TRANSFORMING THE

CARIBBEAN PORT SERVICES INDUSTRY:

TOWARDS THE EFFICIENCY FRONTIER

CARIBBEAN DEVELOPMENT BANK

TRANSFORMING THE CARIBBEAN PORT SERVICES INDUSTRY: TOWARDS THE EFFICIENCY FRONTIER

ISBN 978-976-95695-8-4

Published by the Caribbean Development Bank

CONTENT

List of Figures

List of Tables

Abbreviations

AMP	Panama Maritime Authority
APM	TA.P. Moller-Maersk Terminals, a Global Terminal Operator
BMC	Borrowing Member Country of the CDB
CAGR	Compound Annual Growth Rate, a measure to calculate the mean annual growth rate over a specified period of time
CFS	Container Freight Station
CDB	Caribbean Development Bank
CSA	Caribbean Shipping Association
DPW	Dubai Ports World, a Global Terminal Operator
FTE	Full Time Equivalent, a measure for the size of a workforce (calculating the 'theoretical amount of full time employees')
JAPDEVA	Junta de Administración Portuaria y de Desarrollo Económico de la Vertiente Atlántica (translated: Board of Port Administration and Economic Development of the Atlantic Coast)
ICTSI	International Container Terminal Services, Inc., a Global Terminal Operator
ISPS	International Ship and Port Facility Security Code
LCL	Less-than-Container Load
MHC	Mobile Harbour Crane
PA	Port Authority
PCS	Port Community System
PPP	Public Private Partnership
TEU	Twenty-foot Equivalent Unit (Container)
TO	Terminal Operator
TOS	Terminal Operating System
ULCS	Ultra Large Container Ship
VGF	Viability Gap Funding

ACKNOWLEDGEMENTS

This publication was commissioned by the Economics Department of the Caribbean Development Bank (CDB), and prepared by a Consulting Firm, Maritime and Transport Business Solutions. The Consulting team was led by Max Meijer who was competently assisted by Frank Luisman, Project Director and Adrian de Gruijiter, Project Analyst. CDB acknowledges with gratitude the work done by the Consultants and all those in the Borrowing Member Countries that were the focus of the study, who assisted in any way in making its completion possible.

An internal team comprising Dr. Patrick Kendall, Dr. Justin Ram, Ian Durant, Brian Samuel and Damien Reeve was responsible for the technical supervision of the process. The team acknowledges with deep appreciation the useful comments and insights offered by CDB staff. Alana Goodman and Linda Cordeaux provided the legal services required of the project; Andria Murrell provided the Administrative support while Klao Bell-Lewis oversaw the design and finish of the publication.

It is our hope that policymakers and other stakeholders will find this study a very useful guide in efforts to enhance the capacity and the efficiency of the Regional Port Services Industry.

Dr. Justin Ram
Director, Economics Department
Caribbean Development Bank

FOREWORD

With the expansion of the Panama Canal in 2016, global maritime transport is about to undertake a quantum leap into a new era characterised by substantially larger ships. We are all asking: what does this mean for the Caribbean? What are the opportunities that this new development will offer? How does the Region unlock such opportunities in an environment which, by all indications, is becoming increasingly competitive?

Regional maritime transport already faces a number of serious challenges, among which are the growing unmet demand for port infrastructure investment; inadequate port infrastructure; poor maintenance of port infrastructure, and under-capitalisation.

The principal objective of the Study is the identification of initiatives that can augment efficiencies and capabilities of gateway ports in the borrowing member countries of the Caribbean Development Bank. For twelve Caribbean countries, the Study generated a composite indicator of port efficiency using seven sub-indicators (berth productivity, that is, the level of productivity with respect to unloading of cargo; labour costs as a percentage of operational cost; the state of port infrastructure; nautical access defined as maximum vessel draught; the level of autonomy of port management; the quantity and quality of stevedoring equipment; and the level of information technology (IT) development). The ports are then ranked in terms of efficiency.

Based on the current characteristics, operational bottlenecks and the expectations for the development of container trade in the future, the Study estimates demand for port services up to 2025 and presents a framework of development direction for these ports, as well as a list of investment requirements for the twelve ports, based on efficiency requirements

Our expectation is that the study can inspire meaningful policy and institutional reforms that can transform port services across our Region.

Wm Warren Smith, PhD
President
Caribbean Development Bank

EXECUTIVE SUMMARY

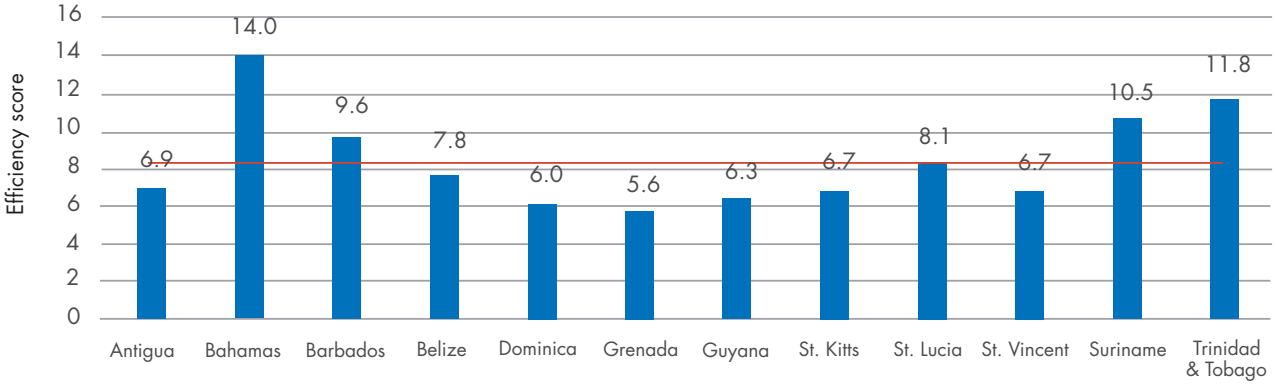
The overall objective of the Study is to stimulate new perspectives with respect to policies, practices and institutions required to enhance efficiency and improved viability of the Port Industry.

The countries and ports considered in this study are[1]:

- Bahamas, Port of Nassau
- Barbados, Port of Bridgetown
- Belize, Belize Port
- Guyana, Port of Georgetown
- Suriname, Port of Paramaribo
- Trinidad & Tobago, Port of Port of Spain
- Antigua & Barbuda, Port of St. John
- Dominica, Port of Roseau
- Grenada, Port of St. George's
- Saint Kitts & Nevis, Port of Basseterre
- Saint Lucia, Port of Castries
- Saint Vincent & the Grenadines, Port of Kingstown and Port of Campden Park

[1] The port of Kingston Jamaica is left out of this Study, even though Jamaica is a BMC. The port of Kingston is a major transhipment hub in the Caribbean and does not match the focus of the Study.

Figure 0-1: Efficiency Score



PORT EFFICIENCY

A key focus of the Study is investigation of the efficiency of the twelve ports. The level of efficiency of ports impacts the costs of import and export, thereby affecting the competitiveness of national economies. Port efficiency also impacts growth in price levels and, hence, the level of poverty. Consequently, port efficiency deserves significant policy attention.

This Study has formulated a composite measure of port efficiency which is used to compare efficiencies across ports. The indicators used in the port efficiency measure are:

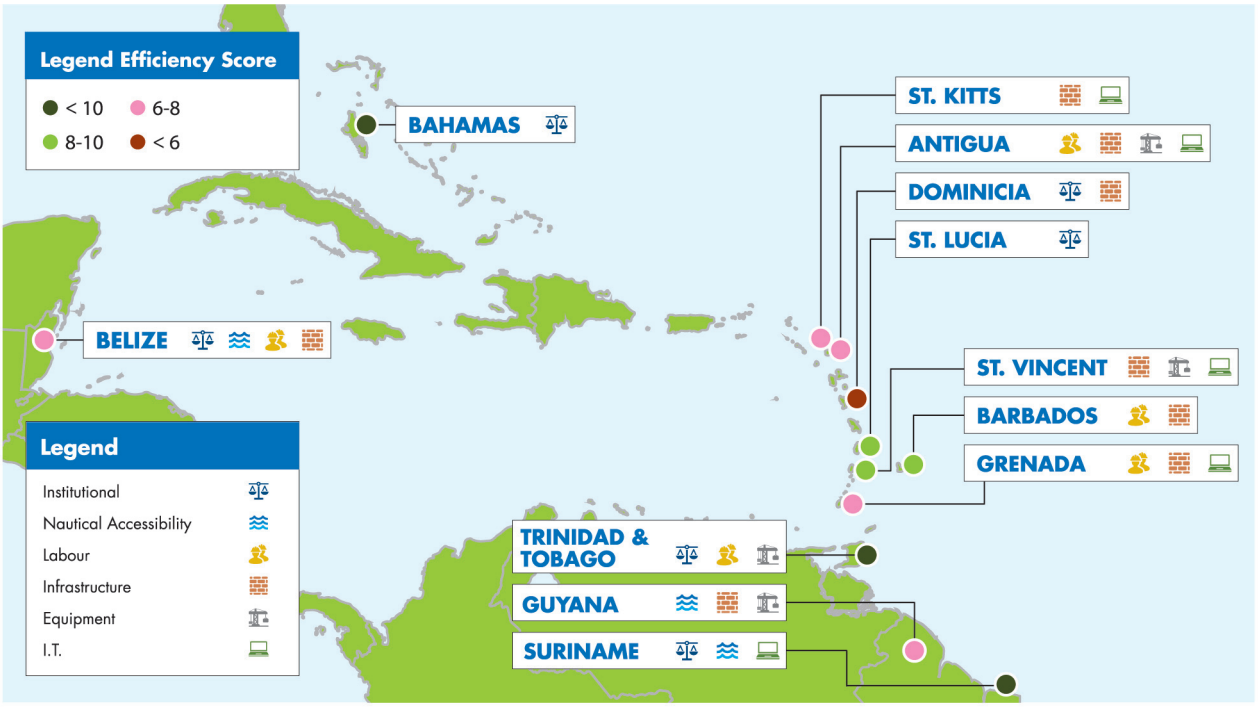
1. Berth productivity;
2. Labour productivity: measured by TEU per employee;
3. Quality of infrastructure;
4. Nautical accessibility measured by the maximum vessel draught;
5. Type of equipment used for stevedoring operations;
6. Type of IT systems used in port operations; and
7. Level of autonomy of the port operator

Figure 0-1 shows the total score for the ports in the sample. The red line in the figure denotes the average of the sample.

The Port of Nassau in the Bahamas is the most efficient port in the sample. This should come as no surprise, given the newness of the port and private sector leadership. The second most efficient is the port of Port of Spain (PPOS), which enjoys economies of scale, has the largest crane park, and is a front runner on IT implementation. The third most efficient is in Suriname, which has successfully implemented a landlord structure, a port management model that allocates investments in infrastructure to the port authority and investments in operations/stevedoring and equipment to the private sector. As part of this Public Private Partnership (PPP), the port is now operated by private companies among which is Dubai Ports World (DPW), a world class operator.

Among the OECS countries, the most efficient is the port of Saint Lucia which scores high on the quality of infrastructure, availability of equipment and the implementation of IT systems. The most challenged ports in the OECS are Grenada and Dominica, both of which score relatively low on operational performance, labour productivity and the level of autonomy.

Figure 0-2 Main Bottlenecks in Port Efficiency



OVERVIEW OF MAIN BOTTLENECKS

Figure 0-2 highlights the main bottlenecks in port efficiency for each port. The colour of the dots indicates the respective efficiency score as presented above. The figure illustrates that:

- The institutional framework presents some challenges to enhanced efficiency in the Bahamas, Belize, Dominica and Saint Lucia. In Dominica and Saint Lucia, indications are that the operations of the port authorities are somewhat constrained in their development by the lack of autonomy due to government control. In the Bahamas and Belize, the port authorities are failing to carry out fully their responsibilities as stipulated in their respective agreements with the port operators.
- Limited nautical accessibility is a major bottleneck in Belize, Guyana and Suriname, as it constrains the ability to exploit economies of scale in maritime transport.
- The state of the port infrastructure is an operational bottleneck in Belize, Guyana, St. Kitts, Antigua, Dominica, Saint Vincent and Grenada. Infrastructure in the OECS ports is often outdated and the terminal layout is from the breakbulk era in which warehouses were constructed on the quay. This hampers efficient container handling.
- The state, or the lack, of equipment is a bottleneck in Trinidad & Tobago, Guyana, Antigua and Saint Vincent. In PPOS, the cranes are outdated and break down on occasion, leading to higher waiting times for vessels. In Guyana, no mobile harbour cranes are available,but the volumes would warrant the use of a crane. In Antigua and Saint Vincent, the mobile harbour cranes are outdated.
- The lack of (integrated) IT systems is an efficiency bottleneck in Suriname, St. Kitts, Antigua, St. Vincent and Grenada. IT systems provide users with up to date information and give port managers insight into the operational processes.

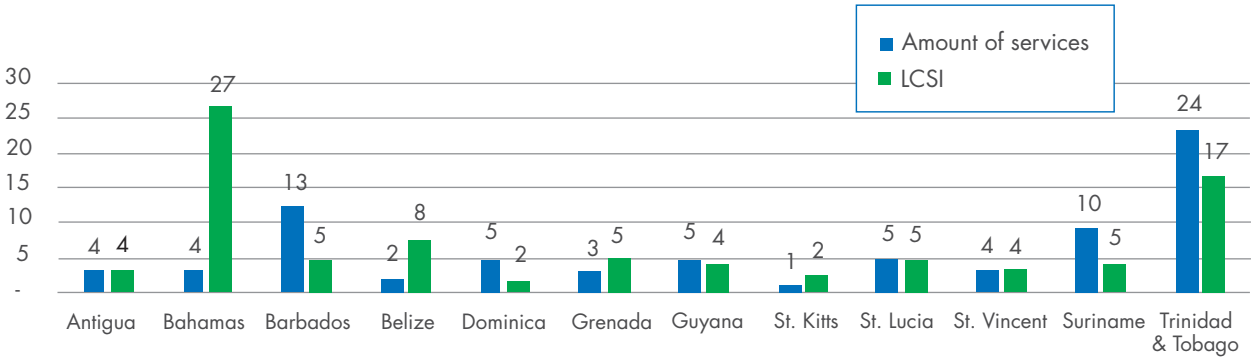
MARITIME CONNECTIVITY OF THE PORTS

The Caribbean basin hosts some of the largest transhipment ports in the world. Hence, the level of transhipment of container cargo is substantial. Shipping lines use the hub-and-spoke system in order to minimise supply chain cost and network coverage. The ports in the sample are therefore mostly connected to the global markets through the transhipment hubs. The shipping lines that call upon the ports frequently use the Miami, Everglades and Kingston hub ports.

The level of connectivity to the global maritime networks is measured by the World Bank in a Liner Shipping Connectivity Index (LSCI).[2] However, this is based on country level data. Another way to assess the connectivity is to count the number of liner services calling the port. Figure 0-3 shows the results of the connectivity analyses.

Trinidad & Tobago is best connected with 24 services and LSCI score of 17.3, followed by Barbados (13 services and 4.7 LSCI score), and Suriname (10 services and 5.0 LSCI score). The lowest scores are obtained by St. Kitts (1 and 2.3), Grenada (3 and 4.5) and Saint Vincent (4 and 3.9). The Bahamas scores high on the LCSI because of the Freeport port. The port of Nassau is merely connected by 4 lines. Hence, the LCSI score is not representative of the port.

Figure 0-3: Liner Connectivity Ports[3]



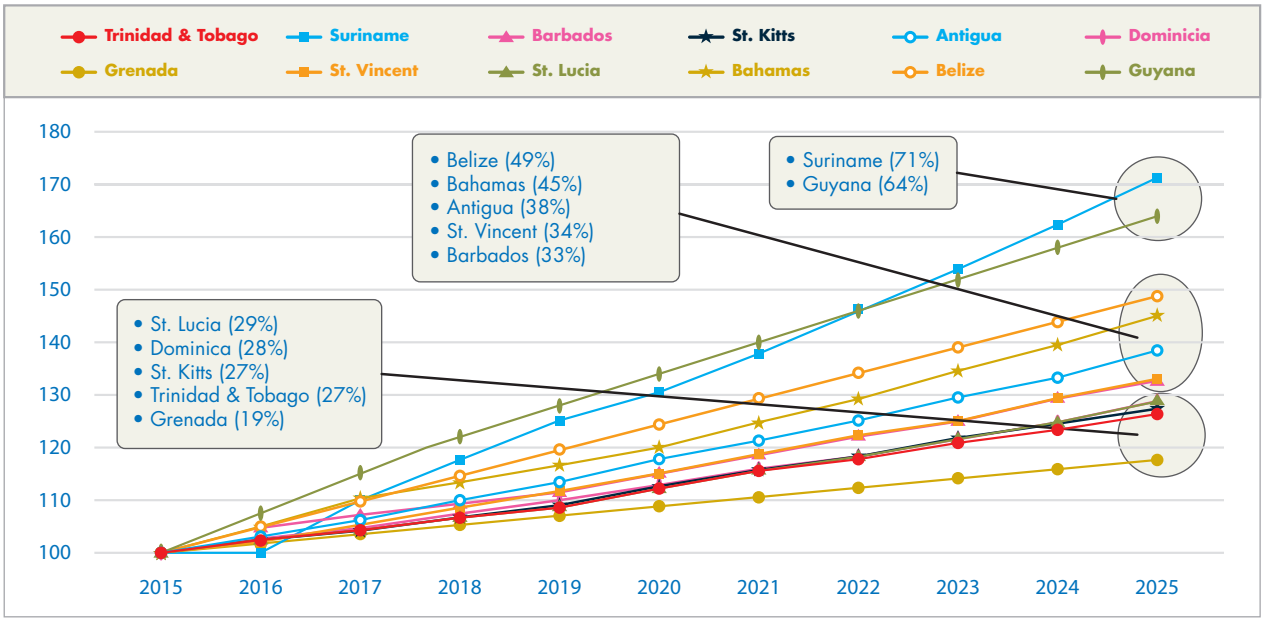
THE TRENDS OF TRANSHIPMENT AND INCREASING VESSEL SIZES WILL CONTINUE

The main trends in the Caribbean maritime sector are the increasing vessel sizes and consolidation among shipping lines. These trends are expected to continue. In fact, double transhipment moves inside the Caribbean basin (which already occur) are likely to become more prevalent as shipping lines aim to optimize use of the larger vessels. In order to do so, shipping lines will call only at several large and conveniently situated ports with the largest vessels. Consequently, medium-sized vessels will serve several regional hubs, and small vessels will be employed to serve small regional ports. As such, regional transhipment activity will likely increase and a new regional hub would possibly emerge among the OECS ports.

2 "The Liner Shipping Connectivity Index captures how well countries are connected to global shipping networks. It is computed by the United Nations Conference on Trade and Development (UNCTAD) based on five components of the maritime transport sector: number of ships, their container-carrying capacity, maximum vessel size, number of services, and number of companies that deploy container ships in a country's ports." World Bank, 2016

3 The amount of services is based on author's calculations. The LCSI is based on World Bank Data (2016) for the year of 2014.

Figure 0-4 Indexed Gateway Container Growth Forecast



TRAFFIC FORECAST FOR THE BMC PORTS

Figure 0-4 provides an overview of the gateway container forecast. The figures have been indexed (year 2015 = 100) in order to enable comparison of growth between individual countries. From the figure, a substantial range in estimated outcomes can be noted. For example, by 2025, Suriname's gateway container demand is estimated to have grown by approximately 70%, whereas Grenada's cargo demand is estimated to have grown by approximately 20%.

Based on projected growth, countries have been ranked and grouped. The following three groups have been identified:

- High growth group: Suriname and Guyana;
- Medium growth group: Belize, Bahamas, Antigua, Saint Vincent, and Barbados; and,
- Low growth group: Saint Lucia, Dominica, St. Kitts, Trinidad & Tobago, and Grenada.

