

# **Abstract: Seizing opportunities from the Panama Canal Expansion through Adaptive Port Planning**

## **A case study of the Caribbean Port of Barranquilla**

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### **Background and objective of study**

The third set of locks of the Panama Canal opened to traffic on June 26<sup>th</sup>, 2016 enabling the transit of Neo-Panamax<sup>1</sup> (NPX) vessels through the 100-year old maritime route. This historic milestone will impact the business cases of port- and transport infrastructure within its region of influence which includes the Caribbean ports such as Bahamas, Trinidad and Tobago, Venezuela, Colombia, Jamaica, Puerto Rico and Dominican Republic. This paper presents a study carried out to first assess the impact of the Panama Canal Expansion (PCE) on the Caribbean ports, and thereafter, to examine how the ports can adapt in order to seize new opportunities created by the expansion. An applied case of long-term planning under uncertainty by using Adaptive Port Planning (APP) framework is presented for a port in Barranquilla, Colombia.

### **Methodology and findings**

A detailed literature study of Panama Canal Expansion (PCE) on Caribbean ports (Soto Reyes, 2017) was carried out. The study concluded that the major short-term impact for Caribbean ports would be a decrease in transshipment container volumes, lost to new direct services deploying NPX vessels calling to the newly adapted ports of the United States East Coast and the Gulf of Mexico. However, due to their privileged geographical location in the crossroad of important maritime routes their development will continue to be intrinsically linked to the Panama Canal beat. The study concludes that an expanded Panama Canal will eventually attract more Caribbean port traffic.

The PCE is expected to reach its capacity around year 2032 (Soto Reyes, 2017) and as the scrapping of old Panamax vessels take place, and the substitute fleet of NPX grows, it is likely that container transshipment business will regain traffic volumes. Thus, the new bottlenecks in the expanded Panama Canal may result in new opportunities for the Caribbean ports.

Like other ports worldwide, the Caribbean Ports are beset with many other future uncertainties related to technology, market and economy, politics and legislation as well as society and environment and yet must ensure functionality, capacity and service quality during their design life time in a sustainable manner (PIANC, 2014a, 2014b; Taneja, 2013). We advocate an adaptive

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<sup>1</sup> NPX vessels: Vessels with the following maximum dimensions 366 meters Length over All (LOA), 49 meters beam, and 15.2 meters draught in Tropical Fresh Water (TFW).

planning approach that aims at developing plans that take uncertainties explicitly into account, allowing for change, learning, and adaptation over time based on new knowledge and changing circumstances. Such flexible or adaptable plans will allow the port to functional under new, different, or changing requirements in a cost-effective manner, and seize opportunities.

This paper presents an applied case of Adaptive Port Planning (APP) for a new port in Barranquilla, Colombia. The existing port complex is located on the West bank of the Magdalena river and the new port expansions on the East bank will consist a liquid bulk terminal with two berths, and one multi-purpose berth for the dry bulk and container terminal. The design vessel is smaller than a Panamax vessel and therefore the port will be unable to handle NPX vessels now transiting PCE.

In addition to the uncertainties related to future technology, energy transition, climate change and sea-level rise, One Belt One Road (OBOR) Chinese project (CBBC, 2016), U.S. Protectionism policies, China's deceleration, India's surge, Latin American integration and upsurge, e.g. "Chile-con Valley" (The Economist, 2012), the project is confronted by many other uncertain developments. These relate to traffic on Panama Canal routes, trade with neighbouring countries, future development plans of CORMAGDALENA<sup>2</sup> in the region, the demands placed on the project, and the investment in hinterland connections, i.e. developing a network of inland intermodal terminals.

Since the project is located next to an environmentally protected area, opposition from the public and stakeholders is likely. Moreover, utilities supply from the West bank to the terminal represent a logistics issue for the construction of the terminal. Decay of transshipment on Caribbean ports, scrapping of Panamax vessels due to economies of scale from NPX and other Post-Panamax categories of vessels and deepening of U.S. East Coast and Gulf ports represent some other uncertainties. A major opportunity is LNG<sup>3</sup> business as LNG becomes the "cleaner" fuel of the future.

After having identified critical uncertainties, i.e., vulnerabilities and opportunities, actions are proposed to make the existing masterplan of the port expansion robust.

The paper further suggests that a monitoring system be set up that scans the external environment for new developments and alerts planners of the need to implement the above actions.

## **Conclusions**

We should move from risk management to uncertainty management and, from static strategic planning to dynamic adaptive planning. Accordingly, such uncertainty management and dynamic planning should be deemed as essentially interlinked and contemporaneous. Adaptive port planning is a comprehensive, coherent and integrated methodology to incorporate flexibility into port infrastructure projects.

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<sup>2</sup> Corporación Autónoma Regional del Río Grande de la Magdalena (CORMAGDALENA)

<sup>3</sup> Liquefied Natural Gas (LNG)

The Panama Canal expansion will certainly bring cascading impacts on the ports and logistics platforms of the Caribbean region. Initially, the decrease of transshipment containers volumes, lost to new direct services deploying Neo-Panamax vessels. The escalated scrapping of old Panamax vessels will also have its effects. The eventual capacity saturation of the expanded Panama Canal around year 2030 may however contribute to the recovery of the container transshipment business in the Caribbean port system.

Hence, uncertainty is omnipresent as far as this point, especially when many of the estimations are based on uncertain assumptions of different alternatives for sailing patterns, mergers and alliances, innovative technologies, and global economy's outlooks.

For the specific research case study, flexible options generally resulted in a more viable project.

Overall, the Adaptive Port Planning methodology, as applied in this research work, proved to be an innovative and yet pragmatic methodology to tackle the somehow tricky task of valuing flexibility, accomplished by means of the simple and transparent tools such as dynamic forecasting, Real Options Analysis and Monte Carlo Simulation.

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