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Reflection of expanded Panama Canal to supply chains and port infrastructure in North America

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ABSTRACT

The enhancement of world maritime shipping leads to increasing of the time required for transit passage and impossibility of old locks in Panama Canal to serve the newest vessel's generation. Many states in east and south-eastern part of the country, as Florida, Georgia, Virginia and South Carolina, are becoming attractive for business. They have made various investments and improvements in regional transport infrastructure to dominate over freight traffic in the region, such as dredging of port entrances and port basins, expansion of container terminals, and improving inland transport connections to the port. The goal of this article is to study how the design and construction of new set of locks on the Panama Canal affects to the global trade and further to the multimodal chains, transport infrastructure and ports along the East American Coast.

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1 Introduction

The Panama Canal connects the Atlantic and Pacific Ocean through the Caribbean sea and reduce with more than 8,000 miles the ships voyages in the directions Asia and the East Coast of the United States. The expansion of the canal began on 25th August 2007 as a consequence of sustainable growth of maritime trade and further increase of transit time for vessel's passage through the canal from 9 to 16 hours. The 5.2 milliard USD canal project includes the following stages:

- construction of two new set of locks – one on the Atlantic Ocean (Aqua Clara) and one on the Pacific Ocean (Cocoli);
- deepening the entrances to the canals in order to ensure safe access to vessel with larger size and minimize the impact of natural phenomena “El Nino” and southern fluctuations (increasing of atmospheric pressure in the western tropics), that repeated every five years in the tropical region of Pacific Ocean.
- deepening, widening and navigation of waterways between the set of locks on the Pacific side and Lake Gatun;

- deepening of Lake Gatun and the increasing of lowest water level from 88 feet to 89 feet that improves the supply of water saving basins and allows 1,100 passages additionally.

The new set of locks on Panama Canal are brought into use on 26 June 2016 at a time when about 90% of global trade is carried out by sea, and about 5% of international trade routes pass through the Panama Canal. The first vessel, passed through the new set of locks, was chinese ship “Andronikos”, owned by COSCO, with capacity of 9,472 TEUs. Initially Panama Canal authority allows passages through the new set of locks of vessels that have following dimensions: length – up to 1,200 ft, width – up to 160 ft and draft – up to 50 ft. On 1 June 2018 the authority of Panama Canal took a decision the maximum allowable beam for vessels transiting new “Neopanamax” locks to be increased up to 168 feet [13]. This led to augmentation in number of vessel transits in direction from Asia to the U.S. East Coast for about 1 year with more than 3,000.

Due to climate change, the year 2019 was the fifth driest year in last 70 years. The water level at Gatun and Alajuela lakes fall down and the steady draft level in the

Panama Canal decreased to 49 feet. In order to guarantee the quantity of needed water supply and to improve the control and quality of fresh water during September 2020 the Panama Canal authority decide to make additional investment in new innovative water management system [23]. The system should ensure smooth performing of passages through the canal and local consumption within next fifty years.

2 Challenge to transport patterns and to port infrastructure in USA affected from opening of new set of locks of Panama Canal

2.1 Analysis of development on transport infrastructure and ports on eastern part of USA

The geographical location the Panama Canal has significant role to the international trade in various goods and reflects not only to the global food market, but also to the trade with raw materials for producing energy power. The great economic value of this canal comes on the facts that it connects the Atlantic and Pacific Oceans, shortening the sea voyages from the East Coast of the United States to Asia with 3,000 miles, and those from South America to Europe with app. 5,000 miles. The expansion of the Panama Canal influenced to the already established trans-continental sea trade routes and international supply chain. It stimulates sustainable economic growth in fast developing countries as China, USA and in some of European countries. More than 140 maritime routes lie on the canal and enable linking to ports between over than 160 countries worldwide. The major traffic flow through the canal is in the direction from the East Coast of the United States to the Far East. The second major trade route along the canal is in direction from Europe to the West Coast of the United States and Canada (Figure 1) [27]. However the flow of goods between Asia and the East Coast of North America is not just a matter of choosing mode of transportation from the West Coast of the United States and passing the Panama Canal. During the carriage of cargo from Asia in direction northwards from Port of Los Angeles many of the 8,000 TEUs container vessels, instead of the port of Oakland, choose to visit ports, which have appropriate infrastructure to service such large ships. There has been a shift in U.S. container traffic from west coast ports to these on east coast [19]. In order to be able to respond to this sharp increase, the business started in advance to prepare for the changes that will be occurred after the opening of the new Panama Canal.