From the identified groups, it may be noted that the OECS countries included in the assessment generally underperform in projected cargo growth, as compared to other countries included in the assessment. This is to be expected, as the smaller island nations typically exhibit low population and GDP growth. It can be further noted that Trinidad & Tobago is expected to achieve a substantially lower cargo growth than comparable countries. This is mainly attributable to a low GDP growth expectation (the IMF World Economic Outlook forecasts the country's GDP to grow by 1.0% to 1.75% per annum until 2020).

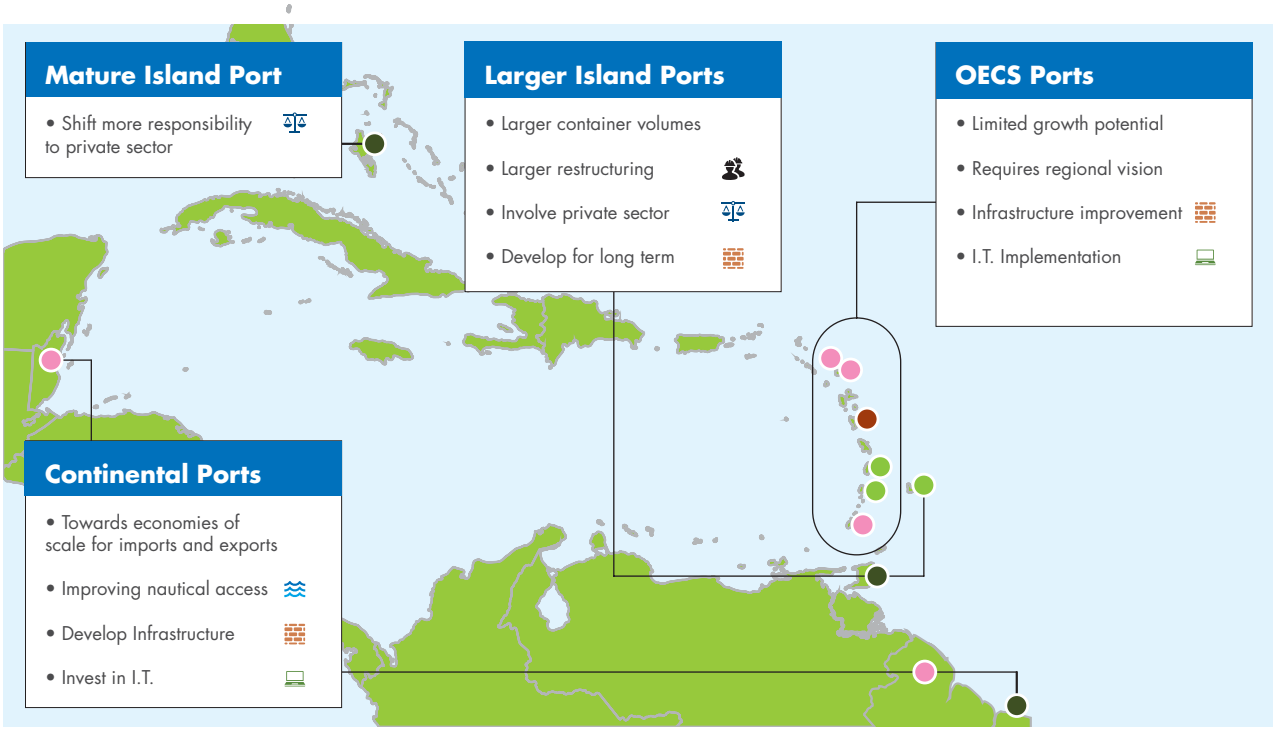
Based on the projected demand growth, capacity constraints are expected to develop mainly in the continental ports (Suriname and Guyana), even after carrying out a sensitivity analysis that controls for potentially optimistic economic growth projections.

DEVELOPMENT VISION FOR THE PORTS

Based on the current characteristics, operational bottlenecks and the expectations for the development of container trade in the future, this Study formulated development visions for the ports. The development visions present a framework of development direction which also aids in the formulation of the development projects.

- The OECS are small island economies with limited growth potential. Most OECS countries are therefore advised to optimize the current operations within their means. There is limited potential for PPP, given the small volumes which make the ports dependent on public resources for investment.
- The continental ports of Belize, Guyana and Suriname need to improve nautical accessibility and the quality of infrastructure. As these continental ports face high growth expectations, there is a need for the upgrade of the infrastructure facilities and nautical accessibility. With higher volumes, the ports should aim to capture the effects of economies of scale through larger vessel sizes and consolidated operations.
- The larger island ports of Bridgetown and Port of Spain need to focus on labour restructuring and attracting the private sector. Both ports have substantial volumes which would generate interest among private sector parties. Currently the efficiency of these ports is mainly hampered by traditional labour practices. The implementation of port reform, however, should be guided by a long-term vision of port development in the respective countries.
- The port of Nassau represents a mature island port. The port is functioning highly efficiently. This could warrant the shift of additional responsibilities to the private sector.

Figure 0-5: Development Vision of Ports



DEVELOPMENT AND INVESTMENT OPTIONS

The Study revealed a long list of investment options which can contribute to the enhancement of port efficiency. The list on the following page presents a summary of the investment options with cost estimates. In general, implementation of the identified projects will lead to a decrease in transport costs, allow for economic growth, and safer port operations.

RECOMMENDATIONS

Based on the findings of the Study, CDB recommends:

- Port investment and modernization among Borrowing Member Countries (BMCs). BMC Ports require the substantial attention of policy makers as low port efficiency significantly affects import and export cost, regional competitiveness and poverty levels.
- Combining funding with port reform, where applicable. As a development bank, CDB will exert its influence in order to realize port and/or labour reform, and work towards more efficient port operations.
- Exploration of a regional port strategy for the OECS. Given the limited volumes being handled in the ports, port investments are often not financially feasible. Investments should be made under prudent guidance and with an awareness of the regional developments. It would be a waste of public resources for all the OECS countries to invest in deep-sea facilities.
- Formulation of a master plan/feasibility studies, in order to optimize on infrastructure investment opportunities.
- Allocation of funds to finance port labour training. In particular, ports managed by the public sector have been deficient in training of operational staff with respect to the use of IT and equipment operation and maintenance.

It is recommended that policy makers:

- Take into consideration the regional and competitive environment. Port development projects are capital intensive and require prudent investment decisions. It is therefore crucial to assume a regional perspective and to understand the regional dynamics and the role of the respective ports. The highly connected OECS ports should especially consider a regional perspective strategy.
- Allow the port organizations a higher degree of autonomy. Political interference is found to limit the port authority's ability to operate efficiently or to establish a long-term vision. A higher degree of autonomy can be realized through private sector involvement. The ports of Paramaribo and Nassau are prime examples of private sector involvement leading to a high degree of efficiency.
- Recognise the need for labour restructuring and work towards a viable long-term solution. In numerous ports, labour is still functioning under traditional conditions devised in the breakbulk era. High labour costs weigh heavily on the port operations. This situation is unsustainable in the long term. It is recommended that policy makers move towards a long-term solution.
- Embrace a long-term port development vision concerning port development. In a number of countries, there is no long-term port development vision that is embraced by the various stakeholders and being executed. The lack of a common long-term vision hampers development as investors are uncertain of the future.

Table 0-1: Lending Options

No.	Description of project	Costs (M USD)	Recipient	Timing
Antigua	Finance labour restructuring	5	Antigua Port Authority	2016-2020
Antigua	Acquisition of a mobile harbour crane	3	Antigua Port Authority	Q3 2016
Antigua	Acquisition and implementation of Port IT system	2	Antigua Port Authority	2016
Bahamas	Rehabilitation of the breakwater	20	Port Department Bahamas	2016-2017
Barbados	Financing labour restructuring program	10-20	Barbados Port Inc	2016-2020
Barbados	Development of cruise pier Sugar Point	200	Barbados Port Inc	2017-2020
Barbados	Implementation of Master Plan cargo port	100	Barbados Port Inc	2016-2020
Belize	Financing dredging works	15	Port Authority Belize	2017
Belize	Funding labour restructuring	5-10	Belize Port Limited	2016-2018
Dominica	Development of Port Masterplan	1	Dominica Air & Sea Port Authority	2016
Dominica	Funding of port development	unknown	Dominica Air & Sea Port Authority	Long term
Grenada	Reduction in labour costs	5 -10	Grenada Ports Authority	2016 - 2018
Grenada	Improved terminal layout	1 / 10 – 20	Grenada Ports Authority	Medium Term
Grenada	Rehabilitation of deteriorated pavement	1	Grenada Ports Authority	2016 – 2018
Guyana	Development Port Masterplan	1	Guyana National Shipping Association	016
Guyana	Funding of port development	50-150	New consortium	Long term
St. Kitts	Study on rehabilitation of cargo pier	1	St. Christopher Air & Sea Port Authority	2016
St. Kitts	Rehabilitation of cargo pier	20-50	St. Christopher Air & Sea Port Authority	Long term
St. Kitts	Acquisition and implementation of IT system	2	St. Christopher Air & Sea Port Authority	2016
Saint Lucia	Increased autonomy of SLASPA through Institutional reform	unknown	Saint Lucia Air & Sea Ports Authority	2016 - 2020
Saint Lucia	Procurement of an additional mobile harbour crane	2.5 – 5.0	Saint Lucia Air & Sea Ports Authority	2018 - 2020
Saint Lucia	Feasibility Study of Structural Integrity 5 of Berth	0.5 – 1.0	Saint Lucia Air & Sea Ports Authority	2016 - 2018
Saint Vincent	Improved terminal layout	1 / 10 – 20	Saint Vincent & the Grenadines Port Authority	2016 – 2018
Saint Vincent	Rehabilitation of the main ports	2.5 – 5.0	Saint Vincent & the Grenadines Port Authority	2016 - 2018
Suriname	Economic Feasibility Study on Deepening River	1	Maritime Authority Suriname / Port Authority	2016
Suriname	Financing dredging work	20-50	Maritime Authority Suriname / Port Authority	Long term
Suriname	Acquisition and implementation of Port Community System	2	Port Authority	2016
Suriname	Expansion of the truck gate	2	Port Authority	2016-2017
Trinidad & Tobago	Development of a National Port Masterplan	1	Ministry of Transport	2016-2017
Trinidad & Tobago	Financial Assistance in labour restructuring	15-30	Port Authority	
Trinidad & Tobago	Long term			
Trinidad & Tobago	Financing acquisition of new equipment	20-30	Port Authority Trinidad & Tobago / PPOS	2016-2018

INTRODUCTION

1.1 GENERAL INTRODUCTION

Background

With the opening of the expanded Panama Canal in 2016, maritime transport in the Caribbean basin will witness significant change as ship sizes increase and shipping line patterns change due to the new economics of the maritime sector. Maritime transport in the Caribbean Region is challenged by inadequate infrastructure provision and inefficient port operations, leading to delays and additional transport costs. Expansion of the Panama Canal increases the demand for port infrastructure and efficient port operations.

The small to medium-sized ports in the Caribbean basin (excluding the major transhipment hubs) are particularly facing significant challenges in this changing environment. Financial constraints have affected the level of maintenance, infrastructure provision and deployment of equipment. The open economies of the Caribbean strongly depend on port operations for import and export. Increased efficiency of port operations so as to decrease costs, increase international competitiveness, and increase social welfare should therefore be a key focus among policy makers.

1.2 OBJECTIVES OF THE STUDY

The overall objectives of the study are:

(a) To stimulate new perspectives with respect to policies, practices and institutions required for enhanced efficiency and improved viability of the Industry; and

(b) to undertake an assessment of relevant port investment requirements.

From the Scope of Works, the following sub-objectives of the Study were deduced:

- Evaluation of current port efficiency, port capacity, institutional arrangements, operational practices and management of the ports;
- Projection of future trade patterns and cargo transport demand;
- Identification of main port performance enhancing measures;
- Identification of possible infrastructure development and effects;
- Presentation of overall conclusions and recommendations with respect to infrastructure development and efficiency enhancement for the ports of the BMCs.

1.3 SCOPE OF THE STUDY

The countries and ports included in this study are:

- Bahamas, Port of Nassau
- Barbados, Port of Bridgetown
- Belize, Belize Port
- Guyana, Port of Georgetown
- Suriname, Port of Paramaribo
- Trinidad & Tobago, Port of Port of Spain
- Antigua & Barbuda, Port of St. John
- Dominica, Port of Roseau
- Grenada, Port of St. Georges
- Saint Kitts & Nevis, Port of Basseterre
- Saint Lucia, Port of Castries
- St Vincent & the Grenadines, Port of Kingstown and Port of Campden Park

For readability purposes, the Study uses the names of the countries in tables and graphs to indicate the respective ports.

1.4 REPORT STRUCTURE

The Report is structured as follows:

- Chapter 2 presents the findings on the ports with respect to efficiency in section 2.2, and estimates an aggregate efficiency score for each port in section 2.3. The chapter continues by addressing the main bottlenecks to port efficiency in section 2.4, and concludes with the presentation of methods to enhance port efficiency in section 2.5.

- Chapter 3 provides an overview of container transport in the Caribbean basin in section 3.1, and addresses the main transhipment port developments in 3.2. Section 3.3 analyses the maritime connectivity of the ports. Section 3.4 continues with an assessment of the future development in the sector. The chapter concludes with a presentation of the traffic forecast for each port in section 3.5.

- Chapter 4 presents the various strategic considerations for port development options in section 4.1. Section 4.2 highlights a development vision for the ports, and section 4.3 lists concrete investment options for the ports in line with their development vision.

- Chapter 5 presents the conclusions and recommendations of the Study.

- Annex I contains the port fact sheets that present detailed information on each port.

- Annex II presents the bibliography.

2 PORT EFFICIENCY AND BOTTLENECKS

This chapter presents the findings on the analysis of port efficiency among the twelve ports included in the Study. The level of port efficiency and the bottlenecks identified herein provide inputs for the development projects of the ports. The chapter is structured as follows:

- Section 2.1 provides a general introduction to the relevance of port efficiency for the economy;
- Section 2.2 presents an overview of the port characteristics;
- Section 2.3 details the score of port efficiency based on seven dimensions;
- Section 2.4 addresses the main bottlenecks in the port operations; and,
- Section 2.5 presents a list of efficiency enhancing measures for each port

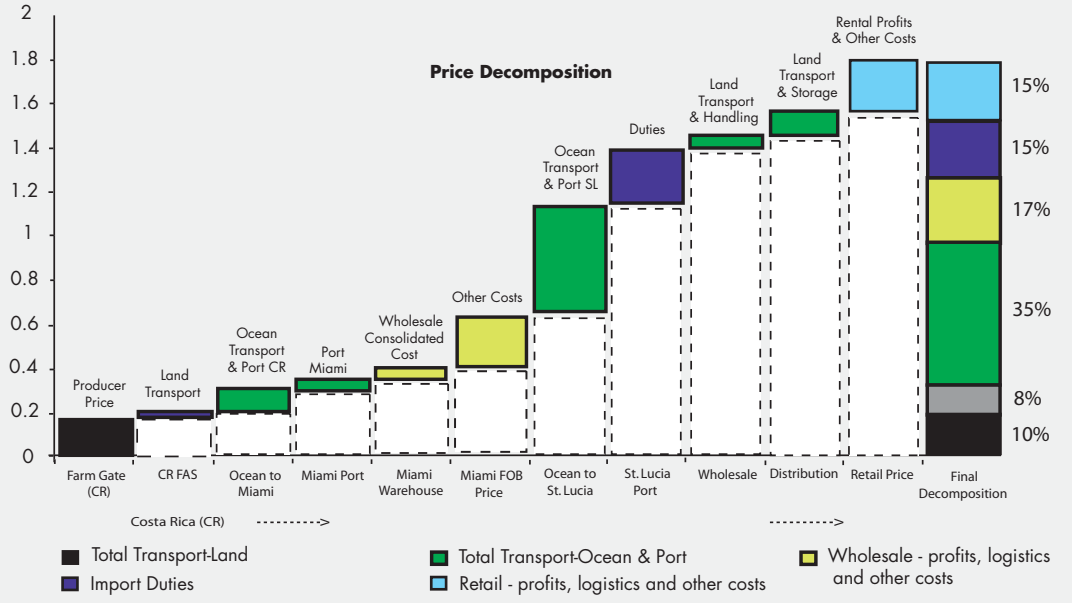
2.1 INTRODUCTION TO THE ISSUE OF PORT EFFICIENCY

The Borrowing Member Countries are heavily dependent on their seaports for the import and export of goods. As such, port efficiency has a direct effect on the costs of goods for importers and exporters. For example, the World Bank (2012) found that ocean shipping costs and port handling can amount up to 35% of the costs of consumer goods imported from Costa Rica to Saint Lucia (see Figure 2-2).

Port efficiency impacts both ocean shipping costs as well as port handling costs:

1. **Port handling costs:** Improving cost effective handling (efficient) of the cargo decreases port handling costs
   Ocean shipping costs: (1) Increasing the efficiency and reliability of the service to

Figure2-1: Price Decomposition Pineapple Transport, Costa Rica to Saint Lucia



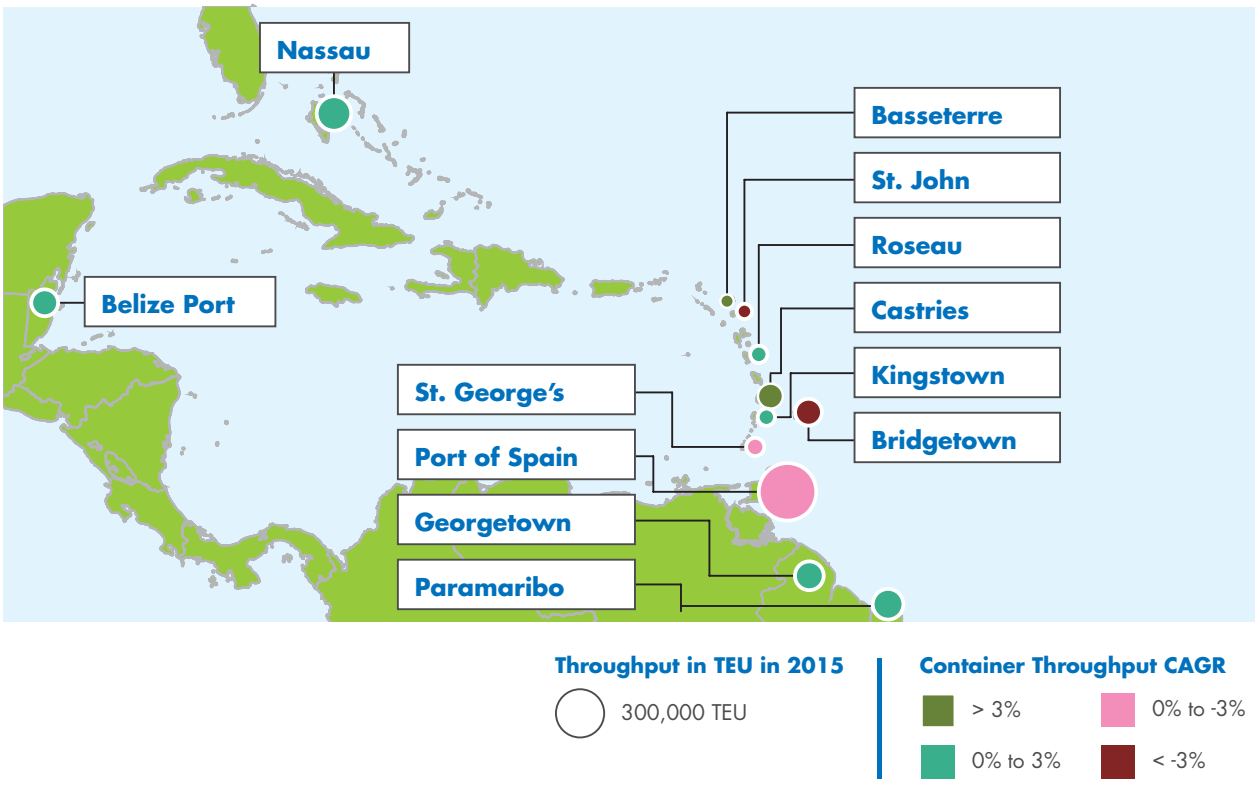
shipping lines decreases the port call costs and the risk of delays, which are priced into the ocean shipping costs; and (2) increasing nautical accessibility of the port facilitates entry of larger vessels which generally are able to achieve lower transport costs per unit.

2. As such, a higher level of port efficiency leads to:
   - lower cost of imports which in turn contributes to moderation in the cost of living and poverty levels, containment in wage growth, lowering in the cost of production; and
   - increased competiveness of exports.

2.2.1 PORT THROUGHPUT AND GROWTH

The container throughput varies substantially across the ports. The port of Port of Spain (PPOS) is the largest port, handling over 300,000 TEU per annum up to 2014. The smallest port in the sample is Basseterre in St. Kitts, handling 10,000 TEU per annum. Figure 2-2 shows the TEU throughput per port in the size of the circles. The colour represents past growth.

Figure 2-2: Container Throughput and Growth[4]



*CAGR: Compound Annual Growth Rate (a measure to calculate the mean annual growth rate over a specific period of time).

4 The growth is computed for the available years. Hence, not for all ports is the CAGR calculated over 2007-2015.

Table 2-1: Container Throughput in the Twelve Ports

In '000 TEU	2007	2008	2009	2010	2011	2012	2013	2014	2015	CAGR
Antigua	18	17	15	13	12	13	13	14	16	-2.1%
Bahamas[2]							130	134	137	2.4%
Barbados	100	87	83	80	77	72	75	78	67	-4.8%
Belize	39	38	31	32	35	37	41	44		1.5%
Dominica		13	13	14	14	20	12	13	14	1.2%
Grenada		18	15	15	14	14	17	16		-1.5%
Guyana	57	56	52	60	62	66	67	72	69	2.4%
St. Kitts		7	8	7	7	8	7	9	10	4.7%
Saint Lucia	36	36	30	31	30	46				4.8%
Saint Vincent	17	17	16	17	16	17				0.2%
Suriname				92	97	104	108	109	105	2.7%
Trinidad	334	350	382	355	352	343	354	357	278	-2.3%

[2] The Nassau Container Port only started operations in 2012

2.2 OVERVIEW OF PORT CHARACTERISTICS

This section addresses the port characteristics. The port fact sheets presented in Annex I contain more detailed information for individual ports. The factsheets also provide a visual layout of the port. In this section, the characteristics are addressed per topic in order to enable comparison. The topics addressed are:

- Port throughput and growth
- Institutional setting
- Infrastructure
- Equipment
- Labour
- Information technology; and
- Level of Autonomy of the Port Operator

For presentation purposes, this section distinguishes between two groups of ports: the OECS ports and the 'regional ports'. The latter group represents the non-OECS ports.

Table 2-1 presents the historic volumes of the ports. It can be seen that the ports vary widely in historic growth in volumes. In general, a drop in volumes is noticeable after the global financial crisis. Further, the islands are susceptible to drops in tourist activity or the presence of storms which would increase volumes the year after.

Table 2-2: General Classification of Port Management Models

Port management model	Private participation	Regulation	Infra -structure	Super -structure	Equipment	Labour	Nautical services
Public service port	Zero	Public	Public	Public	Public	Public	Public
Tool port	Very low	Public	Public	Public	Public	Private	Public or private
Landlord port	Medium	Public	Public	Private	Private	Private	Public or private
Private port	Maximum	Public or private	Private	Private	Private	Private	Private

Table 2-3: Institutional Framework in OECS Ports

Port, Country	Management Model	Description
Basseterre, St. Kitts	Service Port/Tool Port	• Operated by public authority St. Christopher Air & Sea Port Authority (SCASPA) • Private sector participation in stevedoring (vertical move only)
St. John's, Antigua & Barbuda	Service Port/Tool Port	• Operated by public authority Antigua Port Authority (APA) • Private sector participation in stevedoring geared vessels
Roseau, Dominica	Service Port	• Operated by public authority Dominica Air and Sea Ports Authority (DASPA) • No private sector involvement
Castries, Saint Lucia	Service Port/Tool Port	• Operated by public authority Saint Lucia Air and Sea Ports Authority (SLASPA) • Private sector participation in tug and line handling, and limited private participation in provision of stevedoring labourers
Kingstown, Saint Vincent Grenadines	Service Port & Grenadines	• Operated and managed by Saint Vincent and the Port Authority (SVGPA) • Private sector participation in stevedoring
St. George's, Grenada	Service Port	• Operated by public authority Grenada Port Authority (GPA) • No private sector involvement

2.2.2 INSTITUTIONAL FRAMEWORK

The institutional framework of a port can be described by the typology of the port management model. Table 2-2 provides a general classification of the port management models, indicated by the division of responsibilities between the public and private sector. In practice, port management models often exhibit hybrid forms.

The institutional framework in the six OECS countries is best characterized by the public service port model. The respective port authorities are responsible for the development, management and operation of the port. In some cases, such as in the ports of Basseterre and St. Johns, there is some private sector involvement in stevedoring; in these cases, private stevedores are responsible for operating the board cranes. Port authorities in the OECS countries also often have managerial and operational responsibility of the airports.

In the regional ports, the institutional framework varies widely, from the public service port to the landlord structure to the privatized port. In Paramaribo, the port evolved from a tool port model to a landlord model as the condition for receiving a EUR 27M grant from the EU. The privatization of the port operations in Belize was part of a government policy that favoured privatisation of public services. However, as the private company could not meet its debt obligations, the lender 'stepped in' and has now been managing the port for four years. The private port operations in Nassau were coupled with the development of a dedicated container terminal for the island.

Table 2-4: Institutional Framework in Regional Ports

Port, Country	Management Model	Description
Bridgetown, Barbados	Service Port	• Operated by corporatized body Barbados Port Inc., a 100% government owned enterprise • Private sector participation in stevedoring
Port of Spain, Trinidad & Tobago	Service Port	• Operated by Port of Port of Spain (PPOS) which is a department of the Port Authority of Trinidad and Tobago (PATNT), a 100% government owned entity
Georgetown, Guyana	Mixed	• Operated by five stevedoring companies, of which 3 private and 2 publicly owned firms • No overarching port authority which determines future development
Paramaribo, Suriname	Landlord Port	• Managed and developed by Port Authority Havenbeheer • Operated by two stevedoring companies (DPW and VSH)
Belize Port, Belize	Private Port	• Managed, Developed and Operated by the Belize Port Limited, a private company operating under receivership of the lender. • Port Authority of Belize has limited role in development of ports. Responsible for nautical accessibility (dredging)
Nassau, Bahamas	Private Port	• Managed, developed and operated by the Arawak Port Development Ltd. • Port authority responsibility limited to provision of marine services and cruise port.

2.2.3 INFRASTRUCTURE

The maritime infrastructure in the OECS ports is characterized by breakbulk facilities. The ports have sufficient nautical depth due to their geographical characteristics. The length of the quays usually allows for 2 vessels to be berthed simultaneously. The terminal areas can be constraining due to the inefficient use of the area. The old warehouse on the quay side such as in the OECS hampers operational efficiency, as container stacking is distanced from the stevedoring activities.

In general, the quay infrastructure facilities in the OECS ports are dated. The structural integrity can be questioned, as not all quays are currently strong enough to hold a mobile harbour crane.

Table 2-5: Infrastructure in OECS Ports

Port, Country	Type of facility	Amount of Berths	Length of berths	Max. Vessel Depth	Terminal Area	Commodities
Basseterre, St. Kitts	Breakbulk	1	133m	12.0m	10.1 ha	Containers, breakbulk, RoRo, cruise
St. John's, Antigua & Barbuda	Breakbulk	3	366m	10.6m	6.2 ha	Containers, breakbulk, RoRo
Roseau, Dominica	Breakbulk	2	244m	11.0m	4.3 ha	Containers, breakbulk, RoRo
Castries, Saint Lucia	Breakbulk	8	482m	10.0m	11.7 ha	Containers, breakbulk, RoRo, Cruise
Kingstown, Saint Vincent & Grenadines	Breakbulk	2	495m	11.0m	6.4 ha	Containers, breakbulk, RoRo, Cruise
St. George's, Grenada	Breakbulk	2	335m	9.0m	4.2 ha	Containers, breakbulk, RoRo, Cruise

The quality of the nautical infrastructure in the regional ports varies widely. The ports of Nassau, Port of Spain and Bridgetown all offer nautical depth over 8.0m and sufficient quay walls. The port of Belize is hampered by the siltation of the rivers in the harbour basin. The finger pier limits the vessel sizes able to berth alongside, and the lack of dredging works limits the vessel depth. The siltation in the ports of Georgetown and Paramaribo is the major obstacle for the port operations, as the draught of vessels is limited to 6.1m and 7.2m, respectively.

The ports of Bridgetown, Paramaribo, Nassau and the Port of Spain feature modern port facilities, with container stacking areas adjacent to the apron. This fosters efficient movement of the containers.

Table 2-6: Infrastructure in regional ports

Port, Country	Type of facility	Amount of Berths	Length of berths	Max. Vessel Depth	Terminal Area	Commodities
Bridgetown, Barbados	Containers / multipurpose	5	620m	11.0m	11.9 ha	Containers, RoRo, General cargo, cruise
Port of Spain, Trinidad & Tobago	Containers / Multipurpose	8	1,500m	12.0m	48.1 ha	Containers, RoRo, General cargo, cruise
Georgetown, Guyana	Breakbulk	5	982m	6.1m	21.2 ha*	Containers, RoRo, Bulk, breakbulk
Paramaribo, Suriname	Containers / multipurpose	3	600m	7.2m	18.0 ha	Containers, RoRo, General cargo, cruise
Belize Port, Belize	Container pier	1	67m	8.5m	5.8 ha	Containers, breakbulk
Nassau, Bahamas	Containers, bulk, breakbulk	3	801m	8.0m	22.9 ha	Containers, RoRo, Bulk, breakbulk

*terminal area is fragmented, thereby reducing the efficiency substantially.

Table 2-7: Advantages / Disadvantages Ship to Shore Cranes

	Advantages	Disadvantages
Gantry Cranes	• High throughput capacity • Limited space between cranes	• High Investment and maintenance costs • Limited flexibility • High Surface loads
Mobiles harbour Cranes (MHCs)	• Flexibility • Possibility to skip horizontal transport because of large back reach • Requires much workspace	• Low investment equipment • Low throughput capacity • Less accuracy because of sway

2.2.4 EQUIPMENT

The equipment utilized has a direct relation to the operational productivity achieved on the terminal. Ship-to-shore cranes are important equipment for a container terminal. The quantity, type and efficiency of the cranes determine the speed of the loading/offloading of containers and thus the time that is required for the vessel to be inside the port. Faster handling rates are preferred by shipping lines as it decreases their costs.

In general, there are two types of cranes, gantry cranes and mobile harbor cranes. Table 2-7 shows the main advantages and disadvantages of the two types.

Both types of cranes come in different sizes. The size of the crane determines the maximum size of the vessel it can handle without additional movements. The main characteristics are provided below.

Furthermore, the type of yard equipment employed has an effect on the yard utilization of a container terminal. With yard cranes, either Rubber Tyre Gantry (RTG) cranes or Rail Mounted Gantry (RMG) cranes, a productivity of 1,100 TEU/ha can be achieved. When container storage is on chassis, not even 25% of that efficiency can be achieved.

Table 2-8: Productivity Benchmarks Per Type of Equipment

	Appropriate for vessels	Able to reach containers wide	Productivity Moves per hour
Gantry - Panamax	Panamax*	12-13	25
Gantry - Post Panamax	Post Panamax*	18	30
Gantry- Super Post Panamax	Super Post Panamax*	22	35
Mobile Harbour Crane (64t ton)	Feeder / Handymax*	<12	15-25
Mobile Harbour Crane (124 ton)	Panamax / Post Panamax*	<18	15-25
Mobile Harbour Crane (208 ton)	Post Panamax / Capesize*	22	15-25

*vessel details are presented in Figure 3-6.

Furthermore, the type of yard equipment employed has an effect on the yard utilization of a container terminal. With yard cranes, either Rubber Tyre Gantry (RTG) cranes or Rail Mounted Gantry (RMG) cranes, a productivity of 1,100 TEU/ha can be achieved. When container storage is on chassis, not even 25% of that efficiency can be achieved.

OECS ports

The stevedoring equipment in the OECS is limited. Stevedoring occurs mainly by using on-board cranes (see Figure 2-4 for an example of a vessel with on-board cranes). Productivity of on-board cranes is generally less than mobile harbour cranes, due to the influence of the waves on the vessel. The ports of St. Johns, Castries and Campden Park offer a single mobile harbour crane, used for stevedoring containers.

Equipment used to handle horizontal moves (ground moves on the terminal) mainly comprises reachstackers. Reachstackers allow for a high degree of flexibility in stacking. The terminal areas in some OECS ports are spread out and not on an even level. Reachstackers can cope with suboptimal terminal areas, whereas yard cranes or straddle carriers require a more structured environment (see Figure 2-3 for a comparison of ground equipment).

Figure 2-3: Yard Utilization Per Type of Equipment

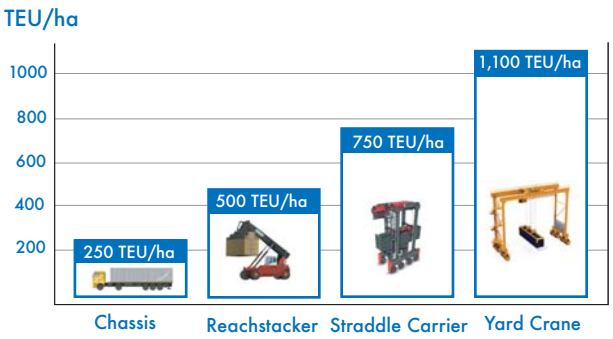


Figure 2-4 Multipurpose Vessel with On-board Cranes

Figure 2-5: Examples of Reachstacker and Straddle Carrier

Table 2-9: Equipment in OECS Ports

Port, Country	Stevedoring equipment	Horizontal equipment	Notes
Basseterre, St. Kitts	No cranes	2 Reachstackers Various tractor trailers	
St. John's, Antigua & Barbuda Various tractor trailers	1 large MHC	2 Reachstackers	Plans to acquire a 2nd MHC when new commercial agreement is signed
Roseau, Dominica	No cranes	2 Reachstackers Various tractor trailers	Currently pier is not strong enough to hold a MHC
Castries, Saint Lucia	1 large MHC	2 Reachstackers Various tractor trailers	Currently, berth 5 is not adequate to support a MHC
Kingstown, Saint Vincent & Grenadines	1 large MHC (in Campden Park)	1 Reachstacker Various tractor trailers	One of the Reachstackers (toppick) is outdated and has substantial downtime.
St. George's, Grenada	No cranes	2 Reachstackers Various tractor trailers	

Regional ports

In the regional ports, the ship-to-shore equipment is more modern. The ports of Port of Spain (PPOS) and Bridgetown employ modern Ship-To-Shore gantry cranes (STS). The ports of Nassau and Paramaribo use mobile harbour cranes (MHC). Modern stevedoring equipment also puts pressure on the yard operations. Hence, Bridgetown, Port of Spain, and Paramaribo employ RTGs to achieve more efficient yard operations. The horizontal equipment in Guyana and Belize is limited.

Table 2-10: Equipment in Regional Ports

Port, Country	Stevedoring equipment	Horizontal equipment	Notes
Bridgetown, Barbados	1 STS 1 MHC	9 Straddle carriers 3 reachstackers	
Port of Spain, Trinidad & Tobago	4 STS cranes 1 MHC	14 RTG cranes (max 4 high) 8 reach stackers 9 empty handlers	Plans to acquire a 2nd MHC when new commercial contract is signed
Georgetown, Guyana	No MHC	3 reachstackers*	
Paramaribo, Suriname	4 MHC	3 RTG cranes	
Belize Port, Belize	2 MHC	2 reachstackers 7 trucks (for movement to yard)	
Nassau, Bahamas	3 MHC	Horizontal equipment is owned by agents. Reachstacker operated terminals.	

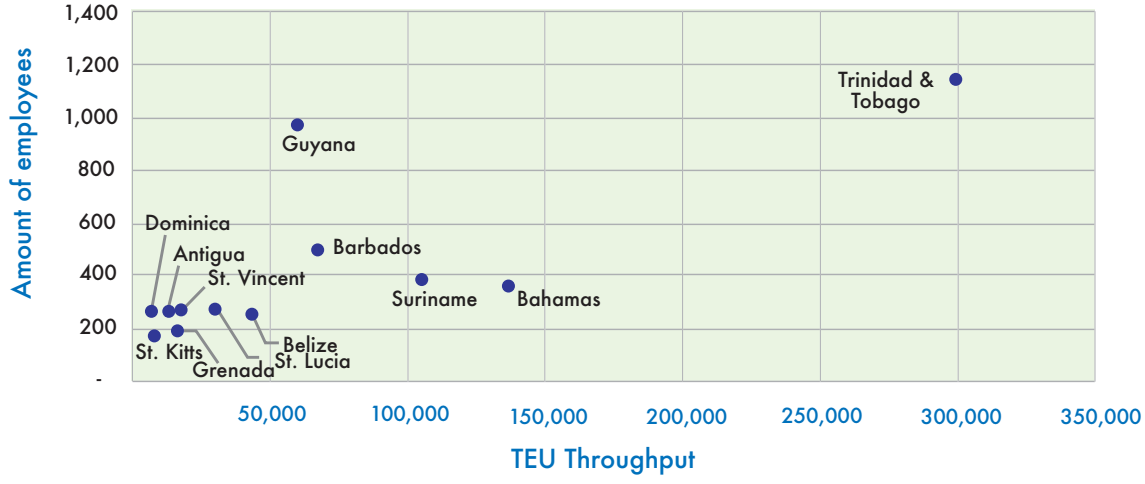
* Fernandes Terminal

2.2.5 LABOUR

Port labour is a sensitive topic. In an industry that continues to modernize and innovate, the demand for operational labour decreases. Decreasing demand does not always correspond with a decreased amount of labour active in the port. Two main reasons can be identified for this. Firstly, labour unions are powerful institutions that protect the job security of their members and thereby can oppose efficiency enhancing measures if they are not properly compensated. Secondly, public authorities have a social-economic responsibility imposed upon them to provide employment to the population.

Figure 2-6 shows the relationship between the number of employees and the container throughput

Figure 2-6: Employees Versus Throughput



in the ports. The figure illustrates that Guyana especially records a high employee versus TEU throughput ratio. This is related to the fact that five different terminals operate on a volume of about 60,000 TEU and the low costs of labour in the country. Trinidad & Tobago appears an outlier in the graph but, in fact, is only slightly above a linear trend line. The PPOS handles a high volume of containers and has a high amount of workers. Given the modern operations in PPOS, one would expect a less than proportional labour staff to be required.

Labour in the OECS ports is highly unionized, and exhibits traditional operational characteristics. Gang sizes are still tailored for breakbulk operations and/or workers do not work on a shift basis but, rather, on a vessel basis, reducing the efficiency of operations and increasing the costs. Consequently, labour costs account for a substantial portion of operational costs. Changing the labour conditions has proven difficult in a number of islands. Nevertheless, the SCASPA in St. Kitts has been able to reduce its organization from 400 to 260 workers by offering a severance package to workers.

The level of training is limited in the OECS ports. The lack of training negatively impacts operational efficiency as equipment is not properly operated and/or maintained, leading to a higher degree of breakdowns. Most training occurs on an ad-hoc basis, on the job. The main reason for the lack of training is budget constraints.

The regional ports show a mixed labour situation. The port of Nassau exemplifies a modern working environment, providing tailored training programs for its employees. An example of the training provided in Nassau is that APD Limited provides dedicated trainers to work with crane operators for a month. One main advantage is that workers are trained in their environment with their equipment. This has been a fruitful alternative to mere simulator based training. In PPOS, the labour force is aging and has not grown accustomed to the IT driven operations. Budget for IT training is limited.

Most regional ports still face traditional labour unions that prevent the implementation of modern working standards. Examples of traditional labour

Table 2-11: Labour in OECS Ports

Port, Country	Number employees	Share of Operational costs	Gangsizes	Unionized?	Training
Basseterre, St. Kitts	Total: 260	unknown	18 workers	Yes, strong union	Limited
St. Johns, Antigua & Barbuda	Total: 260 Ops: 160	62%	20 workers	Yes, strong union	Limited
Roseau, Dominica	Seaport: 260	60%	17 workers	Yes, but a good relation	Limited
Castries, Saint Lucia	Seaport: 270	50%	15 workers	Yes, but a good relation	Limited
Kingstown, Saint Vincent & Grenadines	Total: 270	45%	13 workers	Yes, but a decent relation	Limited
St. George's, Grenada	Total: 188	unknown	23 workers	Yes, strong union	Limited

Table 2-12: Labour in Regional Ports

Port, Country	Number employees	Share of Operational costs	Gangsizes[5]	Unionized?	Training
Bridgetown, Barbados	Total: 500, of which Operations: 130	60%-65%	14 workers	Yes, strong labour union which prevents modern working standards	Active thru Caribbean maritime Institute
Port of Spain, Trinidad & Tobago	PPOS: 1146 Operations: 832	75%	23 workers	Yes, strong union	Limited
Georgetown, Guyana	GNSC: 220 Fernandes: 550 Other: 200†	58%	16 workers	No labour union	Limited
Paramaribo, Suriname*	PA:182 employees TO: 200†	Unknown	18 workers (DPW)	Yes, but unions have been flexible	PA: Limited TO: On-site training
Belize Port, Belize	Total: 254, of which 94 full time 160 stevedoring part time	Unknown	15 workers	Yes, strong labour union which prevents modern working standards	Yes, on-site training
Nassau, Bahamas	Operations: 210 full time 30 part time Admin: 40 Gov't staff: 80	28%[6]	12 workers	Yes, but presence of multiple terminal operators limits power of the individual union.	Yes, on-site training

* The terminal operator refrained from providing cost estimates of labour; hence only the PA total employees are provided.
† Consultant estimates

[5] Number of workers in the gang that handles the container from vessel to quay to stack.
[6] Source: ADP financial statement (2015)

planning are plentiful. In the port of Belize, the operating rule is that a single gang operates a single vessel. As a result, it can happen that a single gang works for more than 24-hours straight, jeopardizing safety and limiting productivity.

In Barbados, a stuffing/stripping gang only handles 3 Twenty-foot Equivalent Units (TEU) per shift, despite the (limited) amount of time it requires. In Port of Spain, the gang size of 23 workers per gang generates a high cost of operations in the port, but changing the gang size has proven difficult.

2.2.6 INFORMATION TECHNOLOGY

Since ports connect multiple parties, the exchange of information is becoming increasingly important. Various Information Technology (IT) systems are of relevance for efficient cargo handling. First, there is the customs system. Almost all customs offices in the sample employ the ASYCUDA (Automated SYstem for CUstoms DAta) World system for this process. ASYCUDA is a computerised customs management system which covers most foreign trade procedures. The system handles manifests and customs declarations, accounting procedures, transit, and suspense procedures.

Second, modern container terminals use Terminal Operation Systems (TOS). TOS allows management of the movement and storage of different types of cargo in and around a container terminal or port. It enables terminals to make better use of their assets, labour, and equipment, plan workloads and get up to the minute information to make timely and cos effective decisions. Examples of TOS are NAVIS and Klein Systems. The cost of TOS depends on the size and type of operations. For smaller ports (as in this Study) an amount of $1.0M USD to $1.5M is reasonable.

Lastly, a Port Community System (PCS), or single window system, is an electronic platform that connects the multiple systems operated by a variety of organisations that make up a seaport community. It is shared in the sense that it is set up, organised and used by firms in the same sector – in this case, a port community. A Port Community System:

- is an open electronic platform enabling intelligent and secure exchange of information between public and private stakeholders in order to improve the competitive position of the sea and air ports' communities.

- optimises, manages and automates port and logistics processes through a single submission of data and connecting transport and logistics chains. [7]

The OECS ports are limited in their use of IT systems. Dominica Air & Seaports Authority utilizes the Klein TOS but has not yet been able to connect the system to its billing information, which in turn requires additional man hours to extract the information from the system to prepare the financial bills. An exception to this rule is observed in Saint Lucia, where an advanced cargo management system employed by SLASPA has been integrated with the customs' ASYCUDA World IT systems. This integration has resulted in a platform where cargo owners can declare and track their cargo through the SLASPA website.

Table 2-13: IT in OECS ports

Port, Country	Customs system	Terminal Operating Systems?	Integrated systems?	Port Community System?
Basseterre, St. Kitts	ASYCUDA World	No	No	No
St. John's, Antigua & Barbuda	Customs in ports does not use an IT system	No	No	No
Roseau, Dominica	ASYCUDA World	Klein	Yes	No
Castries, Saint Lucia	ASYCUDA World	Unitrack	Yes	Yes
Kingstown, Saint Vincent & Grenadines	ASYCUDA World	Unitrack	No	No
St. George's, Grenada	ASYCUDA World	Own system	No	No

[7] See also: http://www.epcsa.eu/pcs

Table 2-14: IT in regional ports

Port, Country	Customs system	Terminal Operating Systems?	Integrated systems?	Port Community System?	Notes
Bridgetown, Barbados	ASYCUDA World	Klein	Yes	Yes in 2016	
Port of Spain, Trinidad & Tobago	ASYCUDA World	Navis N4	Yes	Yes	Not fully functioning
Georgetown, Guyana	ASYCUDA World SWAPS	Own developed	No	No	
Paramaribo, Suriname*	ASYCUDA World	Yes	No	No	Single window is planned
Belize Port, Belize	ASYCUDA World	Own developed	No	No	
Nassau, Bahamas	ECAS (E-Customs Automated System)	Navis N4 plus XPS yard management	Yes	Yes	ECAS is an Electronic Single Window Web-based system

* the terminal operator refrained from providing cost estimates of labour; hence only the PA total employees are provided.

In the larger ports, TOS are more commonly used. PPOS and the port of Nassau utilise the NAVIS system, whereas the port of Bridgetown utilises the Klein System. The port of Nassau also has a single window system. As reported with respect to PPOS, the system is not yet functioning as desired as not all parties are utilizing it properly. Ports of Georgetown and Belize have not yet adopted the modern systems.

The textbox below highlights the operational benefits of the XPS yard management system in the port of Nassau.

Text Box 2-1: Effects of implementation of yard management system

The Nassau Container Port implemented a yard management system in 2015. In its annual report, it reported on the effects thereof:

"In February of 2015, following several months of systems configuration and training, APD launched the N4 NAVIS terminal operating system upgrade and also a new yard management module, XPS. The addition of the XPS yard management system has provided both the terminal operator and truck operator greater productivity and has enhanced the importer's supply chain.

Upon entering the port gates, the trucker presents the shipping papers for the container he has come to collect. While the trucker is still at the port gate, the XPS system searches the container yard and identifies the location of the container. The related terminal address is printed and provided to the trucker who departs the port gate in route to the designated address. While the trucker is proceeding to the container's location, the container handling equipment "CHE" receives an electronic communication advising that the trucker is in route. The CHE operator begins the process of digging the container out of the stack well before the arrival of the trucker. Providing the trucker with the exact location of the container, while simultaneously sending electronic work instructions to the CHE, has reduced the time the trucker spends in the port by 50%, resulting in an average turn time of less than 25 minutes.

A further benefit of the XPS system is that the trucker has a very specific path to follow, which avoids the possibility of the driver's becoming distracted while searching for his container. The investment in XPS has resulted in a safer terminal for all."

Source: ADP Annual Report, 2015

2.3 PORT EFFICIENCY SCORE

This section presents the port efficiency score of the ports. The port efficiency score provides a uniform measurement of efficiency. The underlying dimensions also contribute to the identification of the bottlenecks. A measure of port efficiency has been devised which presents an indication of the level of port efficiency relative to the sample. The indicators used in the port efficiency measure are:

1. **Berth productivity**
2. **Labour productivity, measured by TEU per employee**
3. **Quality of infrastructure**
4. **Nautical accessibility, measured by maximum vessel draught**
5. **Type of equipment used for stevedoring operations**
6. **Type of IT systems being used in port operations**
7. **Level of autonomy of port operator**

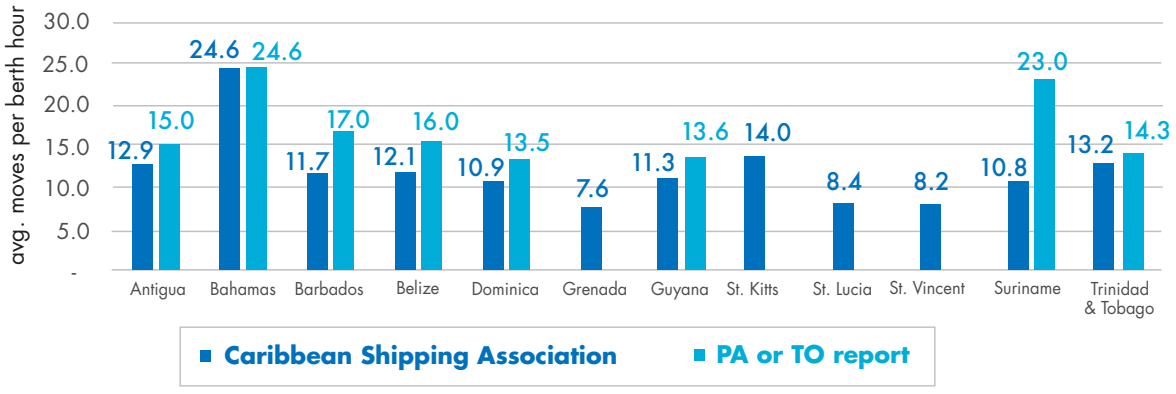
The seven factors are detailed below.

Berth Productivity

A main indicator for measurement of container port performance is the number of container moves per berth hour. This indicator is particularly relevant as it directly translates to the berthing time of vessels. The longer vessels have to remain in port, the more expensive the port call becomes. An expensive port call is translated to the costs of shipping goods. Since the industry considers this indicator important, the Caribbean Shipping Association (CSA) collects the realized berth moves per hour from the shipping lines calling the port. In addition, the consultants interviewed port authorities and terminal operators about operational performance.

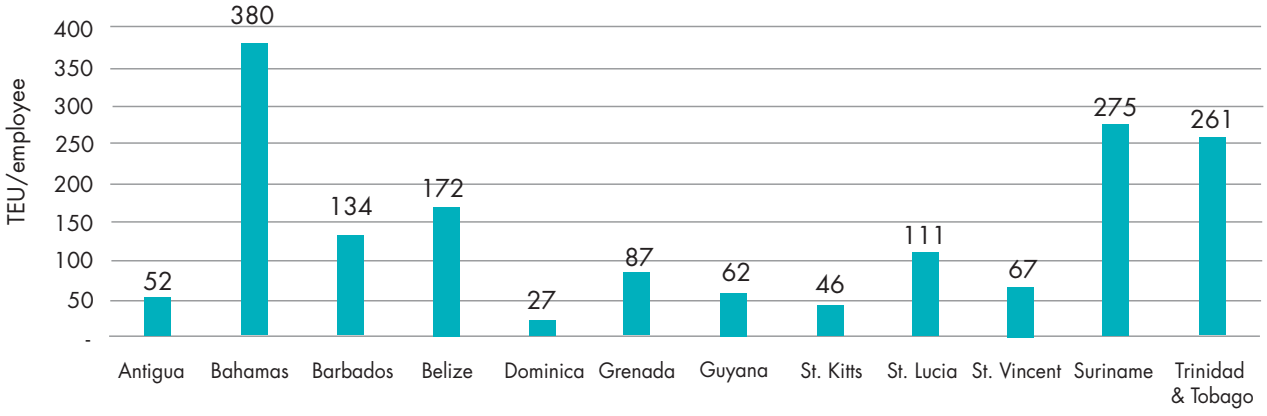
Figure 2-7 shows the results of both queries. It can be seen that the highest productivity recorded is by the Nassau Container Port. The ports of Saint Lucia, Saint Vincent, Grenada obtain worrisome productivity rates, below 10 moves per berth hour. Barbados, Trinidad & Tobago, Guyana, St. Kitts, Antigua and Belize record rates between 10 and 15 moves per hour. There is a large discrepancy between the berth productivity of CSA and that reported by the port authority in Suriname. The discrepancy can be explained by the fact that the CSA has obtained reports from geared vessels.

Figure 2-7: Operational Performance: Moves per Berth Hour [8]



[8] A difference in the numbers of the CSA and the port authorities can be attributed to the fact that shipping lines measure productivity in berth hour (thus including waiting time at berth) and terminal operators generally measure productivity at start of operations (excluding waiting time at berth).

Figure 2-8: Operational Performance: TEU Per Employee



Productivity per employee

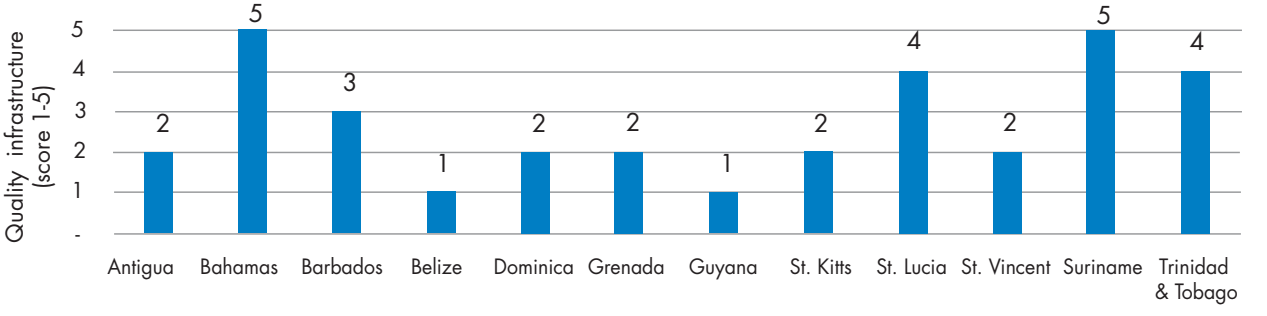
Section 2.2.5 shows that the proportion of labour costs on the total port operations is higher than 50% in most port organizations. The measure of productivity per employee indicates the amount of TEU handled (in 2015) per employee. It can be seen that the OECS countries obtain a low score. Naturally, there is an amount of fixed labour that a port organisation requires regardless of the amount of cargo handled. Hence, ports with low volumes are at a disadvantage. The ports of Nassau, Paramaribo and Port of Spain obtain the best scores.

Quality of the infrastructure

Based on the site visits, the quality of infrastructure is scored with a measure from 1 to 5, with "1" being in a poor state with immediate need of reinvestment and "5" being brand new infrastructure.[9] The infrastructure score also takes into account the layout of the port. For example, breakbulk terminal layouts receive a lower score as they result in inefficient container handling.

Figure 2-9 shows that the ports in the Bahamas and Suriname have the most modern infrastructure facilities. Guyana and Belize have poor infrastructure facilities despite handling substantial volumes. The port of Georgetown offers dispersed terminals, characterized by wooden quay on piles. Belize offers a small pier (66m berthing length) attached to a 750m single lane causeway. Most OECS ports score a "2" due to old infrastructure and a breakbulk terminal layout.

Figure 2-9: Quality of Infrastructure



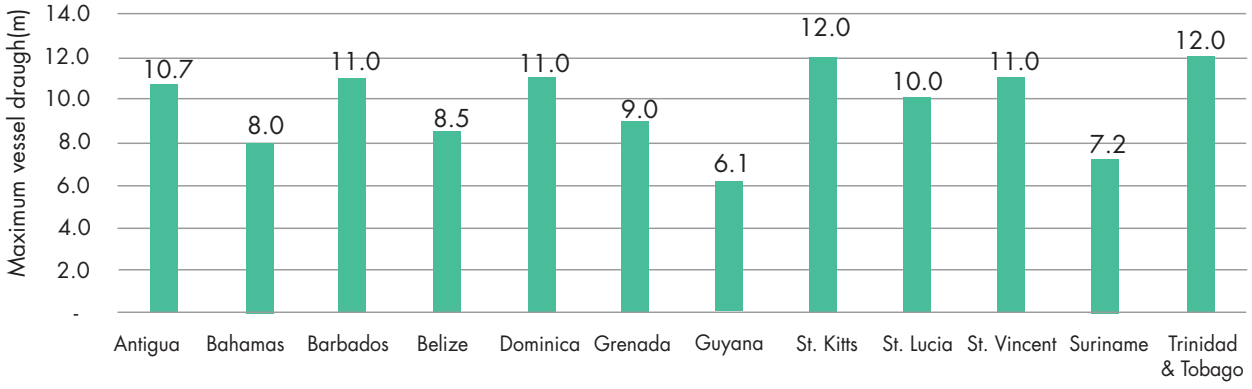
[9] The scores represent: 1= a poor state with immediate need of reinvestment; 2=poor layout of infrastructure; 3=adequate state infrastructure, investments can be made; 4=adequate infrastructure, no need for investments; 5= being brand new infrastructure

Nautical Accessibility

Nautical accessibility provides an indication of the maximum vessel size that can be employed. With larger vessels being utilized, the importers and exporters enjoy economies of scale, reducing the cost of transport per container.

Figure 2-10 shows that most ports can offer access to vessels between 8.0m and 12.0m draught. Suriname and Guyana have limitations due to siltation of the rivers. While Belize also faces siltation issues, due to their long causeway structure, the berthing facility is situated in deeper waters.

Figure 2-10: Nautical Accessibility Per Port



Equipment Utilized

The stevedoring equipment utilized also affects berth productivity. The availability of ship to shore cranes provides shipping lines with a level of comfort for efficient handling. Figure 2-11 shows the amount of cranes per type used in the ports. The figure shows that Dominica, Grenada, Guyana and St. Kitts offer no mobile harbour cranes (MHC) or gantry cranes and are thus dependent on geared vessels. Trinidad & Tobago and Barbados are the only ports with gantry cranes.

Figure 2-11: Stevedoring Equipment Utilized

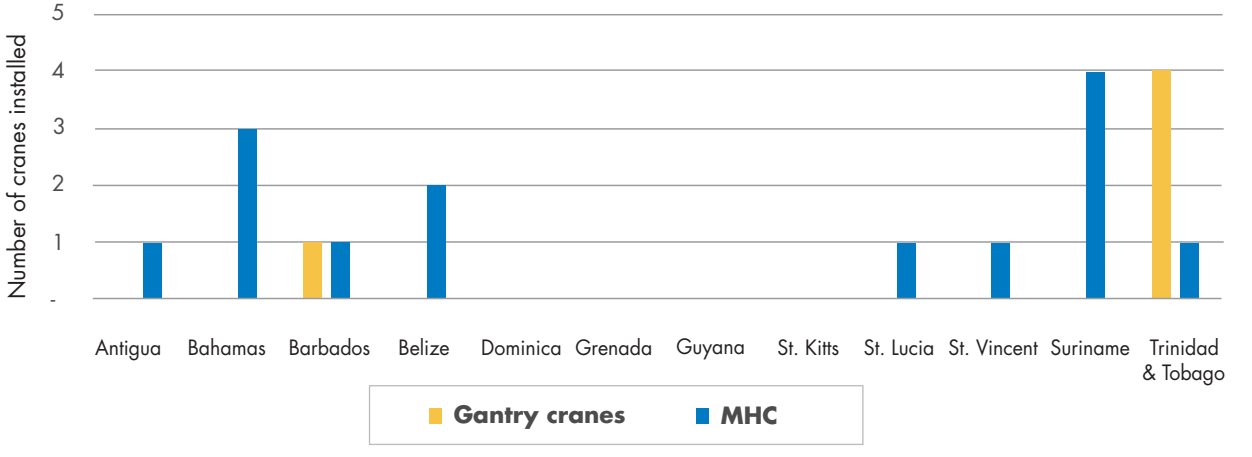


Table 2-15: IT Implementation

	ESW	ASYCUDA World	Cargo Management System	Integrated system	Port Community System
Antigua [1]					
Bahamas	x		x	x	x
Barbados		x	x		x
Belize		x			
Dominica		x	x	x	
Grenada		x			
Guyana		x	x	x	
St. Kitts		x			
Saint Lucia		x	x	x	x
Saint Vincent		x			
Suriname		x	x		
Trinidad & Tobago		x	x	x	X

[1] The port of St. John's in Antigua has no IT system in place.

Level of IT implementation

The level of IT implementation enables port users to transport their goods more efficiently through the port. The ports are scored on four levels:

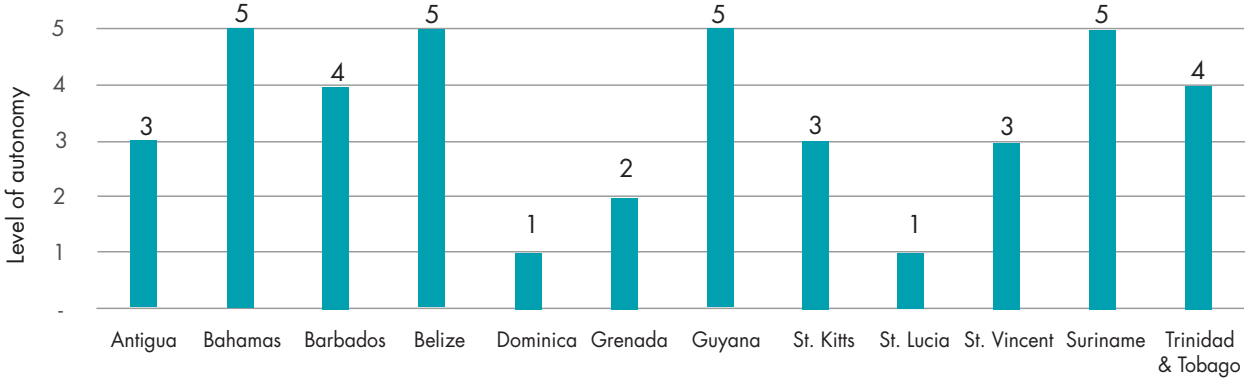
- Whether they have implemented a PCS system
- Whether they have implemented a cargo management system
- Whether they are employing ASYCUDA World or an Electronic Single Window Web-based system
- Whether they have an integrated system (ASYCUDA and cargo management; ESW)

Level of autonomy

This measure captures the extent to which the port is operated without government/ministerial interference. The Study gives a score from 1 to 5, with "1" being a low level of autonomy and "5" being the highest level of autonomy, such as fully private entities. Corporatized entities with a 100% government shareholder are awarded a "4" (despite still being fully owned by central government, corporatized entities typically have substantial autonomy in development strategy and resource allocation). Port authorities, which are also the operators, with an established level of autonomy are awarded a "3" and with lower levels of autonomy a lower score.

Figure 2-12 shows that the Bahamas, Belize,

Figure 2-12: Level of Autonomy



Guyana and Suriname, due to the privatized operations, have the highest level of autonomy. Dominica and Saint Lucia operate under the lowest level of autonomy. In Dominica, the Minister has to approve all Board decisions. The port authority in Saint Lucia is allowed only a 50% share of their revenues, and is further limited in efficiency due to the need for ministerial approvals.

Total Efficiency Score

The total efficiency score is calculated in two steps:

- The individual scores are made relative to the sample, so that the total scores awarded per dimension add to 100%.

- The scores on the seven dimensions are weighted, that is, given a defined percentage, totalling to 100%. The seven dimensions are weighed a follows:

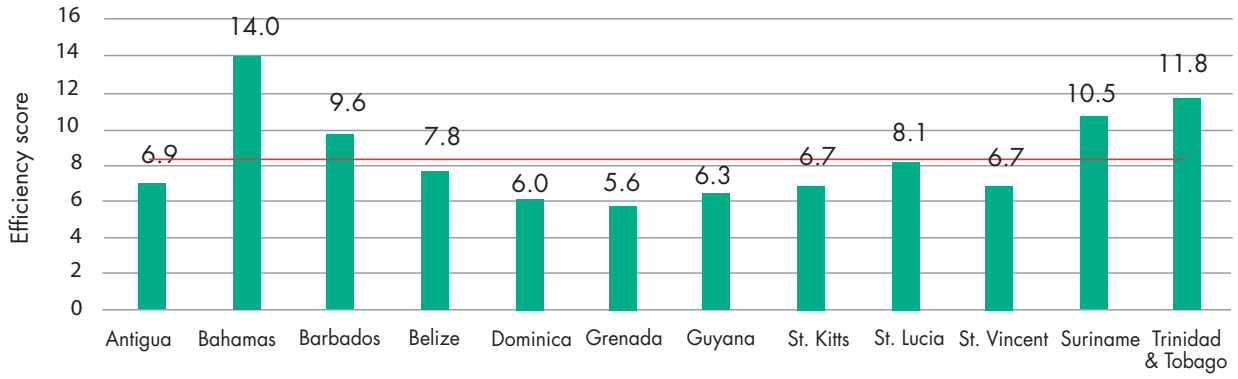
  – Productivity: 20% - Awarded the highest weight as it impacts the perception of shipping lines on the speed of service which shipping lines also take account of in pricing their services;
  – Labour: 15% - A high weight due to the high share of operational costs related to labour
  – Infrastructure: 15% - A high weight as the quality of port infrastructure has an impact on the type of operations and the efficiency of container handling;
  – Nautical access: 15% - A high weight as it impacts the vessel sizes that can call the port. The larger the vessels, the lower the transport costs per unit;
  – Equipment: 15% - the higher the availability of equipment, the more efficient tends to be the movement of cargo
  – Information Technology: 10% - A lower weight as the implementation of IT has a smaller effect on overall efficiency than the other factors;
  – Autonomy: 10% - A lower weight as the effect of autonomy is expected to be smaller than the other factors;

The results are shown in the table below.

Table 2-16: Efficiency Score

	Productivity	Labour	Infrastructure	Nautical Access	Equipment	IT	Autonomy	Total
Weight	20%	15%	15%	15%	15%	10%	10%	100%
Antigua	1.8	0.5	0.9	1.4	1.4	0.3	0.7	6.9
Bahamas	3.4	3.4	2.3	1.0	1.4	1.3	1.2	14.0
Barbados	1.6	1.2	1.4	1.4	2.0	1.0	1.0	9.6
Belize	1.7	1.5	0.5	1.1	1.4	0.5	1.2	7.8
Dominica	1.5	0.2	0.9	1.4	0.7	1.0	0.2	6.0
Grenada	1.0	0.8	0.9	1.2	0.7	0.5	0.5	5.6
Guyana	1.6	0.6	0.5	0.8	0.7	1.0	1.2	6.3
St. Kitts	1.9	0.4	0.9	1.5	0.7	0.5	0.7	6.7
Saint Lucia	1.1	1.0	1.8	1.3	1.4	1.3	0.2	8.1
Saint Vincent	1.1	0.6	0.9	1.4	1.4	0.5	0.7	6.7
Suriname	1.5	2.5	2.3	0.9	1.4	0.8	1.2	10.5
Trinidad	1.8	2.3	1.8	1.5	2.0	1.3	1.0	11.8
Average	**1.7**	**1.3**	**1.3**	**1.3**	**1.3**	**0.8**	**0.8**	**8.33**

Figure 2-13: Efficiency Score



*An example calculation of the efficiency score is provided in text box 2-17

Figure 2-13 shows the total score for the ports in the sample. The red line in the figure denotes the average of the sample.

It can be seen that the most efficient port in the sample is the port of Nassau, Bahamas. This should come as no surprise, given the newness of the port and its private sector leadership. The second most efficient is PPOS which enjoys economies of scale, has the largest crane park, and is a front runner on IT implementation. The third most efficient is Suriname, which has successfully implemented a landlord structure and has attracted DPW, a world class operator.

Among the OECS countries, the most efficient is the port of Saint Lucia which scores high on the quality of infrastructure, availability of equipment and the implementation of IT systems. The most challenged ports in the OECS are Grenada and Dominica, both of which score relatively low on operational performance, labour productivity and the level of autonomy.

Text Box 2-2 Port Efficiency Score - Methodology

Methodology

The efficiency score of a port is calculated through a multi criteria analysis, where all components (productivity, labour, infrastructure, nautical access, equipment, IT, and autonomy) have been assigned a weight.

The scores for each component have subsequently been standardized and summed to arrive at a single total efficiency score for a given port.

Example – Port Productivity

To arrive at the productivity (component) score for each port, a 3 step process is employed:

1. The input (for example, berth moves per hour) is identified for each of the ports (see column "Productivity (Berth Moves / Hour" in the table below).

2. The productivity figures are transformed into relative terms (%) of the "total productivity" (sum of all productivity inputs), in order to highlight the relative performance between ports (see column "Productivity (Standardized)" in the table below).

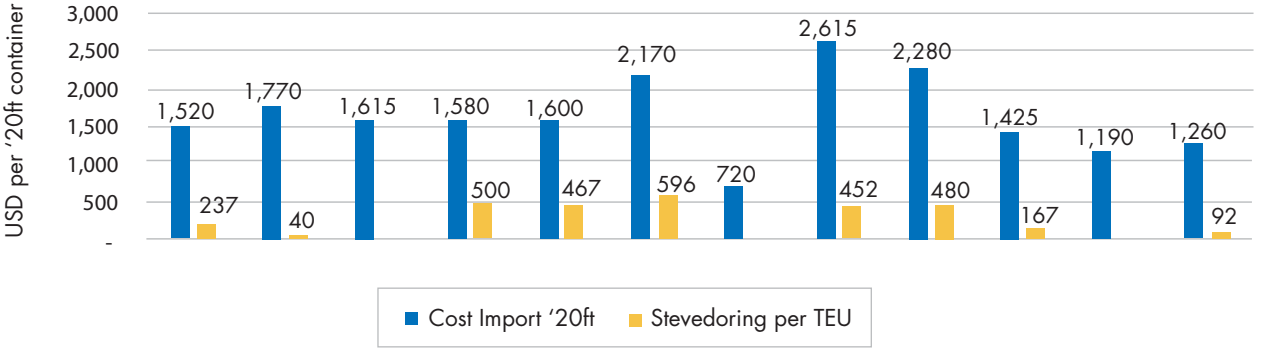
3. The relative productivity figures are multiplied by the weight assigned to the productivity component (e.g., Antigua: 8.85% (relative score) * 20 (productivity component weight) = 1.8) to arrive at a productivity score for each port.

	Productivity (Berth Moves/Hour)	Productivity (Standardized)	Productivity (Weighted (20%)
Antigua	13	8.85%	1.8
Bahamas	25	16.90%	3.4
Barbados	12	8.03%	1.6
Belize	12	8.30%	1.7
Dominica	11	7.51%	1.5
Grenada	8	5.20%	1.0
Guyana	11	7.77%	1.6
St. Kitts	14	9.58%	1.9
Saint Lucia	8	5.74%	1.1
Saint Vincent	8	5.64%	1.1
Suriname	11	7.44%	1.5
Trinidad & Tobago	13	9.03%	1.8
Total	**145.7**	**100.00%**	**20.0***

*It may be noted that the sum of all productivity scores in the last column equals 20, which is the weight of the productivity component. For each component, the sum of all scores equals the weight of the component; this scoring methodology avoids issues concerning double weighting, as the exact weight of the component is distributed among the ports.

The total port efficiency score is subsequently calculated as the sum of all independent component scores.

Figure 2-14: Costs of Import Containers [11]



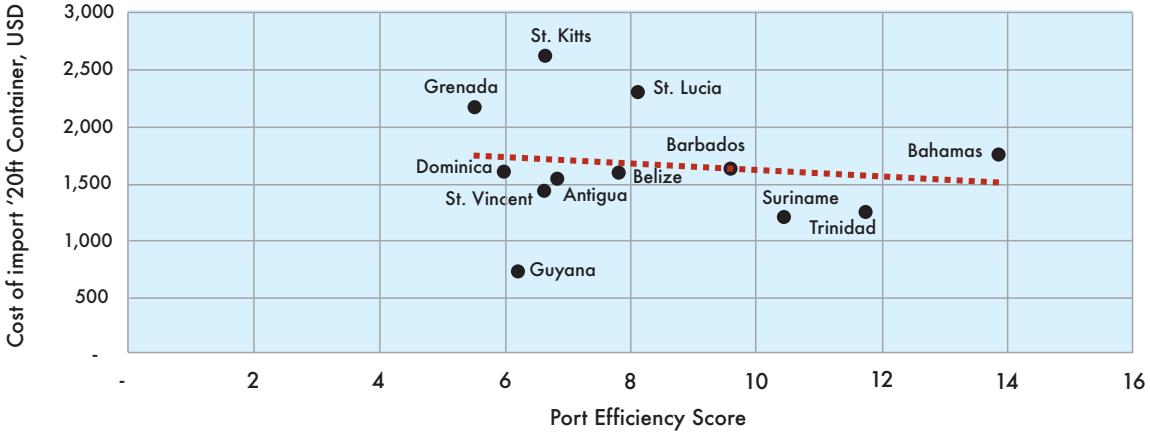
Cost of Imports

The World Bank keeps track of the cost of import of containers in the respective countries.[10] It can be seen that the import of a '20ft container is most costly in St. Kitts, Saint Lucia, and Grenada. The costs are surprisingly low in Guyana. This could be explained by the low costs for labour. Suriname and Trinidad & Tobago also record lower costs than average.

Container costs comprise administrative fees, broker fees, terminal handling charges and inland transport. Figure 2-14 shows container costs as reported by the World Bank in the dark blue bars. The light blue bars represent the stevedoring fees which are part of the terminal handling charges. Stevedoring fees in the country sample range from 2.3% of container cost in the Bahamas to 34.7% in Grenada. In Belize, Dominica, Saint Lucia and St. Kitts, the estimates are 31.6%, 29.2%, 21.1% and 17.3% respectively. Stevedoring fees could not be obtained for all ports in the sample

Figure 2-15 shows the relation between the costs of import (World Bank) and the port efficiency score.

Figure 2-15: Relation Between Cost of Import and Port Efficiency



[10] World Bank (2016) definition: "Cost measures the fees levied on a 20-foot container in U.S. dollars. All the fees associated with completing the procedures to export or import the goods are included. These include costs for documents, administrative fees for customs clearance and technical control, customs broker fees, terminal handling charges and inland transport. The cost measure does not include tariffs or trade taxes. Only official costs are recorded."

[11] Costs of Import '20ft are based on World Bank Data (2016) for the year of 2014. Stevedoring per TEU has been assessed based on Cubas et al (2015) and author's calculations.

It shows a negative relationship, which accords with expectations. This indicates that the higher the level of port efficiency, the lower the cost per container. The size of the slope suggests, however, that in addition to enhanced port efficiency herein defined, additional measures may need to be taken to further lower container costs.

2.4 MAIN BOTTLENECKS IN EFFICIENCY

This section identifies the main bottlenecks in port efficiency. The section identifies the main types of bottlenecks of various port clusters.

Overview of main bottlenecks

To provide a summary overview, Figure 2-16 highlights the main bottlenecks in port efficiency per port. Simultaneously, the colour of the dots indicates the respective score of efficiency as presented in the previous chapter. The figure illustrates amongst others that:

- Weaknesses in the institutional framework impact negatively the level of efficiency in the Bahamas, Belize, Dominica, Saint Lucia and Trinidad & Tobago;
- Nautical accessibility is a bottleneck in Belize, Guyana and Suriname;
- State of the port infrastructure is a bottleneck in Belize, Guyana, St. Kitts, Antigua, Dominica, Saint Vincent and Grenada;
- The state of equipment is a bottleneck in Trinidad & Tobago, Guyana, Antigua and Saint Vincent; and,
- The lack of (integrated) IT systems is an efficiency bottleneck in Suriname, St. Kitts, Antigua, Saint Vincent and Grenada.

Figure 2-16: Main Bottlenecks in Port Efficiency

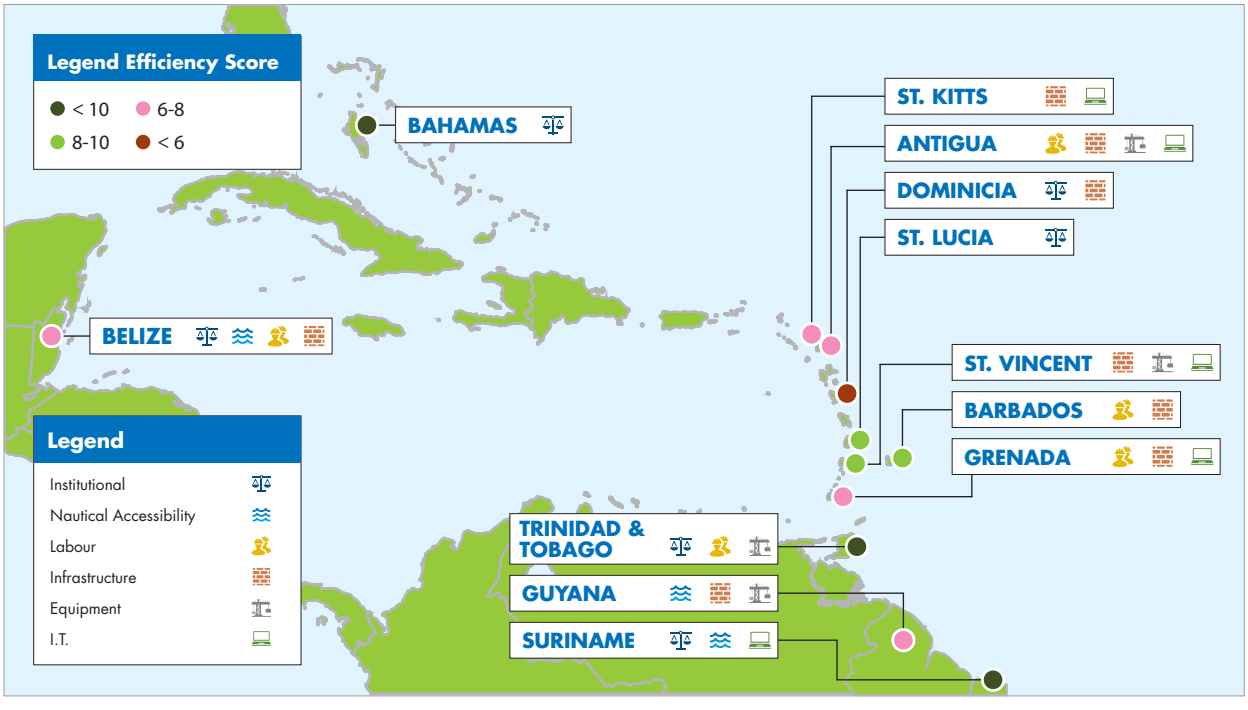
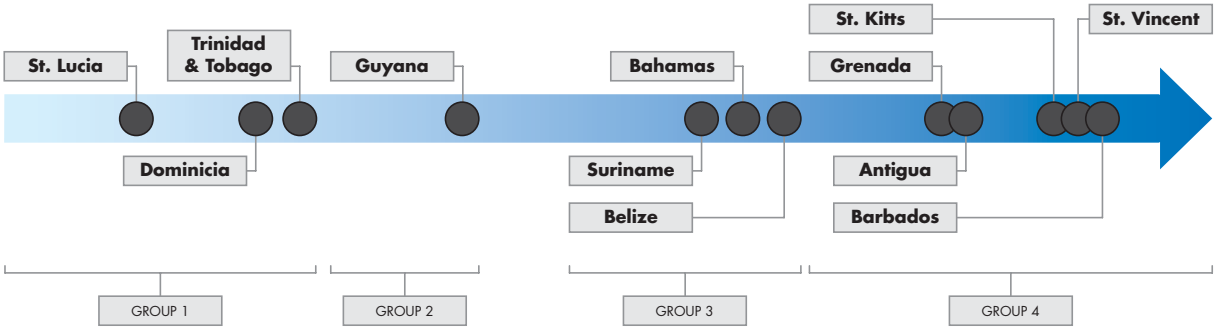


Figure 2-17: Efficiency Spectrum Institutional Framework



The following sections aim to provide an overview of the main bottlenecks in the assessed ports, concerning their institutional setting, infrastructure, equipment, labour, and IT. Thereto, all ports have been placed on a spectrum that indicates their comparative development on a certain efficiency indicator. Additionally, ports that show similar bottlenecks for a certain indicator have been assigned to efficiency groups.

2.4.1 INSTITUTIONAL SETTING

Concerning port performance bottlenecks resulting from the institutional framework, four groups have been identified. These four groups exhibit the following bottlenecks:

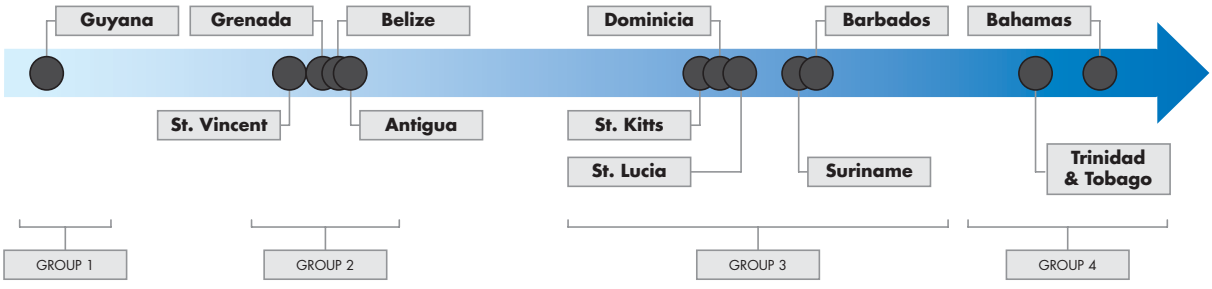
- **Group 1:** excessive government interference, which takes shape either through a high degree of dependence on central Government in decision making, or through excessive charges flowing from the Port Authority/company to the central Government. Excessive government interference can substantially hamper port performance, since port management is unable to efficiently make investment decisions, or lacks funds to implement investments.

- **Group 2:** Guyana lacks a clear structure. There are various operators but no clear port authority that assumes control over port development.

- **Group 3:** Private sector involvement is significant. In Belize and the Bahamas, public authorities do not have the capacity or funds to carry out their respective responsibilities (such as dredging or providing tug boats). This results in a minor burden on the financial capacity of the port operator/owner, but does not severely reduce port performance. In Suriname, multiple operators on a single terminal lead to decreased efficiency.

- **Group 4:** No issues regarding the port's institutional framework have been identified.

Figure 2-18 Efficiency Spectrum Infrastructure



2.4.2 INFRASTRUCTURE

Four groups have been identified with regard to port performance bottlenecks resulting from dilapidated or lack of port infrastructure. These four groups exhibit the following bottlenecks:

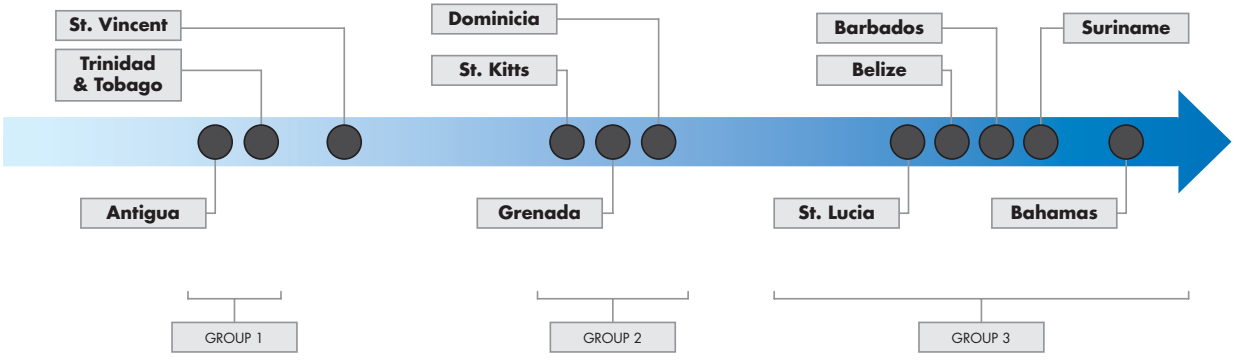
- **Group 1:** countries in group 1 lack basic port infrastructure, such as a paved quay, adequate depth, and an integrated terminal. Lack of such basic infrastructure results in severe constraints to safe and efficient operations.

- **Group 2:** countries in group 2 have inefficient terminal designs, limited space, and outdated cargo pier structures. These characteristics result in substantial restrictions regarding operational efficiency and cargo capacity.

- **Group 3:** countries in group 3 generally have adequate basic infrastructure, in a fair to good state; bottlenecks in countries that fall into this category mainly concern terminal design and adequate quay structure integrity to accommodate a Mobile Harbour Crane.

- **Group 4:** countries in group 4 experience minor or no performance restrictions resulting from infrastructure bottlenecks.

Figure 2-19 Efficiency Spectrum Equipment

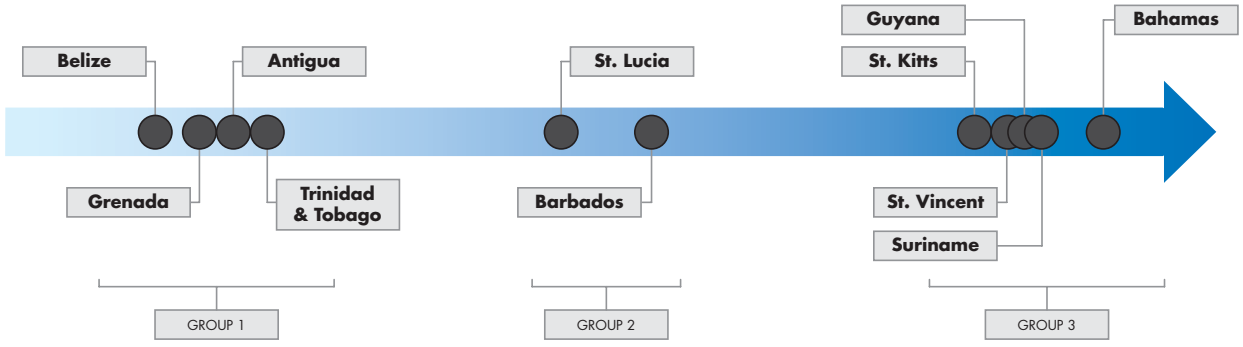


2.4.3 EQUIPMENT

Three groups have been identified with regard to port performance bottlenecks resulting from dilapidated or lack of adequate port equipment. These three groups exhibit the following bottlenecks:

- **Group 1:** countries in group 1 generally have an insufficient amount of equipment or dilapidated equipment, leading to substantial downtime and operational inefficiencies.
- **Group 2:** countries in group 2 have basic equipment, but could improve operational efficiency through acquiring a Mobile Harbour Crane.
- **Group 3:** countries in group 3 have adequate equipment to handle cargo efficiently.

Figure 2-20 Efficiency Spectrum Labour

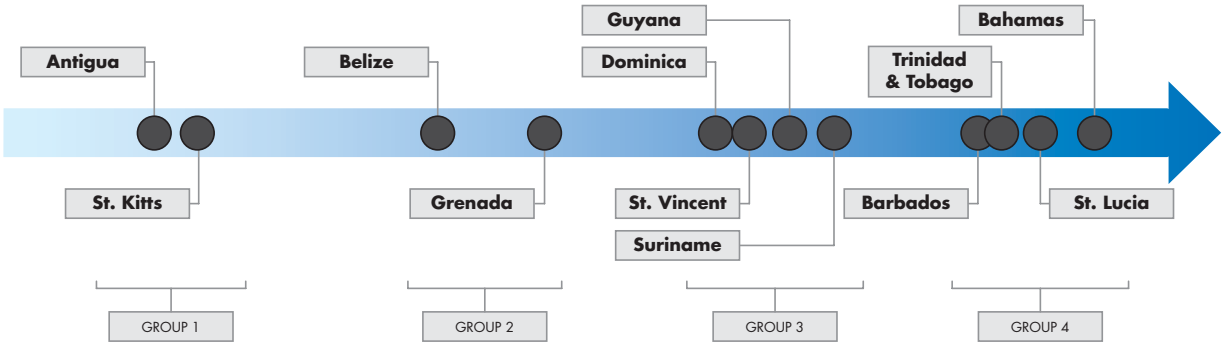


2.4.4 LABOUR

Three groups have been identified with regard to port performance bottlenecks resulting from labour issues. These three groups exhibit the following bottlenecks:

- **Group 1:** countries in group 1 suffer from: (i) outdated labour practices (such as a gang per vessel system, instead of a shift system), resulting in inefficient and dangerous working conditions; and (ii) strong labour unions, leading to severe difficulties in negotiating improved labour conditions.
- **Group 2:** countries in group 2 have some outdated labour agreements, but are making progress in negotiations towards improved labour conditions.
- **Group 3:** countries in group 3 have minor to no issues regarding labour conditions and agreements.

Figure 2-21 Efficiency Spectrum IT



2.4.5 INFORMATION TECHNOLOGY

Four groups have been identified with regard to port performance bottlenecks resulting from IT issues. These four groups exhibit the following bottlenecks:

- **Group 1:** countries in group 1 have no IT systems, resulting in a lot of paperwork and prohibiting efficient cargo clearing and tracking.
- **Group 2:** countries in group 2 have simple inventory IT systems and customs IT systems, enabling some automated processes in recording and clearing cargo; however, the individual IT systems are not integrated.
- **Group 3:** countries in group 3 have more advanced cargo IT systems; however, these systems are not integrated with customs IT systems.
- **Group 4:** countries in group 4 have advanced and partially or fully integrated cargo and customs IT systems, enabling efficient tracking and clearing of cargo, thereby reducing required moves and dwell times of cargo.

2.5 ENHANCING PORT EFFICIENCY

This chapter presents the recommendations for enhancing port efficiency. The recommendations are based on the findings in Chapter 2 and the individual assessments of the ports in the factsheets in the Annex. The chapter addresses the main recommendations for eliminating the identified bottlenecks. In Chapter 4, the development options of the ports will be coupled with cost estimations and planning for implementation.

Table 2-17 lists the recommendations for enhancing port efficiency. In the second column, the main bottlenecks are identified by use of the symbols similar to those presented in section 2.4.

Table 2-17: Recommendation for Enhancing Port Efficiency

Port	Bottleneck	Recommendation
Antigua, St. John's		• Renegotiation with labour union to reduce workforce and modernize working conditions in order to reduce overall labour costs and enhance reliability of service. • Removal of sheds, rehabilitation quays and separation of stevedoring services and truck handling to allow for more efficient handling of containers. APA already plans port redevelopment with Chinese financing. • Acquisition of new MHC in order to be able to continuously offer MHC stevedoring services. • Implementation of terminal operating system and integration with customs to reduce the manual labour required, accelerate the procedures for port users and obtain information about port operations.
The Bahamas, Nassau		• The Port Authority is still responsible for towage, pilotage, dredging and the maintenance of breakwater. However, the PA cannot always fulfil its responsibility. The recommendation is to shift these responsibilities to the private sector, in return for an appropriate share of the port dues, as it is directly affected by underperformance of the PA.
Barbados, Bridgetown		• Renegotiation of working conditions with labour unions is already in progress. Modernization of gang sizes and working times are required to reduce labour costs. • BPI is to co-develop a new cruise berth to allow additional berthing space for cargo vessels during cruise season. Further, it is recommended that BPI implement its masterplan that includes the removal of sheds and lengthening of quay near berth no. 5.
Belize, Port of Belize		• Renegotiation of working conditions to reduce the labour costs and improve operational efficiency. • Dredging works are required to improve nautical accessibility. • Lack of paving makes yard operations more difficult in rainy conditions. Paving would enable more efficient cargo handling and reduce costs of equipment maintenance. • The Port Authority is still responsible for the dredging works, but is currently not fulfilling its responsibility. Shifting this responsibility to the private sector, as it is most directly affected, would enable the operator to make its own decisions on dredging.

Table 2-17: Recommendation for Enhancing Port Efficiency (cont'd)

Port	Bottleneck	Recommendation
Dominica, Roseau		• The cargo pier requires rehabilitation as it is quite old and has been damaged by storm Erika. Further, removal of cargo sheds would create additional storage area on the terminal.
		• DASPA suffers from a high degree of government intervention in the decision making process. A higher degree of autonomy, through corporatization for example, would allow DASPA to operate according to business principles.
Grenada, St. George's		• Renegotiation of working conditions to reduce the costs of labour and improve operational efficiency.
		• Removal of the large cargo shed on the quay would free up space and allow for more efficient container handling operations; additionally, some of the pavement requires rehabilitation.
		• A more advanced and integrated IT system would reduce manual labour (thereby reducing labour costs) and enable more efficient operations.
Guyana, Georgetown		• The limited depth of the Demerara River impedes larger vessels from entering the port. Dredging is required to enjoy economies of scale in the maritime transport leg.
		• The terminals are fragmented. A masterplan should be developed that would create a single container terminal in order to consolidate activities, enable economies of scale on the investments and increase efficiency of cargo handling.
		• The development of a new terminal should be coupled with investments in mobile harbour cranes to increase berth moves per hour. Duration of vessel handling operations is particularly crucial in Georgetown given the strong effects of the tide.
St. Kitts, Basseterre		• St. Kitts requires restructuring of the cargo pier, implying the demolition of the warehouse on the quay. This would allow for more efficient handling of the containers, eliminating unnecessary moves.
		• An IT system should be implemented to limit the amount of administrative labour and to reduce the administrative burden for port users.
Saint Lucia, Castries		• The Port of Castries should restructure the port through a PPP, in order to further improve operational efficiency and put in place a private party with higher autonomy with respect to investment decisions; alternatively, the port could renegotiate terms concerning autonomy and revenue sharing with the central government.
Saint Vincent, Kingstown		• Terminal design should be optimized, in accordance with best practices. Additionally, the port entrance road should be improved, in order to reduce congestion.
		• In order to ensure continued operations, the Port of Kingstown requires additional equipment, as the current backup toppick[12] is in a dilapidated state, resulting in downtime.
		• An integrated IT system would reduce manual labour (thereby reducing labour costs) and enable more efficient operations.

[12] Container handling equipment; comparable to a reachstacker.

Table 2-17: Recommendation for Enhancing Port Efficiency (cont'd)

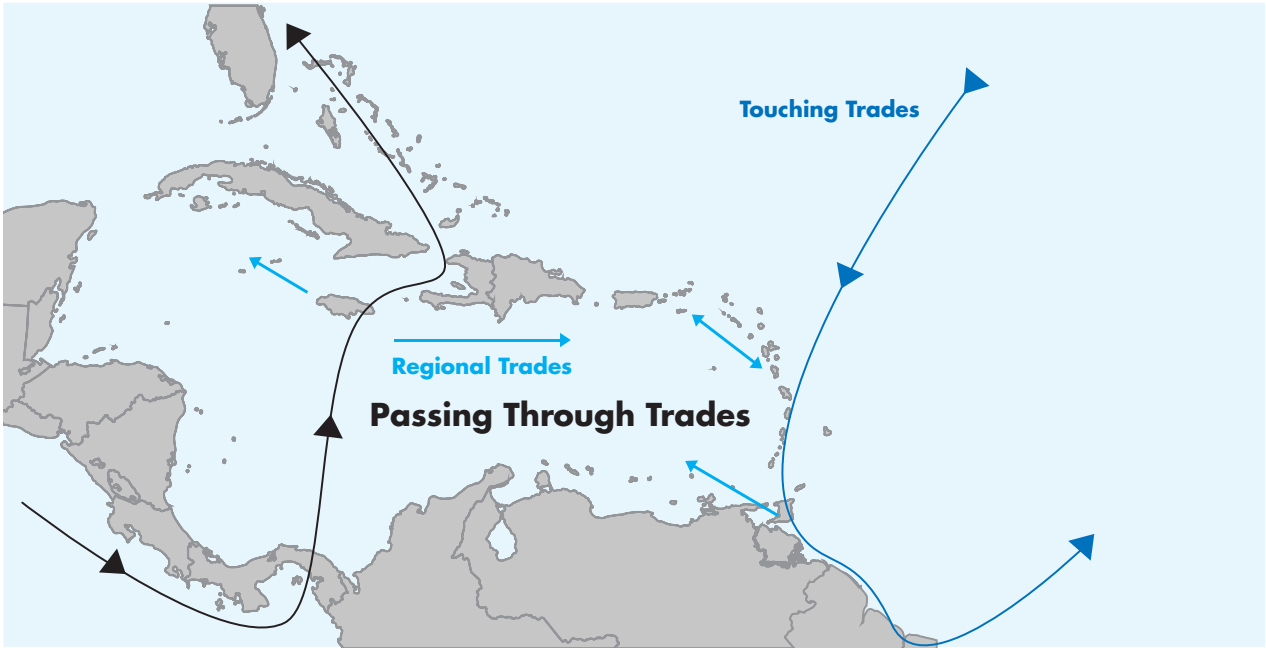
Port	Bottleneck	Recommendation
Suriname, Paramaribo		• The port of Paramaribo requires additional dredging works in order to allow for larger vessels to enter the port. In this way, the port users could enjoy economies of scale in maritime transport.
		• The institutional framework is based on the landlord model. However, the presence of multiple private stevedores leads to inefficient use of equipment and labour. As such, there are four MHCs available where three would suffice. At the end of the concession terms (five more years), an operations concession should be awarded to a single operator.
		• The Port Authority is working towards a Port Community System which could assist in reducing the truck waiting times.
Trinidad & Tobago, Port of Spain		• Negotiations with the labour unions is required to modernize the working conditions in order to reduce labour costs of the organization.
		• New gantry cranes are required to be installed to reduce the downtime of the equipment and to ensure continued operations to shipping lines.
		• It is recommended that the PATNT establish a separate entity for the Terminal Operator PPOS in order to obtain a clear separation of tasks and responsibilities and to enable private sector involvement in the future.

3 CONTAINER TRADE PATTERNS AND FORECASTS

This chapter discusses the container trade patterns in the Caribbean basin, the maritime connectivity of the twelve ports and the future developments with regards to shipping. The chapter is structured as follows:

- **Section 3.1** introduces the container transport industry in the Caribbean basin;
- **Section 3.2** provides an overview of the main transhipment port in the basin;
- **Section 3.3** presents the maritime connectivity of the BMC ports;
- **Section 3.4** addresses the trends and future development of container transport in the basin; and
- **Section 3.5** provides the traffic forecast for the BMC ports.

Figure 3-1: Classification of Trades in Caribbean



3.1 INTRODUCTION TO CONTAINER TRANSPORT IN THE CARIBBEAN BASIN

The Caribbean basin is characterized by high container shipping activity and diversity

The Caribbean basin hosts a wide variety of container trades. The open character of the economies and the strategic location of the Caribbean in connecting sea lanes on East-West trades and North-South trades generate a high level of activity and diversity in Caribbean waters. The active trades in the Caribbean can be classified into three categories: Passing through trades, Regional Trades and Touching trades.

The trades are explained in more detail below.

1. **Passing through trades** – The trade lanes pass through the Panama Canal and will be most directly affected by its expansion. The main trades in this category are:
   - Far East to/from US East Coast (USEC) and US Gulf Coast (USG)
   - Europe to/from West Coast South America (WCSA)
   - USEC USG to/from WCSA

   Services are provided by a concentrated number of global shipping lines of which the largest are Maersk, MSC, CMA-CGM. These shipping lines use the largest vessels that can pass through the Panama Canal. These global shipping lines are the main players that decide on transhipment locations. The liners have hub ports on both sides of the Panama Canal.

2. **Regional trades** – These are trades within the Caribbean basin. The regional trades are serviced by smaller and local shipping lines using mostly geared vessels. Sailing schedules are more flexible. Over the past years, the fleet has modernized partly from RoRo to full container vessels. The regional trade is characterized by several regional players such as Crowley, Seaboard Marine, Tropical, Caribbean Feeder Services and SeaFreight.

3. **Touching trades** – These trades touch the Caribbean basin but do not penetrate into the Caribbean. Services are operated by global shipping lines. These trades may have an effect on how trades lanes are connected and are fuelling the growth of hub ports on the out basin locations such as Balboa in Panama, Port of Spain and or Freeport (The Bahamas).
   - Far East to/from West Coast Central America (WCCA)and West Coast South America
   - Europe to/from East Coast South America (ECSA)
   - USEC USG to/from ECSA

Text Box 3-1: Carried Boxes on the Major East-West Trades

Containers carried on East West Trades

The figure below shows the TEU carried on the largest East West Trades. It shows that the Europe Far-East Trade is still the largest trade. The Transpacific – US West coast trade has remained relatively stable. Third is the Transpacific – US East Coast trade, which passes through the Panama Canal. This trade carries over 5M TEU annually.

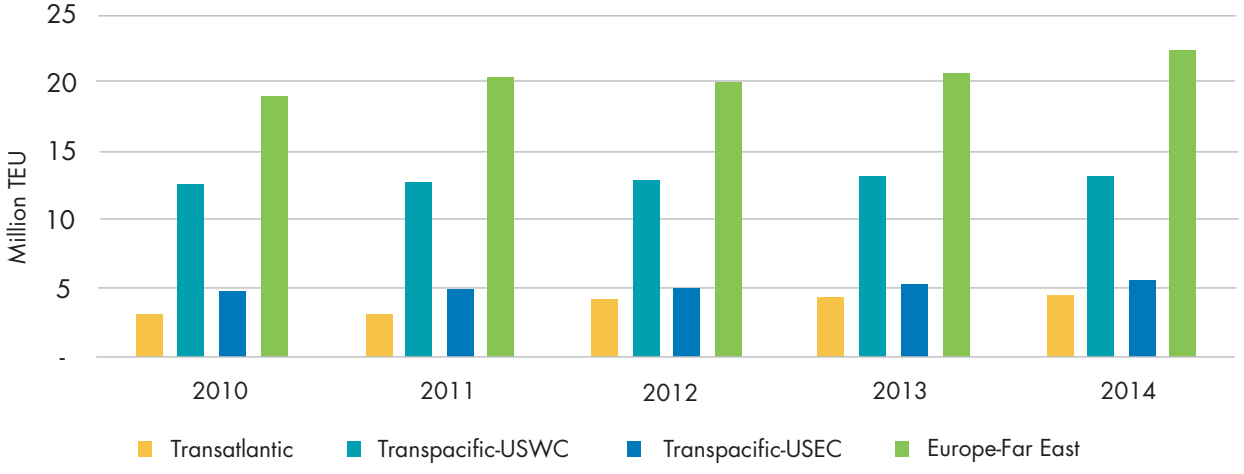
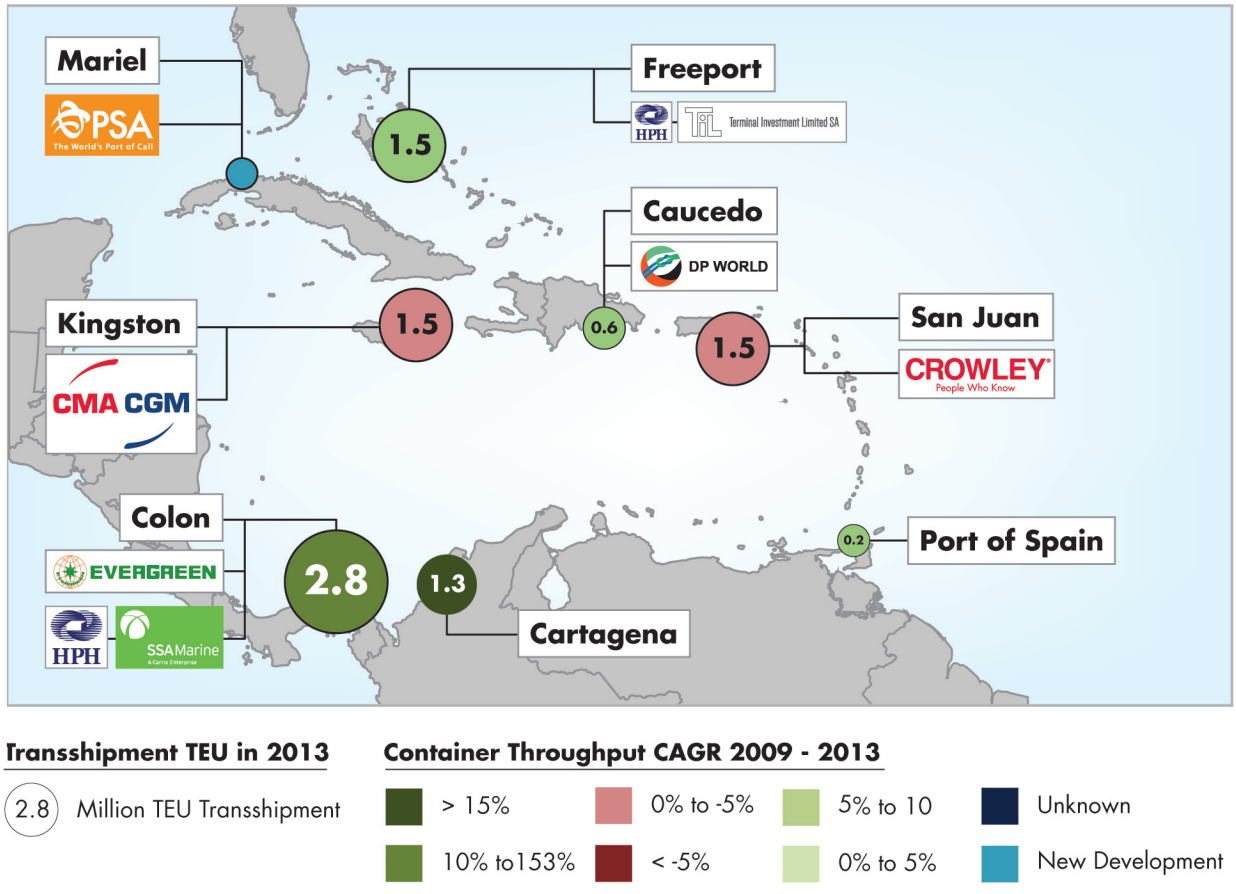


Figure 3-2: Overview Main Transhipment Ports Caribbean



3.2 OVERVIEW OF CONTAINER PORTS IN THE CARIBBEAN REGION

Main Transhipment Ports in the Caribbean

The Caribbean basin hosts a wide variety of container ports. Due to its strategic location, the Caribbean basin is populated by a number of transhipment hubs. Figure 3-2 provides an overview of the main transhipment ports, the volume of containers handled and the present terminal operators in each port. The figure shows that the main transhipment ports are Colón, Kingston and Freeport. These three ports have unique locations vis-à-vis the global shipping routes. A fast growing hub is Cartagena, which benefits from a strong domestic trade and is not too distant from the Panama Canal. A new development in the sector is the Port of Mariel in Cuba, operated by PSA. The proximity to the US coupled with low labour costs make an attractive proposition for a Free Trade Zone port development.

The transhipment hubs have a high degree of private sector involvement. Kingston has just signed an agreement with a CMA-CGM consortium and PPOS is still managed by a public body. The Port of Cartagena is operated by Colombian private companies.

Container Port Developments

The prospective opening of the Panama Canal has stimulated port development in the Caribbean. The textbox below highlights the main container port developments that are expected in the future. The list would add about 21M TEU capacity in the coming decade. It is not reasonable to expect that all developments will materialise.

Text Box 3-2: Main Port Developments in Caribbean

The list below comprises an overview of the main port developments planned for the near future in the Caribbean basin:

- **Kingston Freeport Container Terminal, Kingston Jamaica, +700 kTEU:** The privatization of the Kingston Container Terminal has been completed this year and resulted in a 30-year concession to Terminal Link (part of CMA-CGM). Under the agreement, about $260M USD should be invested in completing dredging works to -14.2m and new equipment to increase the total capacity to 3.2M TEU.
- **CONTECAR, Cartagena Colombia, +2M TEU:** The CONTECAR terminal is in the process of being developed. By 2016, they wish to have expanded to 2.5M TEU. Later to 3.5M TEU, according to demand.
- **Veracruz II Mexico, + 2.5M TEU:** The port of Veracruz, on the eastern coast of Mexico, expects to start constructing its $5 billion expansion in 2016. Veracruz II will feature a 19 meter deep access channel and will feature two new container terminals of 2.5 million TEUs each.
- **Panama Colon Container Port (PCCP), Colon Panama +2M TEU:** The fourth container terminal in, the PCCP is a new project recently approved by the Panama Maritime Authority (AMP) near the Atlantic entrance of the Panama Canal. Opening not before 2018.
- **APM Terminals in Limón:** + 1.3M TEU: In 2008, JAPDEVA (the regional port authority) presented a new port master plan. The master plan highlighted JAPDEVA's vision for terminalisation of activities, i.e., by creating a new dedicated container terminal in Moín to alleviate the efficiency and accessibility issues and to create a dedicated cruise port in Limon to further develop the regional economy. The terminal will be developed in a phased approach, with phase 1 to be completed in 2017 with 1.3M TEU capacity.
- **ICTSI Terminal in Puerto Cortes, Honduras, +1.1M TEU:** In 2013, ICTSI won the international bid for the Specialized Container and Cargo Terminal (Operadora Portuaria Centroamérica, OPC) in the Republic of Honduras for a 30 year period. Operations are scheduled to commence at the end of 2016.
- **Freeport, Bahamas, +2M TEU:** Freeport Container Port is planning to expand its current port. The expansion works include excavation works to create an additional 1,125m of quay. Additionally, an extra berth of 558m can be created. All the expansion works would create an additional 2M TEU capacity. The FCP handles solely transhipment containers. The expansion is based on the expectation that the demand for transhipment will increase due to the widening of the Panama Canal.
- **DP World Caucedo, Dominican Republic, +700k TEU:** DP World Caucedo is about to expand its current container terminal with additional quay length and a substantial logistic zone (40ha in the first phase plus option on 80ha). The first part of the logistics center has begun operations in 2014 under free zone status for logistics activities.
- **PSA in Port Mariel, Cuba, +850k TEU:** With the aid of Brazilian financing, Cuba is developing a deep-water port in Mariel. The $900 M dollar investment entails the creation of a Special Development Zone spanning over a 465-square-kilometer area, a container terminal, and industrial areas. The port should be able to handle about 850,000 TEU per annum, triple the capacity of the container port in Havana. The port will be able to handle the New Panamax vessels. The port is already open for operations, but subsequent phases are still to be executed.
- **Port Lafito, Haiti, +1M TEU:** Port Lafito S.A. is developing a multi-purpose port and terminal in Lafiteau area in Haiti with an estimated initial design throughput capacity of just over 70,000 TEU and capable of handling Panamax vessels. The officials from Port Lafito have presented their plans to become a transhipment hub hoping to handle Post Panamax ships. Operations started in June, 2015 with the first 450m of quay. The second 450m is planned to be operational mid-2016.
- **Goat Island, Jamaica, +7M TEU:** China Harbour Engineering Company (CHEC) has reportedly signed a framework agreement for a US$1.5 billion transhipment port at Goat Island. The port development is part of a larger development project that would create a logistic zone. The port would be developed to accommodate Super Post Panamax vessels.

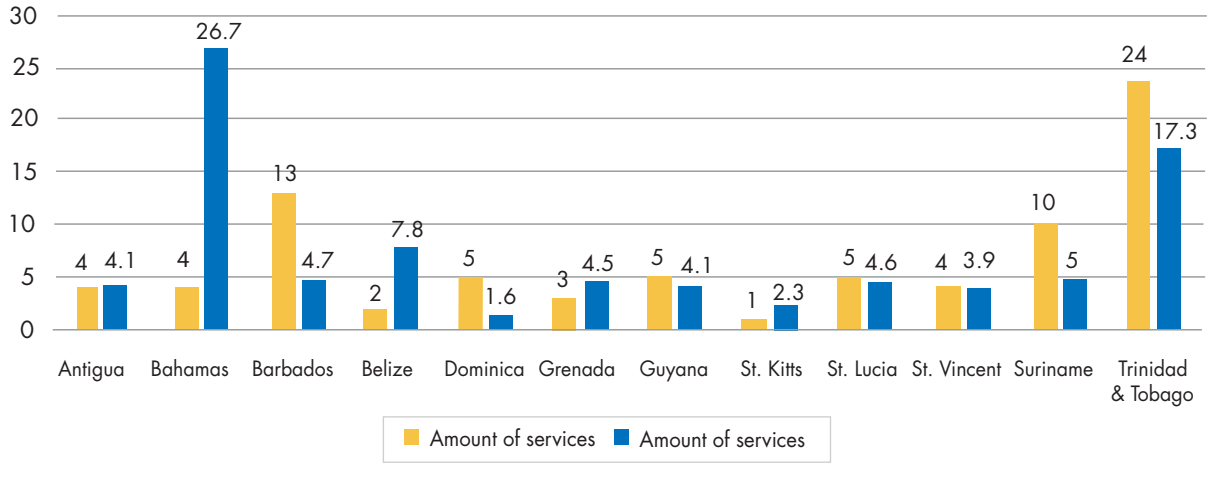
3.3 MARITIME CONNECTIVITY PORTS LINER CONNECTIVITY

The liner connectivity of ports has a large impact on the costs of container transport in the Caribbean.[13] The World Bank keeps track of an index called the Liner Shipping Connectivity Index (LSCI)[14] which indicates the level of connectivity to the global shipping networks.

Figure 3-3 shows the LSCI for the countries of the respective ports. The World Bank reports this data at the country level, not the port level, which is why the Bahamas obtains a high LSCI. The figure also shows the amount of services that are calling the respective ports. Generally, the LSCI and the number of services seem to correspond. However, the obvious mismatch is with the port of Nassau for the aforementioned reason. Trinidad is best connected with 24 services and LSCI score of 17.3, followed by Barbados (13 services and 4.7 LSCI score) and Suriname (10 services and 5.0 LSCI score). The lowest scores are obtained by St. Kitts (1 and 2.3), Grenada (3 and 4.5) and Saint Vincent (4 and 3.9). The Bahamas scores high on the LCSI index because of the Freeport port. The port of Nassau is merely connected by 4 lines.

Table 3-1 shows the amount of services per shipping line company for the respective ports. It can be seen that Tropical Shipping connects the majority of the ports. In addition, CMA-CGM and King Ocean are feeder services that are common in the ports. Geest lines and Europe Caribbean line call the ports with services coming from Europe.

Figure 3-3: Liner Connectivity Ports[15]



[13] See World Bank (2012): Logistics Connectivity in the Caribbean: Current Challenges and Future Prospects

[14] Official definition World Bank (2016): "The Liner Shipping Connectivity Index captures how well countries are connected to global shipping networks. It is computed by the United Nations Conference on Trade and Development (UNCTAD) based on five components of the maritime transport sector: number of ships, their container-carrying capacity, maximum vessel size, number of services, and number of companies that deploy container ships in a country's ports. For each component a country's value is divided by the maximum value of each component in 2004, the five components are averaged for each country, and the average is divided by the maximum average for 2004 and multiplied by 100. The index generates a value of 100 for the country with the highest average index in 2004. The underlying data come from Containerisation International Online."

[15] The amount of services is based on author's calculations. The LCSI is based on World Bank Data (2016) for the year of 2014.

Table 3-1: Liner Services Calling the Ports

	MSC	Tropical	Seaboard	Crowley	CMA-CGM	Caribbean Feeder Services	King Ocean	Geest	Maersk	Zim	Spliethoff	Hyde	Europe Caribbean Line	Seatrade	Marfret
Antigua		2	2												
Bahamas	2	2													
Barbados	1	2	2	1	1	2	2	1							
Belize						1						1			
Dominica		2			1		1	1							
Grenada		1					1	1							
Guyana	1	1			1		1						1		
St. Kitts					1										
Saint Lucia		1		1	1		1	1							
Saint Vincent		2		1				1							
Suriname	1		1	1	1		1		1	1	1		1	1	
Trinidad & Tobago	5	3	2	1	6	1	2		1				1		1

Table 3-2: Liner Rotation Ports

	Miami	Everglades	Freeport	Lauderdale	Port of Spain/ Point Lisas	Kingston	Panama	Pointe-a-Pitre	Fort de France	Philipsburg	New York	EU	Asia
Antigua	x												
Bahamas	x		x	x									
Barbados	x	x			x	x						x	
Belize		x				x							
Dominica	x	x				x						x	
Grenada	x	x											
Guyana					x			x				x	
St. Kitts										x			
Saint Lucia	x	x				x						x	
Saint Vincent	x	x										x	
Suriname	x	x			x	x	x	x				x	
Trinidad & Tobago	x	x			x	x	x	x	x		x	x	x

Table 3-2 shows the hub rotation points of the services calling the ports. It can be seen that the main hub ports used by the services are Miami, Port Everglades and Kingston. Phillipsburg is currently a hub service for St. Kitts, used by CMA-CGM.

*Liner rotation ports are the ports where vessels start and end their loop. E.g., shipping loops starting from Miami call at ports in Antigua, the Bahamas, Barbados, Dominica, Grenada, Saint Lucia, Saint Vincent, Suriname, and Trinidad & Tobago. Rotation ports are often conveniently situated ports that are directly serviced by the global maritime trade routes.

3.4 FUTURE DEVELOPMENT OF CONTAINER TRANSPORT IN THE CARIBBEAN

The Panama Canal Expansion increases the capacity of the Canal from 5,100 TEU to 13,200 TEU vessels

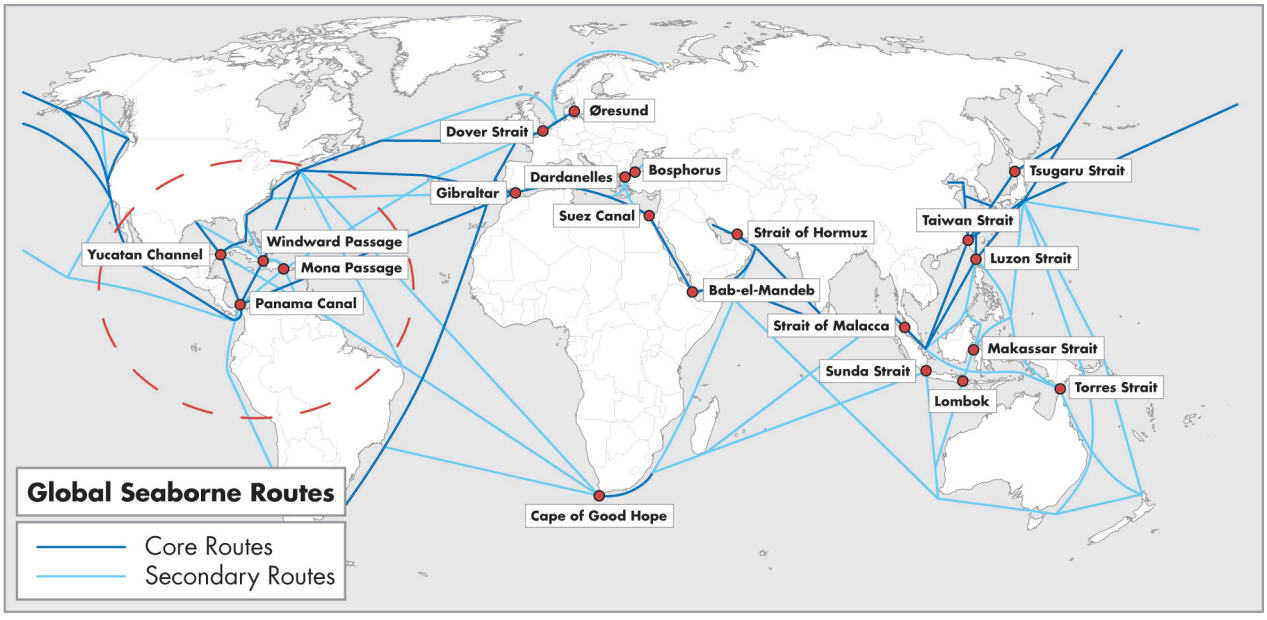
The major game changer in the container shipping sector is the expansion of the Panama Canal. The Panama Canal is one of the most important corridors in trade between the Pacific and Atlantic regions.

The Panama Canal expansion is the largest project at the Canal since it started operations in 1914. The project will create a new traffic lane parallel to the existing two lanes through the construction of a new set of locks to allow larger ships and cater for more traffic. The project is on schedule to be completed by May 2016. It comprises three major components (see also Figure 3-5):

- The construction of two new locks, one on the Atlantic and one on the Pacific side, each consisting of 3 lock chambers.
- The widening and deepening of the existing sea-to-locks navigation channels and the excavation of separate access channels to the new locks
- The deepening of the navigation channels in the Gaillard Cut and Gatún Lake, as well as the elevation of the maximum operating level the of Gatún Lake.

The locks of the Panama Canal are the current bottleneck as they limit the maximum vessel size to around 5,000 TEU. The new locks will allow transit to containerships with a size of up to 13,200 TEU. Hence, the expansion will double the Canal's capacity.

Figure 3-4: Global Seaborne Trade Routes



Source: Dr. Jean-Paul Rodrigue, Dept. of Global Studies & Geography, Hofstra University

Table 3-3: Current and Future Dimensions Panama Canal Locks and Maximum Vessel Dimensions

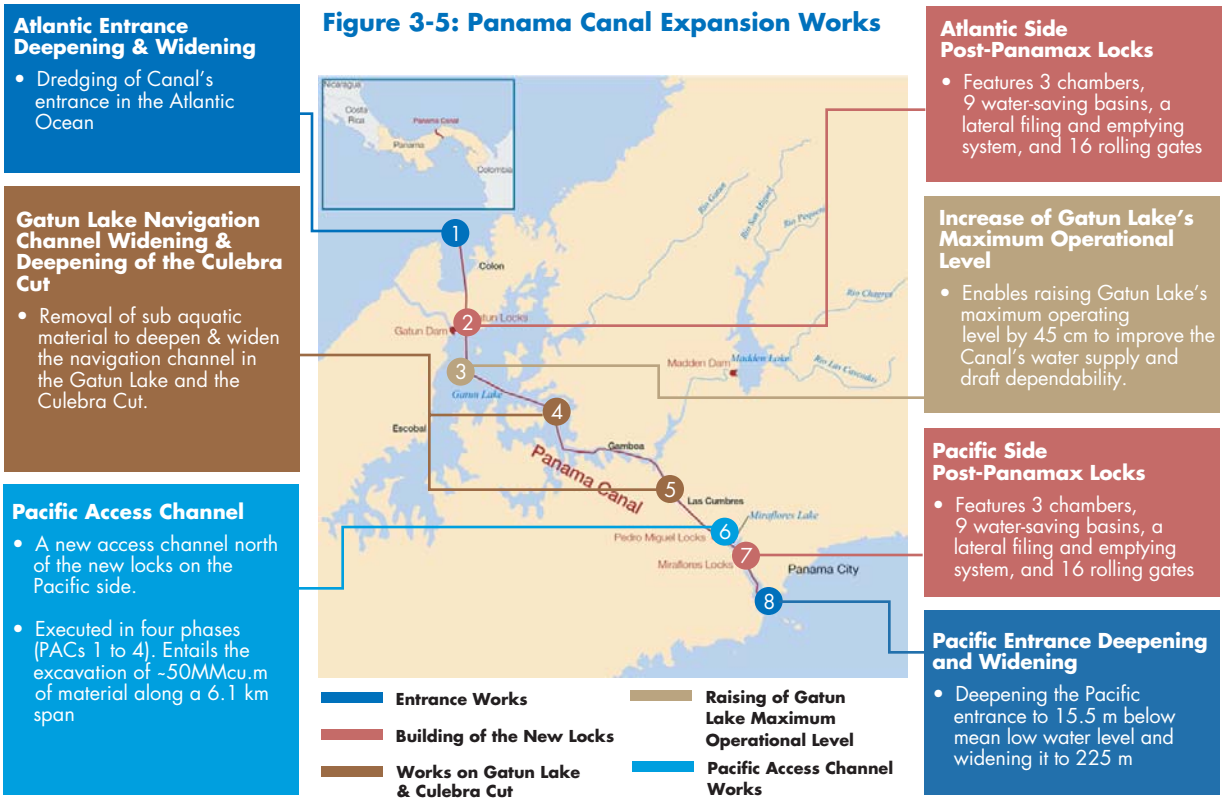
Characteristics	Existing locks	Panamax vessels	New Locks	New Panamax vessels
Length	304.8m (1000ft)	294.13m (965ft)	426.72m (1400ft)	365.76m (1200ft)
Width	33.53m (110ft)	32.31m (106ft)	54.86m (180ft)	48.77m (160ft)
Draft (TFW)	12.8m (42ft)	12.04m (39.5ft)	18.3m (60ft)	15.2m (50ft)
Air Draft	57.91m (190ft)	57.91m (190ft)	57.91m (190ft)	57.91m (190ft)
Vessel TEU Capacity		approx. 5,000		approx. 13,200

Source: Panama Canal Authority

Vessel sizes have increased and will continue to do so

Vessel sizes have increased over the past decades. In 1980, the 3,000 TEU vessel was considered the benchmark of large vessels. In 2006, Maersk was the first to operate a 15,000 TEU vessel (the "Emma Maersk"). Currently, the standard is already 18,000 TEU vessels (such as the Triple E class of Maersk). Figure 3 -6 highlights this evolution of the container vessels over time. The New Panamax vessel indicated under (D) in the figure will be able to make use of the new locks in the Panama Canal.

Figure 3-5: Panama Canal Expansion Works



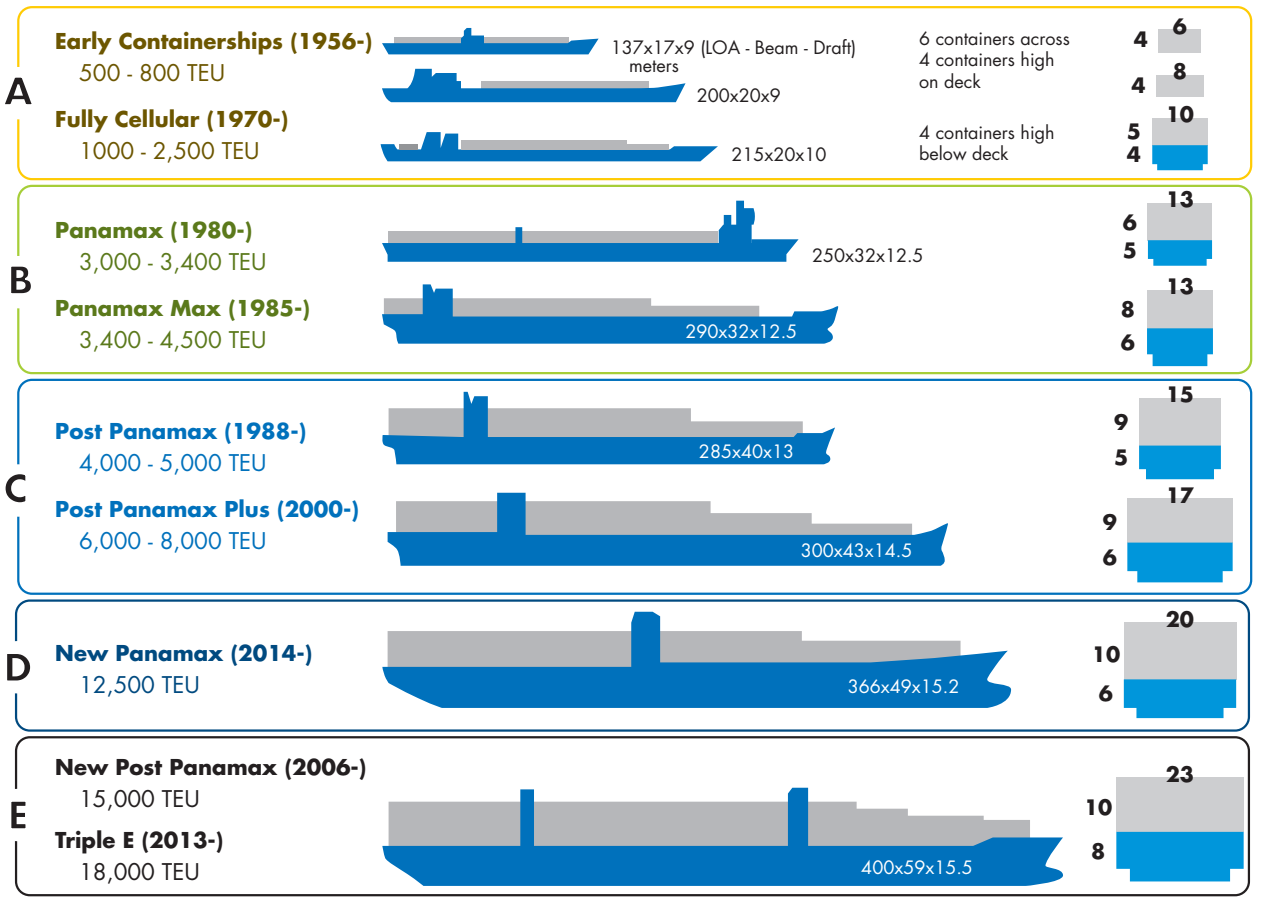
Source: Panama Canal Authority

The trades in the Caribbean basin have experienced different developments in the past seven years:

- Vessels on the 'passing through' trades remained at the same level as they were already limited by the Panama Canal dimensions.

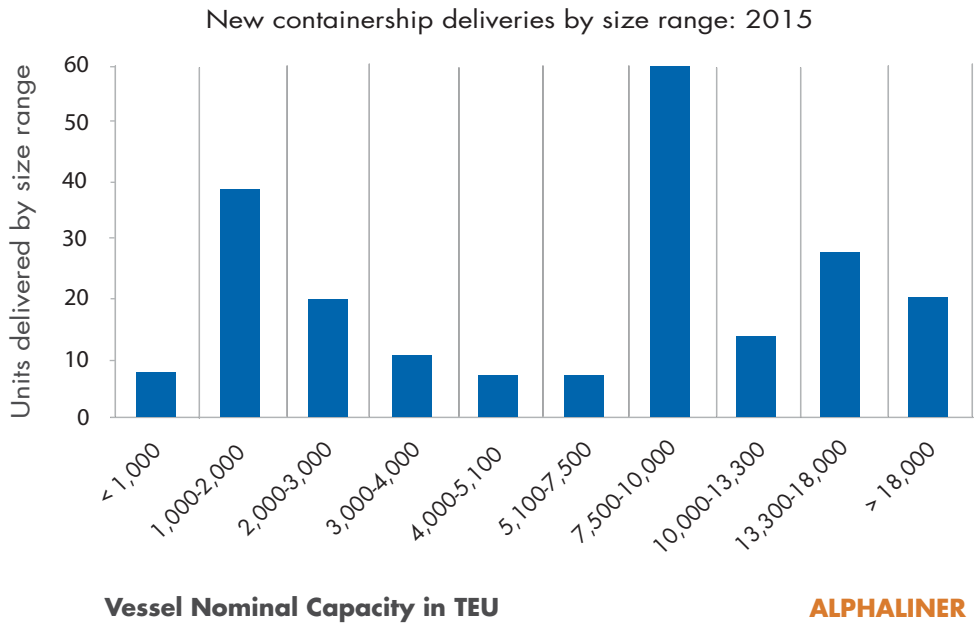
- The average vessel size in the intra Caribbean trade grew significantly from about 700 TEU to 1,000 TEU vessels. In addition, various RoRo (Roll-on Roll-off) services have been replaced by LoLo (Lift-on Lift-off) services, modernizing the active fleet for the intra Caribbean services.
- The trades touching the region have faced a huge transition towards larger vessels. The average vessel sizes on the Europe to ECSA trade grew from 4,000 to 9,000 TEU. This also implied that sailing combinations with Caribbean ports became irrelevant due to the sheer increase in vessel sizes. This has implications for the hub ports on the west side of the Panama Canal which will receive even larger vessels.

Figure 3-6: Evolution of Vessel Sizes



Source: Ashar and Rodrigue, 2012

Figure 3-7: New Containerships Delivered in 2015



The vessels delivered in 2015 highlight that mainly two types of vessels are being ordered, namely the 18,000 TEU vessels as being the new industry standard on the Far East-Europe trade and the New Panamax vessels to be deployed on Far East – US East Coast trades. Secondly, a large class of 7,500-10,000 TEU vessels is being ordered.

In addition, the trend of increased vessel sizes has two side effects:

- **Knock-on or cascade effect:** This effect is basically the knock-on effect that the introduction of Ultra Large Container Ships (ULCS) elicits on the type of vessels deployed in other trades around the world. The deployment of ULCS on the North Europe Far East trade is pushing current smaller classes into the Far East South America trades and the Trans Pacific trades. Thereafter those trades are also affected and their vessels move on to other trades. The result is that most trades are affected and each trade faces larger vessel sizes. At the same time, feeder vessels become larger using the next available size capacity (from average 750 TEU to 1000 TEU and 2500 TEU, depending on their trades). The cascade effect is therefore applicable to all trades globally.

- **Growing importance for transhipment:** With the increased vessel size and the corresponding increased call sizes, these vessels put a lot of pressure on port infrastructure and handling equipment. Only the largest ports can accommodate these vessels in terms of required draught and outreach of the gantry cranes. The total number of vessel calls in a specific string decreases. The role of transhipment becomes more important. Transhipment is used to serve the smaller spoke ports from the main hubs (hub & spoke) and the feeder vessels are used to fill the main liner vessels.

Consequences for the Caribbean Basin

The Panama Canal Expansion coupled with the continued increase of vessels sizes is expected to yield the following effects for the various trades in the Caribbean:

- The average vessel size on the FE – USEC will increase first from 5,100 TEU to 8,000 TEU as soon as the new locks are ready. Thereafter, the vessel sizes will grow along with the increasing port capacity in the ports of the US East Coast.

- The main trades that will directly benefit from the canal expansion is the Europe – WCSA trades as vessel capacity can increase from 5,100 TEU to 9,000 or 13,000 TEU subject to sufficient volume growth on this trade;

- The average vessel size on the FE – WCSA will increase towards 10,000 to 13,000 TEU vessels as demand materializes over the next five years.

- Existing Hub ports such as Kingston, Caucedo and Manzanillo/Colon become larger due to the increased volumes at the main trades.

- Cartagena has also become a hub due to the advantages connecting captive trade (import / export) and transhipment from Caribbean NCSA from /to WCSA and Europe.

- The vessel sizes in the intra Caribbean trade are likely to increase towards 1,700 or 2,500 TEU following the trend deployed already by some shipping lines. The 1,700 TEU vessels are usually 170m-180m in length with a draught of 9.5m to 10.0m. The 2,500 TEU vessels are between 200m-210m long and with a draught of 11.5m.

Consolidation of shipping lines will lead to a higher concentration of container handling

The container shipping industry has seen a large number of mergers and alliances forming over the past decades. The recent economic downturn drove another consolidation wave as shipping lines were forced to reduce costs and to further optimize the deployment of ships and the services offered to their customers. Recent examples of consolidations are:

- The G6 Alliance consisting of Hapag-Lloyd, NYK Line, OOCL, Hyundai Merchant Marine, APL and Mitsui O.S.K. Lines.

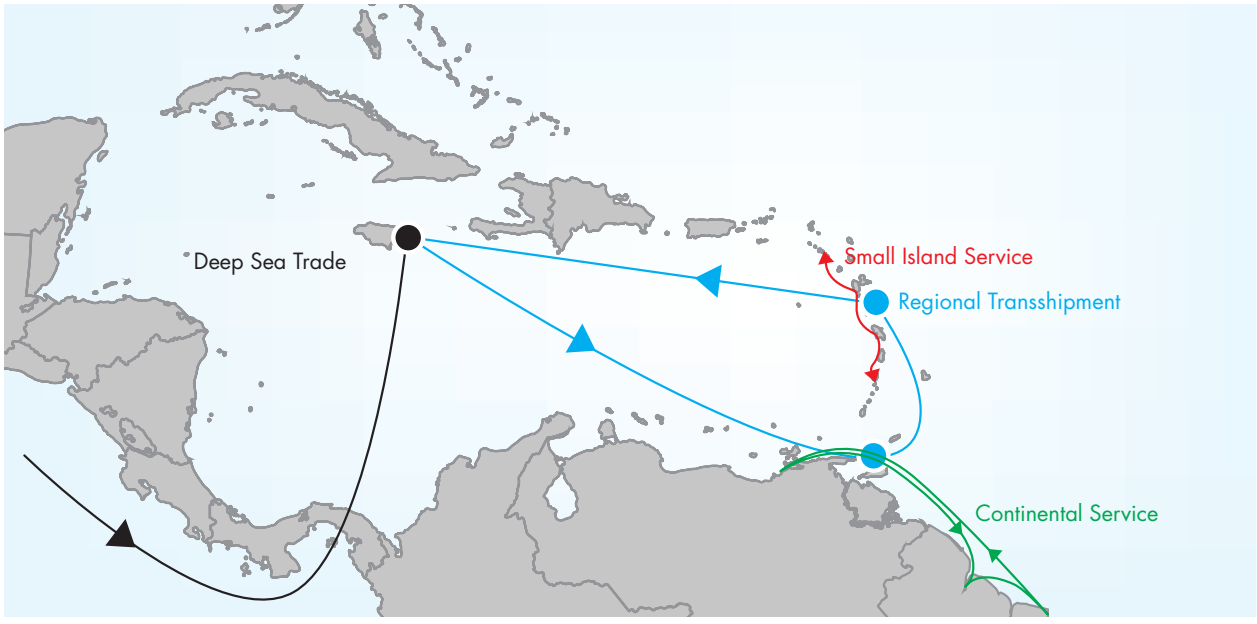
- The 2M alliance (Maersk and MSC) has formed between two of the largest shipping lines. The alliance comprises a vessel sharing agreement on Asia-Europe, Transatlantic and Transpacific trades lanes.

- Hapag Lloyd – CSAV: Hapag-Lloyd is especially strong on the Europe and Mediterranean to Caribbean trade whilst CSAV is strong on the WCSA to Europe trade.

- The merger of two Chinese shipping lines COSCO and China Shipping;

- Evergreen Line & CHKY Alliance (Evergreen Line will join the CHKY alliance of Cosco, