, POLA performs well with around 28 moves an hour, but it underperforms compared to other international ports.

Figure 4.1: Berth Productivity (Moves/Hour) (Le-Griffin, 2008)

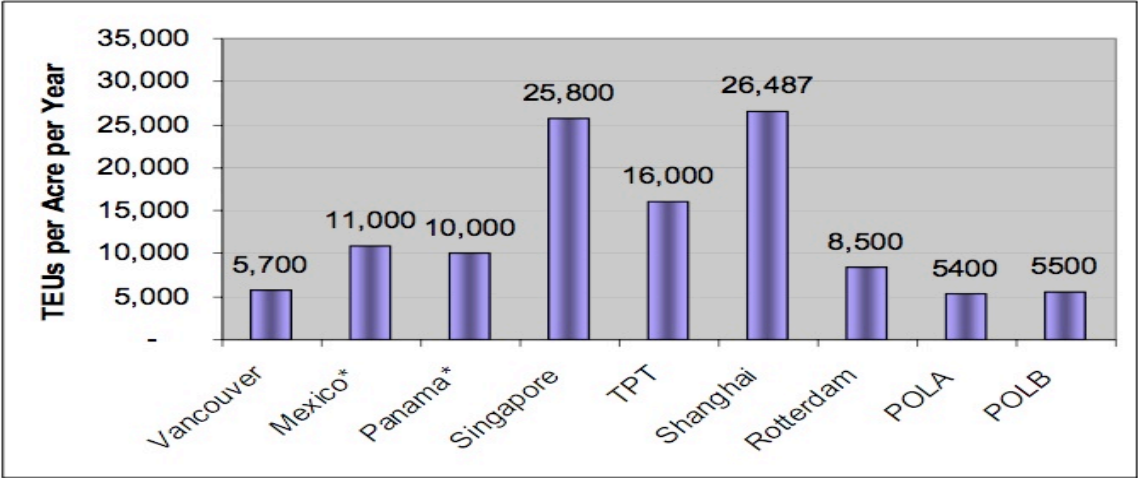


Nevertheless, among the other terminals such as Chile, Mexico and Panama, it is the latter, which has the only transshipment terminal. The others, like POLA are just origin-destination ones, handling local cargo. Hence, transshipment cargo often accomplishes higher levels of productivity. They involve bigger vessels that permit a steady flow of loading and unloading of cargo without repositioning the crane. Also, transferring operations are also less time consuming since they involve mostly quay and apron that are generally attached to the port, this results however, in more moves per hour overall for transshipment terminals versus regular origin-destination ones.

In reality, the analysis not only involves these elements. The data suggests that the productivity seen at these ports is high, regardless of being an origin-destination at the core. This is due to a number of factors that include the work and operational environment found in many of the gateways along with 24/7 operating regime.

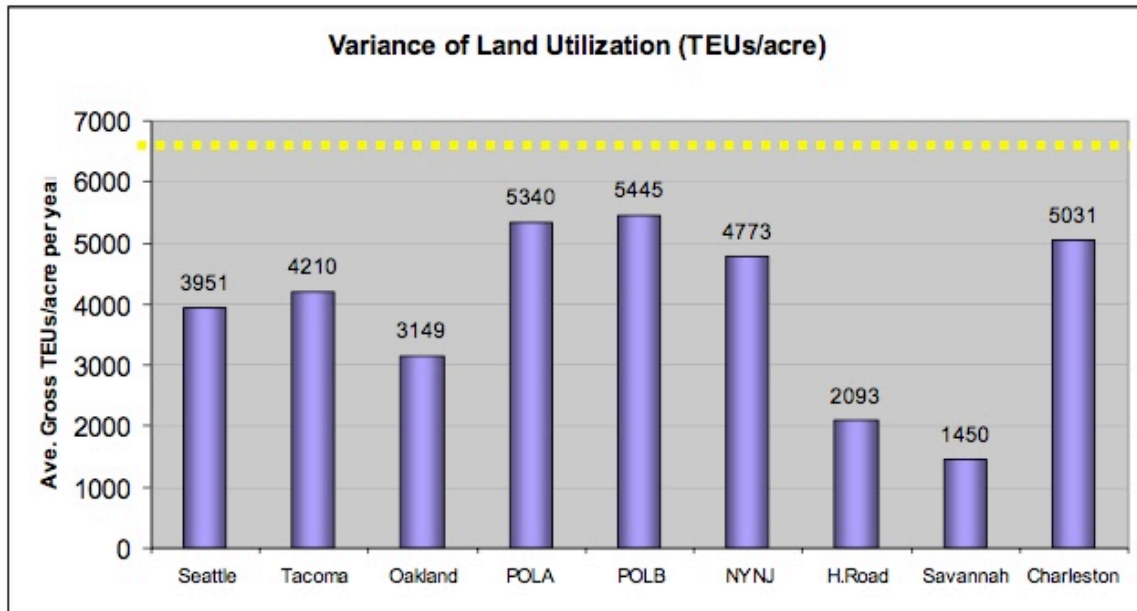
Furthermore, the measurement of effective terminal and land utilization is analyzed by the number of possible containers that are stores in a given area in the terminal, TEUs/acre per year as seen in Figure 4.2. In order to maximize the terminal space either port operators have a higher stacking density or shorter storage time of the containers at the terminal. Data for 2006 shows POLA behind ports in Asia and Europe, but recent data shows the new technologies, policies and work environment, has closed the gap.

Figure 4.2: Land Utilization (TEUs per Acre) (Le-Griffin, 2008)



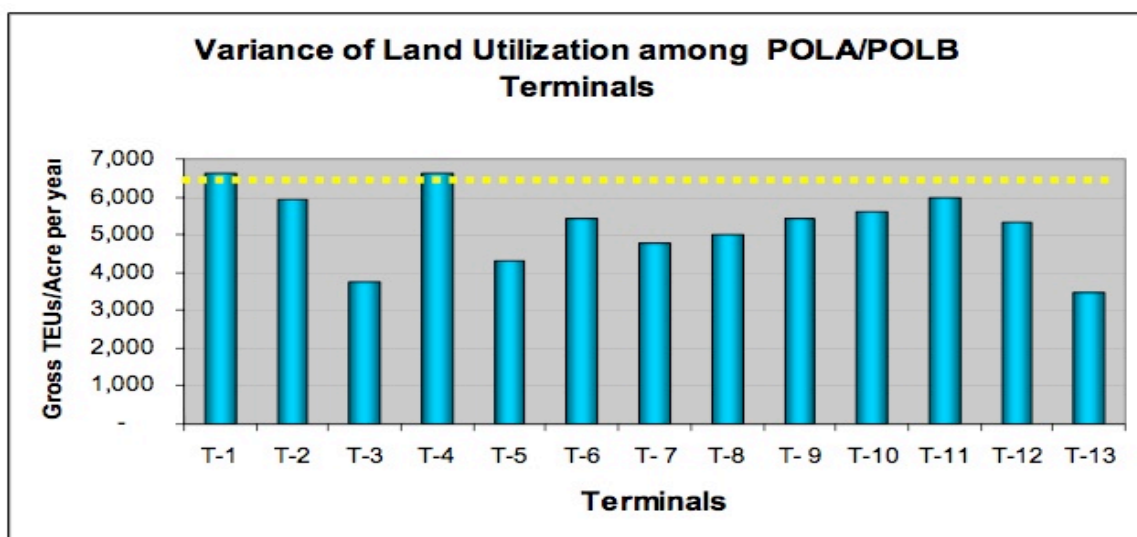
Moreover, as expected POLA performed above any other US port in gross density (TEUs/acre) as we can see from Figure 4.3. The yellow dotted line refers to the industry practical measurement of 6,500 TEUs/acre. By international standards for data up to 2006, POLA performance was below that. Nevertheless, given the land capacity of POLA, there is continuous growth that happening that does not involve significant land expansion.

Figure 4.3: Land Utilization Among US Ports (Le-Griffin, 2008)



Hence, Figure 4.4 shows the gap that exists between the different terminals in POLA. The difference between these figures is due to the decision taken by port operators and the distribution of cargo along the different terminals based on higher operational costs and space availability.

Figure 4.4: Land Utilization among POLA/POLB Terminals (Le-Griffin, 2008)



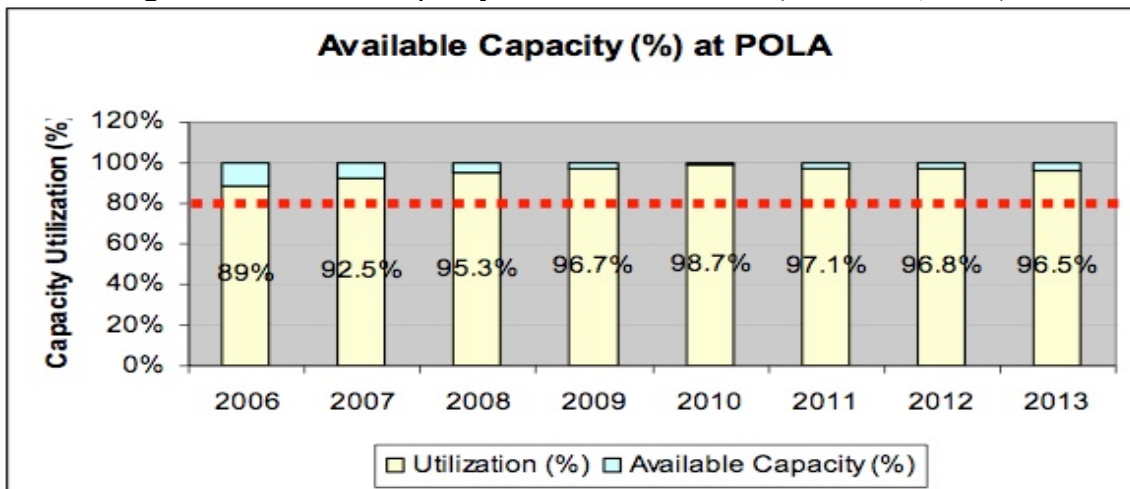
As shown in table 4.4 for average capacity utilization, POLA is higher than much of the other North American ports, except for Vancouver. In its increasing effort to maximize resources and expedite operations, POLA operator and authorities have developed projects that help with the reconfiguration of the terminals as well as new terminal developments which include additional acreage from a project in the West Basin. With optimization operations, including vertical operations of operation stacking, expansion of certain ports and different mechanics, it is estimated that by 2020 TEU volume could nearly double.

Table 4.4: Estimated Capacity and Utilization Levels of POLA/PLB (Le-Griffin, 2008)

	2005			2006 (Est. 6000 TEUs/acre p.a.)		
	Throughput ('000 teu)	Capacity ('000 teu p.a.)	Utilization (%)	Throughput ('000 teu)	Capacity ('000 teu p.a.)	Utilization (%)
POLA	7,485	9,025.0	83%	8470	9516	89%
POLB	6,710	7,834.0	86%	7290	8034	91%
Oakland	2,273	3,810.0	60%	2390	4550	53%
Seattle	2,088	2,766.5	75%	1987	3018	66%
Tacoma	2,070	2,840.5	73%	2067	2946	70%
Vancouver	1,767	2,135.6	83%	2208	2330	95%

As the capacity utilization forecast in Figure 4.5 shows for POLA, virtually full utilization rates of 96.7% and 98.7% are reached in 2009 and 2010, leaving little if any opportunities for future capacity growth (Le-Griffin, 2008).

Figure 4.5: Forecast Capacity Utilization of POLA (Le-Griffin, 2008)



From Figure 4.7 we can see that in order to accommodate all its demand and growth in productivity, POLA will have to nearly double its current numbers of TEUs/acre in order to manage the forecast for throughput.

Figure 4.7: Forecast Productivity per Acre Required at POLA (Le-Griffin, 2008)

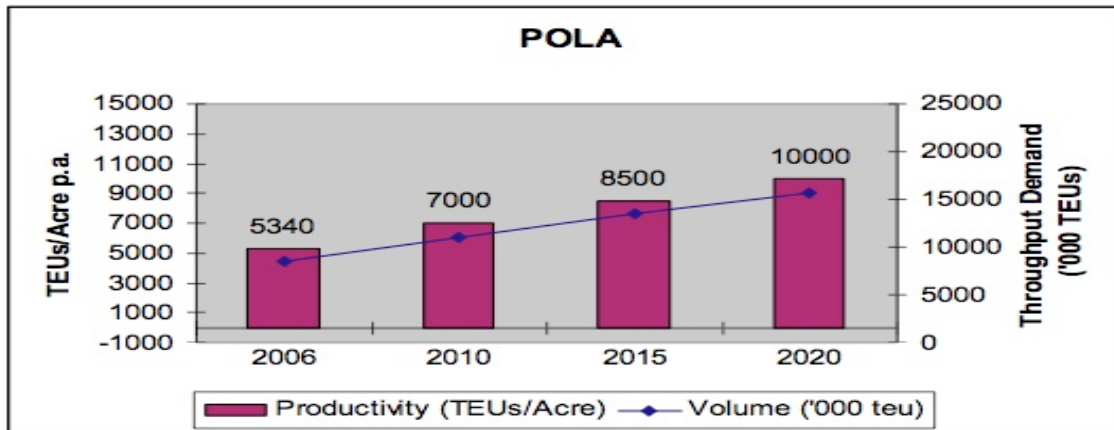
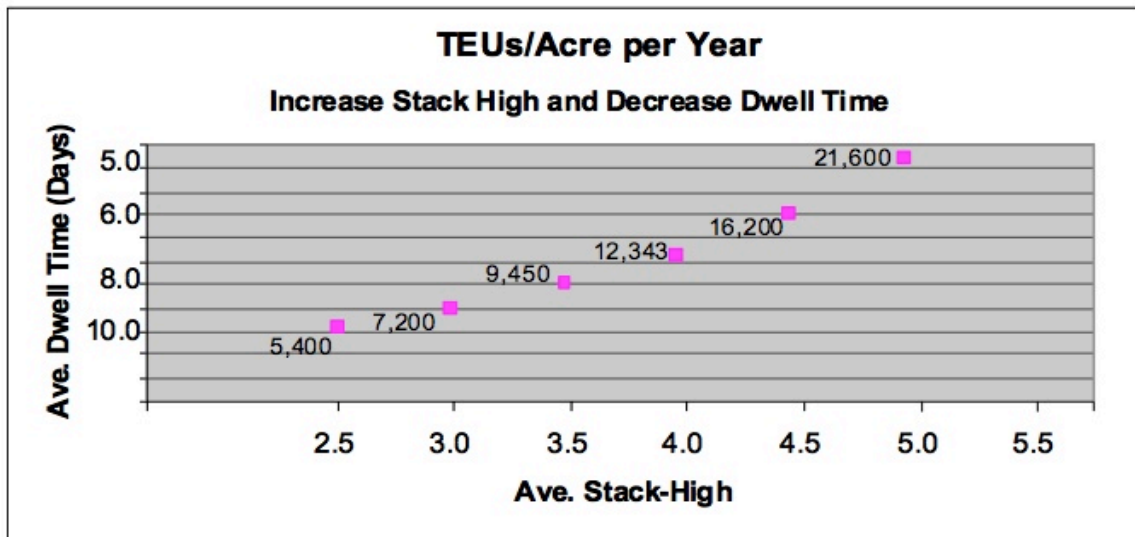


Figure 4.8 exemplifies the relationship between different productivity levels (TEUs/acre per year) in dwell time and stack height. The dotted points, are as a results of two actions: a decrease in the dwell times from 10 to 5 days and an increase in the stack height from 2.5 – to up to 5-high.

Figure 4.8: TEUs/Acre per Year as Function of Dwell Time and Stack Height (Le-Griffin, 2008)



Currently, the problem encountered with terminal space, is that stored boxes are not being effectively used or stacked, including stacking containers and cargo in a single configuration. In achieve higher productivity levels, POLA should operate at a stack-height of 4-high or higher and in a dwell time of less than 7 days. Additionally, eventhough POLA has moved to more effective stacking operations, on-chassis storing is the most common storing method used in POLA.

5. SWOT Analysis and Solutions

Conducting a SWOT analysis for the Port of Los Angeles was an instrumental part of the process. Assessing the port’s strengths, weaknesses, opportunities, and threats gave important insight into the potential and critical issues affecting the port’s competitiveness. The first step consisted in making note of the internal strengths and weaknesses of the port. Then, the external opportunities and threats affecting the port were listed based on its market and overall environment. The analysis yielded the following results:

Table 5.1

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - Infrastructure & Technology - Coordination of Port Activities - Workforce & Job Creation - State of the Art Security 	<ul style="list-style-type: none"> - Limited Land - Location in Relation to the East-Coast
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> - US Gateway to the Pacific Rim - Fast & Consistent Access to National Markets - Support of Economies of Scale 	<ul style="list-style-type: none"> - Panama Canal Expansion - West-Coast & Canada Ports Improving - East-Coast Ports Expanding & Improving Linkage to Midwest - Economic Downturn

5.1 The Strength of POLA

Like any other enterprise the POLA must take a good look at these different factors and adjust its course in order to take the right plan of action that would give them the best possibilities at retaining their competitive advantage over other competitors. In order for the POLA to remain the United States' principal container port amidst a highly unpredictable economic period will require new and creative tactics as well as rigorous work focusing on the most important elements playing a role in these efforts.

The container business side of the POLA is undoubtedly the most significant contributor to its overall revenue and jobs supply. Especial attention must be paid to retain and increase this side of the port's business since it helps fund the investments in other areas and the future. About half of all the containers that come through the port have final destinations out of the region, most of them going to the Midwest on railcars. As highlighted on the SWOT table above there are various competitive challenges that will be facing the POLA in the near future. The other ports located in the West Coast are undergoing expansion of their facilities in order to attract more business. In Canada they are making emphasis in the importance of improving and expanding their ports and railway systems. Perhaps the most significant threat to the port will be the new expansion of the Panama Canal set to be finished in a few years. This will make many ships that would normally call at the POLA go through the canal directly to the East Coast so that shippers can avoid costly inland freight charges. This is also causing East Coast ports to expand in order to become more attractive destinations for containers and along with the ports the railway providers are also improving their network to the Midwest from the East Coast. These containers that go out of the region of the POLA will be of key importance in the port's strategies towards the future especially with the increasing intensity in competition and the volatile economic environment. Not only is the port's well being at risk here but also the well being of the region.

Competition is a basic component of almost everything in life. The POLA is no stranger to competition and thus far has managed very well to stay ahead of those who

threaten its market share. Its rise to number one within the United States was fueled by a well-planned and executed approach to its operations that had infrastructure as its main focus, an infrastructure that would support and encourage economies of scale and complement it with a reliable connection of hinterland transport to national markets throughout the country. That is why the port's strategy going forward is based on bringing forth the strengths that made it number one. Infrastructure development guided towards clean, consistent, and resourceful operations from ship-to-shore operations all the way to hinterland dispatch. The POLA has been able to create important relationships with its clients for the long term that are mutually beneficial and it must continue to build on these relationships with current and future clients, relationships that have benefited also from the port's strong links with railway and trucking companies as well as with the community around them. The good coordination between all the existing activities in the port is another strength that has played an important role in its constant growth, facilities improvement, and adaptation to a changing economic cycle. Constant growth cannot be achieved without the right people working together towards a common goal, after all an enterprise is only as good as its workforce, therefore creating jobs for the community is an important goal of the POLA.

For the POLA to remain at the top spot in the United States there a number of strategies that should be placed in action, to help achieve this. There are three areas that should be looked at when evaluating the results of the strategies put in place. First, Competitive Operations, identifies how the port can best meet the increasing competitive challenges it faces from rival ports. Second, Strong Relationships, encompasses the port's challenges and opportunities dealing with its customers, its stakeholders, its political environment, and its own internal culture. Lastly, Financial Strength, enables the port to implement its competitive development strategy and face its own challenges in the current turbulent economic environment (Strategic Plan 2012-2017). The objectives of the port moving forward to the future are the following:

1. Develop and maintain world class infrastructure

2. Retain and grow market share
3. Advance technology and sustainability
4. Optimize land use
5. Create a positive workplace culture
6. Increase stakeholder and community awareness and support
7. Strengthen financial performance

(Strategic Plan 2012-2017)

All of these objectives are part of the POLA's Capital Improvement Program that was set in motion in the year 2012 and will be in motion for the next five years. For each of these objectives we will study more in depth the Why? How? and outcome of each strategy chosen to face the issue at hand. Why? Will give us an understanding of what is the problem the port is trying to address. How? will give us a look as to the strategy chosen by the port to fix the problem and the criteria used to measure its success. Finally, the outcome will explain what the result should be if the strategy is successfully implemented.

Develop and maintain world-class infrastructure. The POLA's customers call the port over and over simply because they are devoted to improving and advancing their world-class infrastructure. It is extremely important that the port continues to stay ahead of competitors by developing and delivering solutions to its current and future customers. Planning ahead of time and calculating future demand accurately will allow the port to satisfy its customer's needs without any delays or difficulties. The Capital Improvement Program is a key tool in this aspect. Thanks to this injection of funds the port will be able to make sure their facilities are leaders in innovation and of the latest technology. An example of their state of the art facilities to come is the construction of the new automated container terminal. Not only is the port focusing on the needs their current customers have right now they are building their infrastructure with a long term perspective in order to anticipate any future market growth. That's the reason behind the main channel deepening project which will see the main channel's depth be increased to

53 feet in order to accommodate the new larger ships calling at the port. Also, the port has projects with companies such as ExxonMobil, Shell, and ConocoPhillips to provide exclusive quays for the loading and unloading of their vessels. The outcome of successfully finishing these projects will only complement the port's privileged location with respect to the US-China trade route as the new and improved facilities will only enhance the port's appeal to importers.

Retain and grow market share. To put it in the simplest and clearest way possible growing the port's market share will increase its revenue. Innovations, renovations, and overall investments in present and future projects on improving infrastructure are funded through the ports revenues. In order to keep up the port's leading position its facilities have to keep up with the new demands and the constant investments made have been key in its development. Another very important aspect of increasing the POLA's market share is the positive impact it has on the region. The local economy will be boosted by an increase in jobs for the local workforce. The discretionary cargo heading to the Midwest of the United States is the most sensible and risky cargo the POLA handles considering the upcoming increase in competition. It is critical that the port includes in its agenda the strengthening of the relationships with trade organizations and customers in the Midwest region in order to build brand recognition for the port. As the dynamics of the industry change the POLA's must evolve and adapt and take advantage of the strong relationships it has with shipping lines, marine terminal operators, and other supply chain participants. An interesting tool the POLA has developed is the Trade Connect initiative. Trade Connect is an introductory workshop on the basics involved in exporting, including costs, risks and steps. In cooperation with other agencies and professionals, a summary of help and services available is presented, including:

- Basics of the commercial transaction
- Finding overseas markets
- Trade financing

- Documentation

- Logistics

In addition to the provision of expert services, practical techniques of risk mitigation are presented at the workshop. This program connects businesses with the essential resources provided by the following governmental entities:

Federal

U.S. Department of Commerce

U.S. Export Import Bank

U.S. Small Business Administration (Export Assistance Center)

U.S. Southern California Regional District Export Council

State

California International Trade Development Centers (California Community Colleges)

City

Port of Los Angeles (including overseas offices)

Los Angeles World Airport (LAWA)

Minority Business Opportunity Center (MBOC)

*(The Port of Los Angeles | Business)

The impact of Trade Connect has been great for the port. It has helped create a network of political contacts that aid in the promotion efforts of the POLA as a desired destination. Also, by increasing the number of Trade Connect programs the port can increase exports and will develop a tracking system in order to effectively report the relation between Trade Connect programs and the fluctuations in exports. Developing countries are playing an increasingly important role in world trade and it is vital that the POLA takes advantage of these new opportunities in order to create new openings for its clients. Trade missions and marketing efforts focused on places such as Latin America and Vietnam can bring interesting business possibilities for both the export and import markets. The key interest in all these efforts is to make the POLA the desired

port of call for its customers increasing market share and thus increasing revenues and being able to keep the number one position in the United States.

Advance technology and sustainability. In recent years the need to be environmentally friendly has gained some importance. Companies around the world are concentrating resources with the objective of being operationally efficient while at the same time causing little to no damage to their surrounding environment. The POLA is no exception to this. The port is dedicating a significant part of their efforts in growing their operations and capacity with the most environmentally friendly technology hitting the market placing great importance in becoming a leader in sustainable growth and operations. In order to make this a reality the port has to work together with companies developing such technologies so that applications useful to the port can be created and then promote these technologies to their customers so that they can work in sync to integrate them into the daily operations. As part of their initiatives to achieve this goal a partnership with technology companies that can develop electric yard tractors, gantry cranes, and other types of cargo handling machinery is needed. New alternative technologies to move containers within the port as well as to the outside of the port have to be studied. The POLA is also increasing the number of zero emission trucks in their fleet. The goal is to have around 50% of the trucks performing drayage duties to and from rail yards be zero emission trucks by the end of 2014 and by the end of 2020 have the entire fleet of trucks be zero emission. Research universities have always been a good partner of the POLA in helping them conduct studies to later develop or change policies and operational activities. Since automated terminals will be a part of the port in the future it is very important the POLA works together with research universities to create a transition plan for the workforce on the port into this new era. Automated terminal jobs will require different skill levels and training so creating a training program for the workers is an important task as well. If these objectives can be achieved the POLA will be recognized as a leader in sustainable growth through the implementation of technologies and operations that benefit the environment while at the

same time improving the efficiency of the port and the quality of life and work of their employees.

Optimize land use. Land is the one resource the port has to be most careful with, as the supply is extremely limited. Several portions of the San Pedro Bay are designated for public access and recreational activities for the residents of the area; therefore, the port has to make the best of what it has in terms of real estate to handle the cargo that comes through. Optimizing land use also includes making sure all agreements with the port's customers are up to date and that the revenue produced through these agreements matches current situations. That is why it is important that the port keeps land valuations updated and that it has up to the moment reports of how much to charge for its services depending on the type of cargo as dictated by the global market. A comprehensive inventory of all assets must be done along with an evaluation of the performance of these assets so that the port can best decide how to move forward. For vacant land a strategy to look for the best possible use must be put in place, once possible opportunities are identified a set of steps and procedures to achieve these opportunities should be designed and implemented. Any asset currently underperforming should be put under analysis in order to determine if it needs to be redirected to better use or simply discarded along with any other unused assets the port may have. In the case of possible contaminated land and/or facilities the port must device a proposal to look after the affected sites with the purpose of cleaning it and getting it back to health in order to put it to proper use so that it can start generating revenues for the port. Unused assets must be eliminated from the port simply because they serve no purpose, however, there are also facilities that are not water dependent that do serve a purpose to the port but occupy space that could be put to better use. The port should identify which facilities are not water dependent and move them from waterfront areas so that activities that have to be done in waterfront sites have the area to optimize their operations. If the POLA puts the right plans into action and manages to

get the most out of the land it has it will not only increase its revenue stream but it will also ensure it remains the biggest container port in the country.

Create a positive workplace culture. As it was said before an enterprise is as good as the people it employs and quite simply a happy employee is a more productive employee. Having a positive workplace culture helps the port not only to boost their employee's performance but also to motivate them and to make them recognize and adopt the port's vision towards the future as their own. It is this benefit of having the employees adopt the port's priorities and goals as their own that will ultimately help the POLA remain at the number one position. To accomplish this the port must place great importance on communication and interaction between staff, departments, and management. Internal communication channels must be improved so that employees at all levels can be better informed about all that is going on at the port. Promote internal events that create the opportunity for debates between staff and management. For this a training program should be created that would help develop the employee's abilities for public speaking, staff coaching, and conflict management among others. Instill in its employees a sense of self-improvement by offering promotion to better positions in the organization within the existing workforce. The port must also give recognition to the individuals and/or teams that surpass the expectations placed before them when presented with a task therefore making others want to do the same. This could be achieved by creating a recognition method for employees where their managers nominate an outstanding employee for its efforts. A well-prepared, well-communicated, well-organized workforce will undoubtedly be the biggest asset for the POLA.

Increase stakeholder and community awareness and support. The support gained will act as a push forward on projects the port has invested in to improve business. The port needs to go out and create strong relationships with both existing and potential stakeholders and distribute information promoting the port's efforts to contribute to the community and the importance of its role in benefiting its customers and the country. The POLA can reach its customers and clients in variety o ways. Nowadays social

media is at the center of it all so having a presence in websites like Facebook and Twitter to promote the port is important. Business presentations can be increased to expose the port's business more to the public. The port can also design outreach initiatives to different participants along the supply chain, looking for ways to keep information flowing between the parties, and keeping track on the effectiveness of the entire system by monitoring the annual increase according to the region and/or group that was targeted. The media can play a role in the port's outreach efforts. It can be used to put out news stories that highlight the POLA's positive influence in the business of its stakeholders and also to advertise the port's efforts to help its customers grow. Keeping strong bonds with local businesses and politicians is as important as keeping the same strong bonds with foreign businesses and politicians, especially those involved in the areas of transportation, security, and environmental causes. Also quite important is to have a strong customer service center. To have a center with personalized attention to customers would prove very beneficial for the port's reputation. If the POLA can achieve these goals it will not only create a strong and good image in the United States but also abroad.

Strengthen financial performance. The most important reason for this is to instill a sense of confidence in the POLA's customers that the port has the ability to continue to operate in full capacity as well as instilling confidence in its investors so that it can continue to borrow money at good rate. It will be very important that the port produces its financial statements in a timely manner and that its reports are as transparent as possible so that the different stakeholders can take a look at the financial soundness of the port. It is also important that the port gets financing from various sources so that it can show flexibility. To show good financial performance the port must continue to produce revenue growth with firm control on expenses. The use of internal audits of the port's operations and of the port's tenants will be of great help in improving the quality of financial reporting and efficiency. One of the most important sources of funding for the port is grants issued to them by government organizations. It is important that the

port maximizes its grants from no traditional sources like foundations to show diversity as well as applying for grants focused on the maintenance of existing facilities and equipment. Transparency in financial reporting and an ability to monitor and control financial obligations and results will allow for greater trust from stakeholders, including the investor community, resulting in maintaining the Port's cost of capital at the lowest appropriate levels (Strategic Plan 2012-2017).

When we take a look at the threats faced by the POLA it is clear to see that no other factor plays a bigger role than the expansion of the Panama Canal set to be finished by the year 2015. After 100 years of its opening the Panama Canal is being expanded, a move that is causing quite a stir among ports in the United States. When this project is finally finished ports in the gulf coast and the east coast of the country will be able to compete for business regarding the large container ships coming from Asia. Both money and jobs in the west coast ports are at risk, since up until now they have dominated this market, especially the POLA. The trend in shipping is easy to see: bigger and bigger ships. With bigger ships shipping companies do not have the need to own as many vessels as before and also perform less trips saving on operational and capital costs. These savings are then passed on to the customers. The future of shipping will have a big impact on the global economy and in the US no state will feel this impact more than California. Since the mid 1990s the POLA has benefited from the increase trade partnerships with Asia, especially China, and with these new and bigger ships the port was set to continue its prestigious position as the country's desired entry port taking advantage of the east coast's ports' limitations. But, with what is now happening in Panama this could very well change.

At the end of the 1930s the United States put in motion plans to expand the Panama Canal by building new locks that would make way for larger ships. As World War II began this project was stopped until recently when former Panamanian President Martin Torrijos put the new expansion project up for voting in 2006. The voting went smoothly in favor of the new project and work began once again in 2007 on the \$5.25 Billion

work to deepen and widen the canal. The two main problems with the current canal are its traffic capacity and the size of the ships it can handle. The traffic the canal is handling right now is more than the traffic it was designed for and is causing delays. Also, more than 25% of the world's international fleet is of the Post-Panamax category. When containers are shipped from Asia to the US on these large vessels they have to call at west coast ports like the POLA even if the containers' final destination is on the east coast. The containers need to be unloaded and then transported by land, through truck and rail networks, to the other regions of the country. After the new canal is available for use trade will shift with the large ships being able to call gulf coast and east coast ports like Houston, New York, and Miami. This is a shift that these ports are expecting and preparing for. Billions of dollars are being spent on infrastructure expansion and upgrades; rail yard connections being built, and new technology development that will make these ports compete at an equal level with west coast ports. The work needed for the deepening and widening of the gulf coast and east coast port's channels is not simple however. It is a process that takes time and requires a lot of money, but it is one that must be done if they want to be able to accommodate the ships that will be passing the new Panama Canal. This is where the POLA has the upper hand. The POLA has the required depth, technology, infrastructure, and experience for handling these types of ships and is on these qualities that they will compete to remain America's port. Even though it is inevitable the POLA will see a reduction in business once the canal opens the regional trade is large enough to provide a strong base that will keep coming to the port. The real battle will be for the discretionary cargo, and this is when the POLA's strategies studied before will really come into play.

Even though the financial crisis of 2008 was very damaging to the US economy trade has picked up since then according to the Foreign Trade division of the US Census Bureau. Last year the US posted its biggest numbers in history regarding international trade, with \$2.21 trillions in imports and \$1.48 trillions in exports, which translates to port activity and revenue. And this is only the beginning; many industry experts expect

container volumes in US ports to double by the year 2020. The benefits of the exponential increase in trade are not only for ports but also for all stakeholders like warehouses, forwarders, and banks. Effects we discussed earlier when the benefits the POLA provided its community in terms of jobs for example were explained. This economic expansion is significant enough to make all US ports fight for the business that's to come in the future.

6. Conclusion

The POLA is the number 1 container port in the US, and although it already has a position above the rest in the nation there are areas where improvement is needed in order to maintain its position. The continuous investments in the port's infrastructure to make the port more productive, like the deepening of the main channel and the expansion of the China Shipping terminal, are an important step into the future. As the trading relationship with China continues to grow so will cargo volumes, volume the POLA will have to fight for amidst increasing competition. It's a trading relationship that as it has grown in the past in volume and importance it has also grown in complexity. Even though the US carries a trade deficit with China its exports to the PRC have increased. The Key Performance Indicators of the port show that overall the POLA has been very productive over the years, and that despite the economic downturn it has managed to remain profitable.

In terms of productivity the POLA stands above the rest among other national ports. However, when compared against international ports the POLA did show some lacking behind. Since expanding in terms of physical capacity is not really a practical solution to solve handling capacity issues the port has focused on maximizing the capacity of the facilities it already has. A solution to this will be the implementation of advanced technologies that the port will put in place in the short future.

Thanks to the SWOT analysis a better understanding of the POLA's current situation is obtained, with help to create a plan into the future that will take advantage of the port's

assets and strengths. Strengths like infrastructure development and its strong relationships with all its stakeholders are the foundations to remaining competitive in the future. The Panama Canal expansion project will put some pressure on the POLA to perform, as competition from other ports in the country will jeopardize its market share. The correct strategic plan has been put in order to keep the POLA as the desired destination for trans pacific cargo. Even thou competition will increase, the shipping industry will evolve, and the US economy will continue its up rise the POLA is well positioned to make the right changes to grow and progress with time and stay relevant and competitive and in doing so retaining its title of the number 1 port in the nation.

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