The opening of new third set of locks caused reorganization of global maritime route and undoubtedly changed the already established multimodal transport chains in USA. It affected to sea routes and allowed vessels to shorten their voyage to the USA ports, located on the Atlantic Ocean, from Asia with two weeks, instead if they used a sea route on east direction and passage through the Suez Canal. The innovations in port make a substantial change

in their activity and take effect to the cargo handling technologies, such as introduction of modern labor-saving devices for internal traffic and completely new types of stevedoring gear, which simplify or speed up the handling of heavy loads; introduction of special systems, which allows performing of multi-modal carriage; and adoption of innovative system for rapid exchange of information in order to control the data flow documentations and work procedures. [4]

Freight forwarders, that transport goods direct from Asia to the East coast of the United States, save five days from transportation by rail between west and east part of the country and this reduce cargo unit costs. Before the Panama Canal expansion to be completed the USA ports on West Coast (in Los Angeles, Oakland and Seattle), and on the East Coast (in Norfolk, New York, Miami and Baltimore) have already been renovated and were able to handle these large sized ships. The ports in South Carolina carried out the dredging work valued to 300 million u.s.dollars and in year 2012 had 200 visits of "Post-Panamax" ships. In contrast, in small ports the handle of such large vessel will take 5-6 weeks instead of a few hours, spent in ports, that have infrastructure suitable for "Post-Panamax" vessel.

However, the big market researchers company concluded that the optimization of existed sea routes, might not provide any additional benefits for shippers, and in this sense there would be no significant market change to which the ports on the east coast of America could not respond [25]. Many ports in these regions, that expected to generate considerable profits due to large increase in volume of cargo handled and in number of call from "Post-Panamax" ships after 2016, might be disappointed, because the enhancement of container ship load capacity will lead to reduction in the number of container ships calls, served at one port.

USA ports, located on both coasts, are under strong competition to draw up big carriers and to handle these larger ships. In order to be able to receive such large sized vessels, they have to require on following conditions: 1) depth of the approaching channels – 50 feet (15.24 m); 2) sufficient width of the port basins for their manouevring; and 3) the cranes must be able to handle "Post-Panamax" vessel.

The building of large sized container vessels brought additionally to changes in the infrastructure of large container ports. Some terminal operators and ocean carriers expected a significant increase in volume of world trade after introduction into use of new set of locks of the Panama Canal. They thought that future projects, such as the planned building of the fourth "ExpressRail system" at Port New Jersey, deepening the approaching channel and lifting of Bayonne Bridge, might ensure steady increasing of cargo flows through the port.

Approximately 600 million USD were the cost of infrastructure project for renovation and expansion of "Express Rail system" at Port New Jersey (Figure 2). The dredging of

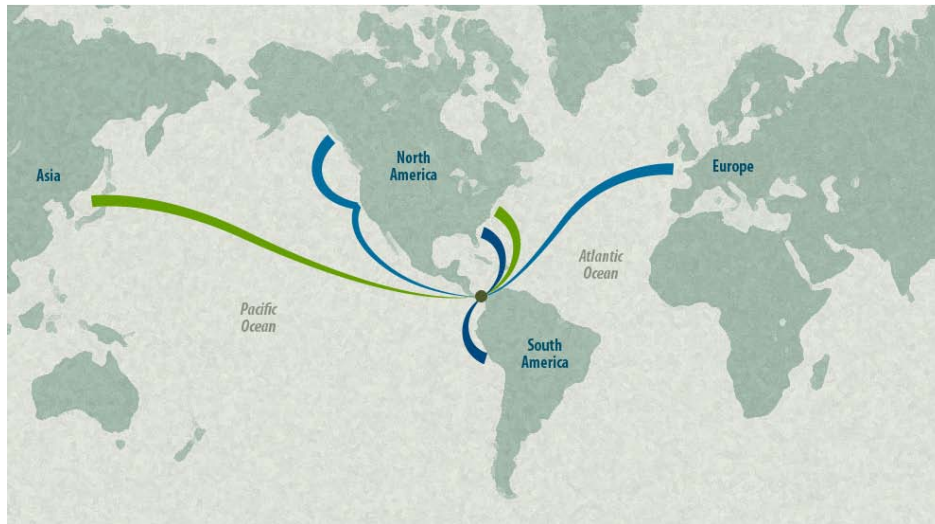


Figure 1 Main trade routes through Panama Canal traffic

Source: <https://logistics.gatech.pa/en/assets/panama-canal/statistics>

navigation channel up to 50 ft is due to complete in 2026. The size of port authority investment is 1.13 milliard USD or 54% from the total cost. The enhancement of air draft at Bayonne Bridge from 151 to 215 feet gives direct access of large sized container vessel (up to 18,000 TEUs) to the ocean terminals in the port of New York and New Jersey.

The capital investment, connected with fulfilment of these projects with the period of ten years, is 1.3 milliards USD and provoked the intention of foreign investors. The global companies such as Amazon already invested in the region and created new logistic and distribution centers.

The “National Gateway project” is a project for improving of multimodal connectivity and better use of railway

network. It covers six states: North Carolina, Virginia, Maryland, West Virginia, Pennsylvania, Ohio and the District of Columbia and were supported from 300 public and private sector organisations. The aim of the projects is increasing of railway freight transportation using of double-stack trains as means of transport in whole the eastern part of United States. At the year 2011 the company “CSX” invested 175 million USD and brought to use intermodal terminal, located in northwest Ohio. As a part of this innovative infrastructure project 68.5 million u.s. dollars are provided for building of intermodal terminal in Columbus that will operate with containers coming from the Ohio River and forward them to Port New Jersey by rail. After its completion by the year 2038 new 20,000 jobs will be created [1].

South Carolina Ports also strive to operate with largest vessels calling on the East Coast. The investments in transport infrastructure and inland terminals give an opportunity these ports to remain competitive on the global market during next decades. In January 2014 the authority started 10-year extensive program with more than 30 planned projects, including construction of five terminals in the vicinity of 10 miles from each other nearby Charleston, one terminal in Georgetown, and building of new coastal city to the northeast direction. The first goal of the program is completion of Inland Port in Greer [8]. This inland port terminal with area of 90-acre is situated on 335 km away from Charleston and close to Greenville-Spartanburg airport. The investment, made from South Carolina Ports Authority in this initiative, is 1.3 milliards USD. The deepening of navigation channel to the port of Charleston from 48 feet up to 54 feet amounting to 565,209.081 million USD. The five staged project is fully funded by federal and state partnership started in 2010 and due to be finished in mid of year 2022.

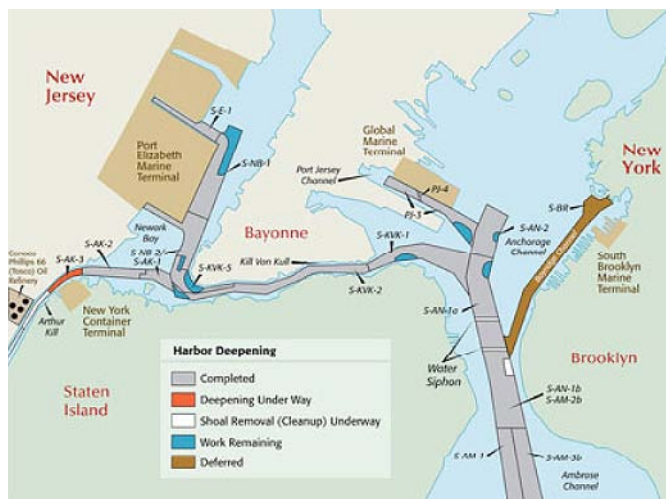


Figure 2 Port of New York and New Jersey

Source: <https://www.joc.com>

“Wando Welch Terminal” is the largest terminal of South Carolina Ports at a distance of 1 day rail to “Inland Port Greer”. The terminal has 40 truck gateways and make abt. 78% from ports container flow. “Wando Welch Terminal” is able to handle simultaneously three “NeoPanamax” container vessel (3 x 14,000 TEU) or one with max container capacity of 20,000 TEU.

“Hugh K. Leatherman Terminal” is the first greenfield terminal from 2009 (Figure 3). The terminal is located on the Cooper River in North Charleston, South Carolina and it has a project depth of 52 ft confirmed on low water is about 2 hours piloting time from the deep ocean. The construction of 286-acre terminal is divided on two phases. On 9 April 2021 completed the construction of phase 1 – developing of 134 acre, with 47 acre container yard. The amount of the investment on first phase is abt. 1 milliard USD. The container terminal is equipped with following port facilities: five STS-crane with lifting capability of 169 ft lift height, 25 hybrid RTGs and has area for handling of refrigerated containers. The first call was 3,237 TEUs containership ‘Yorktown Express’, owned by company “Hapad Lloyds”, which unload 1,000 TEUs [7]. The forecast is that the terminal “Hugh K. Leatherman Terminal” could add the capacity of 700,000 TEUs to the Port of Charleston and upon completion of second phase in year 2033 – to reach the figures of 2.4 million TEUs [19].

As a result from the improvement of inland transport connections and investments in port infrastructure the port operators in South Carolina in 2020 generated incomes of 63.4 milliards USD. At the beginning of the year 2021 South Carolina Ports has the total container capacity of 3.5 million TEUs divided as follows: Wando Welch Terminal – 2.4 million TEUs, North Charleston Terminal – 0.5 million TEUs and Hugh K. Leatherman Terminal – 0.7 million TEUs. For January 2021 the terminals “Wando Welch” and “North Charleston” registered total volume of 216,265 TEUs or 2.5% annual grow year-over-year. The



Figure 3 Hugh K. Leatherman Terminal

Source: Author



Figure 4 Craney Island terminal

Source: Author

rail-served inland terminals “Port Greer”, placed in the up-state of South Carolina and “Port Dillon”, located in the Pee Dee region, made 16,271 rail moves to SC Ports in January 2021, and registered growth with 16% in comparison with previous year. At the same time 12,189 vehicles roll across “Columbus Street Terminal” and 147,936 vehicles were served in Port of Charleston.

The proposed in 2010 construction of “Craney Island terminal” near Portsmouth will be the fourth deep ocean terminal (Figure 4). The terminal is spread over area of 600 acres on the west side of the Elizabeth River and will have semi-automated port facilities with capacity of 5 million TEUs. The capital investment is expected to be about 2.2 milliard USD [17]. The project is planned to be fulfilled in three phases in frame of twenty-twenty five years and the expectation is enhancement of 50% on container handled by rail.

The US states Georgia and South Carolina are also working together to build the container terminal at open sea, named “Jasper Ocean Terminal” (Figure 5). It will be placed on the north bank of the Savannah River nearby Elba Island, on area of 1,500 acre. The construction is planned to start in the 2022 for the period of three years and once completed, this terminal will be able to handle 7 million containers per year [11].

In order to accommodate 10,000 TEUs containership, the port of Savannah began in 2015 a project for deepening the entrance canal to 47 feet MLW that was finished in March 2018, earlier than it was planned. The port has over 3 million ft² warehouse area at a distance of 50 km and large logistics centers of Atlanta, Orlando and Charlotte, which are only into 4 hours away from the terminal. Over the next decade the Port of Savannah’s authority planned expansion of container capacity with 45% annually till 8 million TEUs [3].

Florida sea ports have the geographical advantage that they are closer to the Panama Canal that other continental U.S. port. Therefore they are the main gates for export of USA commodity to the Caribbean region and Latin

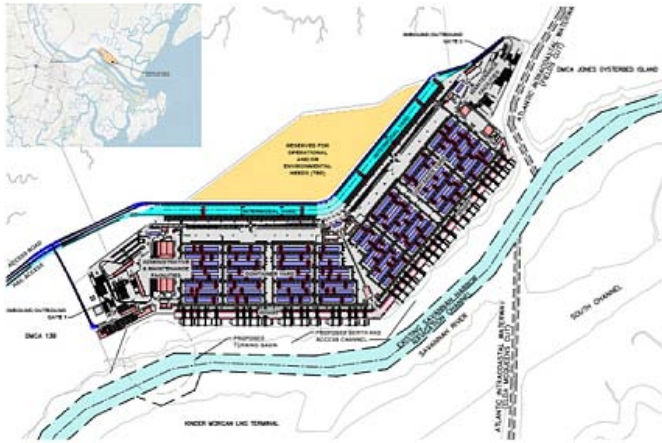


Figure 5 Jasper Ocean Terminal

Source: Author

America countries. At 2015 sea ports within Florida region planned to spend 147 million u. s. dollars over in frame of five years, ordering of 13 newer generation cranes that will be capable to perform efficiently cargo handling operation with “Post Panamax” ships [2]. For the period (2011-2017) the investment in infrastructure projects from federal, state and local funding in the region accounted to 1.02 milliards USD.

The federal, local and public authorities in the region of Florida planned to invest over 1.1 milliards USD within the period of 2015-2020 for development of transport infrastructure and deepening of the navigation channels. Deepening the entrance channel to the port of Miami up to 50 feet mean low water, performed to 2015, amounted to 220 million USD, half of them are given from the Florida Department of Transportation. Still before the completion of Panama Canal expansion the port was equipped with three cranes able to serve vessels from latest generation.

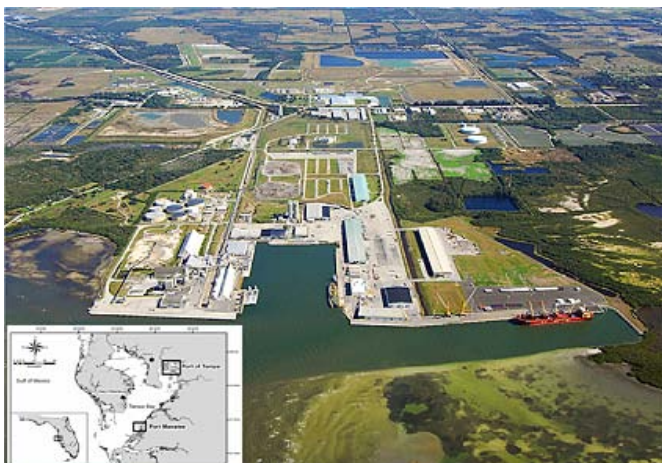


Figure 6 Port Manatee

Source: Author

Panama Canal expansion is considered as a catalyst for developing of economic especially in south-eastern part of America. First year after opening of the Panama canal the ports of Miami, Everglades and Jacksonville have visited from 612 “Post Panamax” ships, 22% were passed new set of locks on the Panama canal [10, 16, 18]. About 90% from “Post Panamax” ship’s arrivals transiting new locks of Panama canal were containerships, divided between Port of Miami (63) and port of Jacksonville (72). In 2018 the port authority of Jacksonville began a procedure for dredging of St. Johns River up to 47 feet. The final cost of the channel expansion will reach 483 million u.s. dollars [10]. The port serves auto-carrier line on big shipping companies. Port Everglades also take steps for the expansion of port efficiency, including deepening of approaching channel up to 48 feet.

Port Manatee is one of the ports, that made a raid growth in recent years. It is located in southwest Florida and is the nearest to the Panama Canal U.S. ocean port (Figure 6). The main cargo flow at port of Manatee consists of dry and liquid bulk cargoes, fresh fruits and vegetables and heavy lift cargoes. The port has 10 berths and can accommodate vessel required up to 40 ft water depth. In 2013 Port Manatee was completed first phase of building on South Port Intermodal Terminal and continued with second phase construction of container yard and vehicle facilities. According to the master plan of the port, the planned capital investments for the period (2015-2020), amounted to a total of 125.854 milliard USD, of which 150 million USD are provided for renovation and improvement of the land road and railway connections to the ports. The port authority predicted for the next ten years 5-6% annual growth of the containers to 44,000 TEUs.

According to the results, presented officially for the financial year 2020, for the period of five years the annual container throughput increased even more from the forecast – from 26,000 TEUs to 88,466 TEUs. For the first half of the financial year (from September till March 2021) the volume of container handled rise to 67,675 TEUs, which is 74% over the first half from previous year [12].

2.2 Changing of supply chains affected from opening of new set of locks of Panama Canal

At the time of opening it has been difficult to predict how the new sets of locks of Panama Canal will affect international trade relations, and especially in cargo flow direction from Asia to North America, as a variety of operational and economic factors influenced on the carriers and shippers attitude and on their choice of best and profitable multimodal transport route. Canada and Mexico are affected on reduction in containers flow carried through the USA states, as they transported the goods to the USA by railway. The problems in transport sector, such as labor disputes with truck drivers, congestion, and the fears of eventual reducing of cargo flow using railway, as a consequence of Panama Canal expansion, didn’t exist on

the East American Coast. Meanwhile the price for transportation with American railways rose steadily, that further encouraged carriers to reroute their cargo flow and to look for lower service price from these that multimodal transcontinental companies offered.

The influence of canal expansion to the East Coast of USA and Gulf of Mexico might be seen still during the next few years after opening of new set of locks. The year 2017 registered 22.2% increase of tonnage from previous year. From 11,992 vessel transits 1,828 were Post-Panamax vessels, divided in following categories: 954 – containers, 539 – LPG vessels, 159 – LNG vessels, 59 – dry bulkers, 22 – car carriers and 1 cruise ship. The total volume of cargo imported from Asia to USA in 2016 was 5.8% and in 2017 grew to 7.9%. The average size of containership passed through the Panama Canal in 2017 increased by 47% and the volume of cargo transported – with 23%. Subsequently, the cargo flow in the USA port on the East coast enhanced with 29% because carriers looked for cost-effective carriage and choose the transport patterns through the Panama Canal, instead of discharge in the ports of Los Angeles, Long Beach, Oakland or Seattle and further land (road or rail) transportation to the east part of USA.

The passages of container vessels through Neopanamax Locks during the year 2017 account to 954 or abt. 52% from all passages of containerships [14]. In 2018 the new set of locks registered 1,209 transits and 70% from the TEU capacity or 10.1 million TEUs, transported through the Panama Canal. The major cargo traffic or 43% was in direction Asia – East Coast of U.S. The official statistic of Panama Canal Authority for 2018 presented that 54% from the volume of TEU capacity belongs to Neopanamax Locks. During the year 2019 the traffic throughput of new set of locks increased to 52% and eighty percent of large vessels transits are done from tankers, dry bulkers, gas carriers and container vessel.

The share of cargo traffic through Panama Canal from/to East Coast of U. S. for the period (2017-2021), analyzed on Figure 7, increased from 55.85% to 65.63% (blue line on Figure 7). During the first year after opening of new set of locks the cargoes with origin or destination U.S. East Coast consist of 81.77% from all cargo from/to U.S., that passed Panama Canal (see red line on Figure 7).

In financial year 2021 the cargo flows from/to ports of East Coast increased in comparison to all cargo from/to U.S. ports to 90.53%. The percentage of containerized cargo, passed through new NeoPamanax Locks, also increased from 64.22% in 2017 to 83.66% in year 2021 (green line on Figure 7) [14, 15].

For the investigated period (2017-2021) the cargo traffic from/to East Coast of U. S. increased with 9.78% and containerized cargo reached the enhancement of 19.44%, which definitely resulted from Panama Canal expansion, improvement of ports and transport infrastructure on East part of U.S. and relocation of cargo supply chains and international trade from western part of U.S. to the eastern (Figure 8). On the second place remained cargo traffic in direction East Coast U.S. – West Coast of South America.

The decreasing of number of vessel passages through Panama Canal in last year 2021 with 0.1% is consequence of Covid-crisis that leads to fewer transits of passenger vessels, general cargo and refrigerated vessels. Regardless of that fact the number of container vessel grows steady for the period of the study (Figure 9).

The trend for higher throughput of containerized cargo in east U.S. ports is observed also by Discartes Datamyne. According to the official data of the company during the period 2012-2017 the volume containers handled on west U.S. ports also raised steady, but the annual growth in percentage declined from 23.2% in 2012 to 20.8% in year 2017 [26]. The largest ports, located on

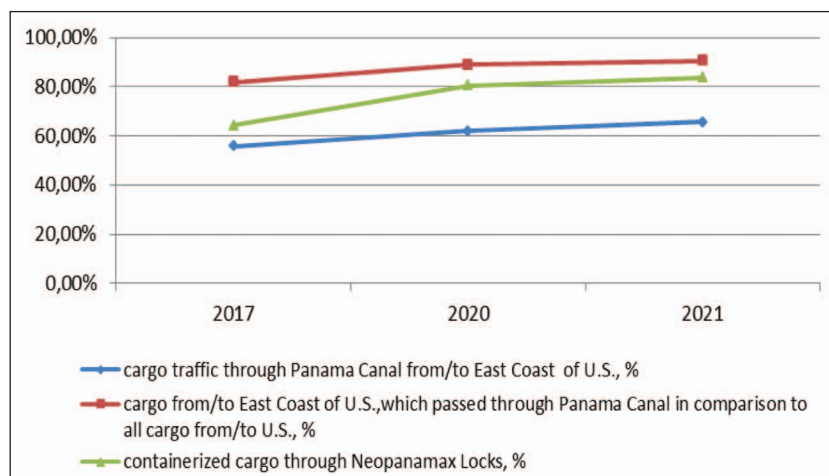


Figure 7 Cargo traffic from/to East Coast U. S. ports

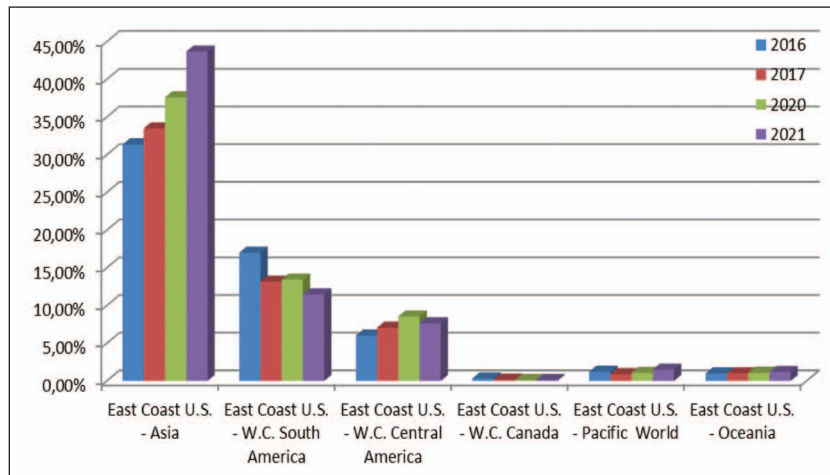


Figure 8 Percentage of cargo traffic through Panama Canal from East Coast U.S. to main sea trade routes

Source: Author

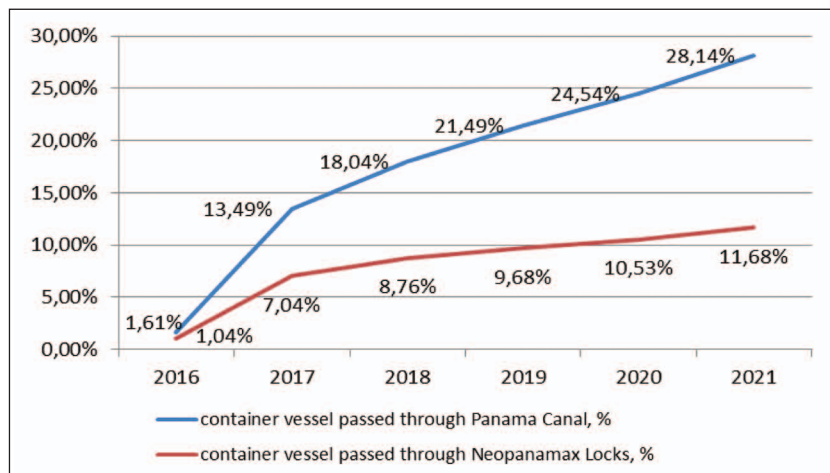


Figure 9 Container vessel through Panama Canal and new Neopanamax locks

Source: Author

west coast, Los Angeles and Long Beach declined the volume of imported containers respectively with 5% and 3%.

According to the researches of Drewly the number of imported containers on east coast U. S. ports in last quarter of 2014 rose with 13.4% from previous 2013 year and in the west coast ports the annual growth is only with 3.6%. The exports from Asia to USA accounts to 13.9 million TEUs or 6.3% average increase from previous year. The growth of cargo volume, imported on Atlantic U.S. port is 10.5% in contrast to these, located on the west coast – only 4.6%. The highest increase in imports in 2015 has ports of Savannah (32%), Houston (26%), Charleston (14%), New York (12%), and Norfolk (11%). The percentage change of imported TEU in some of U. S. ports, located on Atlantic and Pacific coast, before and after opening of new set of locks (between 2015 to 2019) is shown on Figure 10 and Figure 11.

In year 2012, one of the largest port on east U.S. coast, Port of New York/New Jersey increased the volume of handled to 1.69 million TEUs and had a share with 9.6% of U.S. ports. The volume of handled in 2016 at the Port of New York and New Jersey increased to 79,844 thousand tons. The number of handled containers reached 3,602,508 TEUs with total value about 200 milliards USD [1]. This figures put the port in year 2016 on third position of the busiest on the East Coast ports with approximately 30% of the total market share. This trend continued and for the period of five years the port increased the volume of containerized cargoes to 3.14 million TEUs in 2017. In 2019 the port of New York/New Jersey registered container capacity of 5.2 million TEU. The port of Los Angeles handled 4.68 million TEUs in 2017 and 6.3 million TEUs in 2019. The amount of import containers in port of Savannah in 2017 is 1.87 million TEUs and during 2020 reached the volume of 4.7 million TEUs.

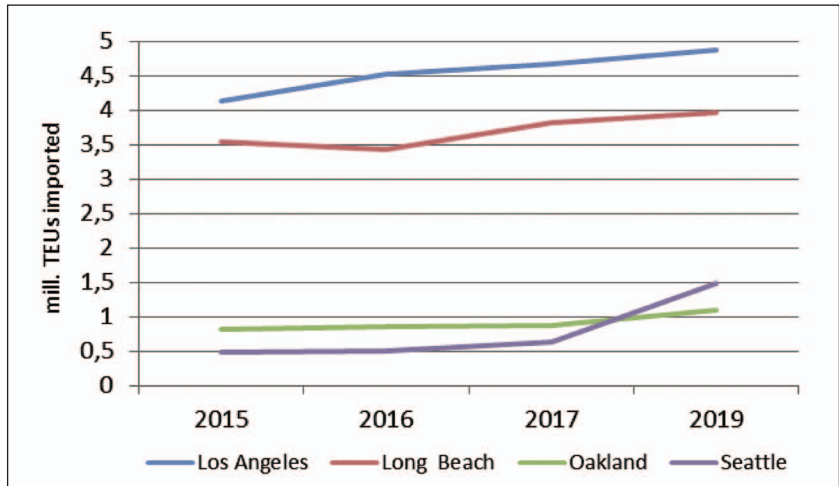


Figure 10 Volume of imported TEU from 2015 to 2019 in west coast U.S. ports

Source: Author

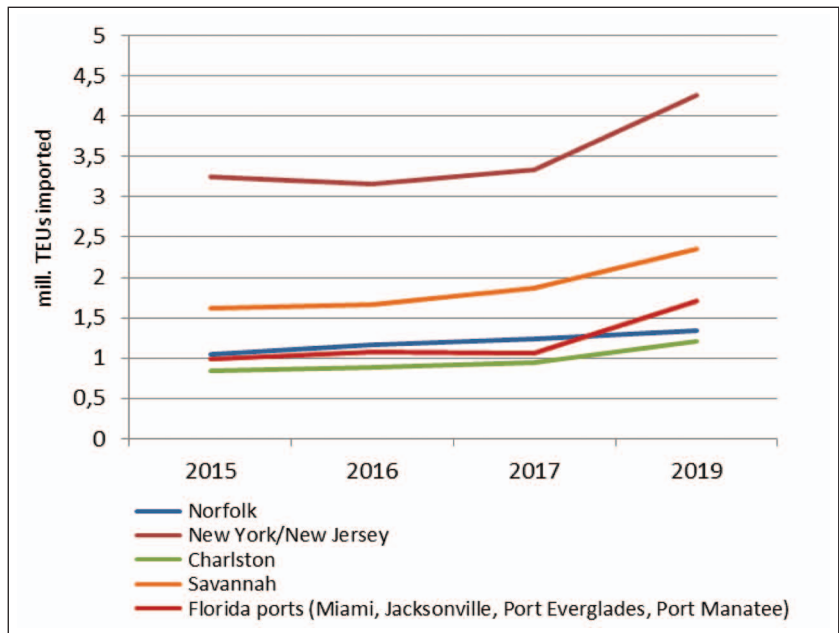


Figure 11 Volume of imported TEU from 2015 to 2019 in east coast U.S. ports

Source: Author

During the financial year 2017, the first year after opening of new set of locks, the Florida seaports handled 3.7 million TEUs. In next 2018 the amount of container throughput increased to 4.1 million TEUs. For the year 2018 they have 80% share from the global market and in 2019 registered 3.1% growth from previous year [20, 21, 22]. From the whole ports, located on the East U.S. coast, the port of Manatee registered rapid growth. Port 5-years period, between 2016-2020, port increased the amount of imported containers with 16.7% and for fiscal year 2021 reached the figure of 135,660 TEUs handled and total cargo throughput app. 10.5 million tons.

From the analyses above, it can be concluded that the expansion of the Panama Canal has caused strong competition between American ports. In desire to handle more vessel from the latest generation the ports, located on East American coast start expansion before the opening of the new locks of Panama Canal, the companies invest huge capitals for upgrades in these regions, including inland intermodal facilities and transport infrastructure. The railway connections were improved and allow unit trains to carry containerized cargo from/to the large logistic and distribution centers.

3 Conclusion

Before the expansion during the navigable period average 35-40 vessel, or 6% of world maritime trade, passed through the old locks of Panama Canal. At the end of 2016 year, the gas processing and manufacturing industry registered a significant leap. The main reason for this is the extending exports of US petroleum products through the new locks of the Panama Canal to developing markets in Asia [6]. Than the Canal made 40% from GDP of Panama and the Panamanian authorities predicted growing of the incomes till year 2021 to reached 2.1 milliards USD per year [15].

In order to respond to the rapid growth in international trade, some ports are periodically required to expand their infrastructure. To reduce the congestions at port and population exposure to health hazardous air pollutants the modal shift for transport of goods to and from the port from road to rail needs to be promoted. Therefore many of large harbours operate mainly with containerized cargoes and implement automated systems for performing of cargo handling operations [5]. The statistic of UNCTAD shows that arrivals of container-ships from all ships of US ports in 2020 are the dominant in comparison with other cargo vessels with 20,037 calls. The container routes passing through the Panama Canal are concentrated in hands of the three global alliances. Before opening of new set of locks these consortiums of large container shipping companies dominated on global market, because they controlled 96% of routes in direction East-West and had a total share of 77.2% on market with containerized cargoes [9]. In consequence of improvement of port infrastructures and inland transports connections the volume of containerized cargo carrying through the expanded Panama Canal from China to the Atlantic U.S. ports grew significantly. As per data of company Panjiva during the year 2020 the amount of imported TEUs in U. S. ports increased with 1.7% annually and reached 2.93 million TEUs.

The relocation of cargo flow into the east coast of the United States decreases the dependency to inland transport, as well as all negatives concerned, such as unexpected delays due to road congestion and accidents, and ensures more efficient use of established supply chains in the country. Generally, for the period of five years the expansion of Panama Canal affected to wide range of industry branches and modified the already existed global supply chains and world maritime trading routes. Some commercial segments have already noticed the positive effect, but for other it is still far away. In the future the process for changing of transport patterns worldwide will continue and in USA will lead to relocation on large centers of international trade into the eastern and south-eastern states of the country.

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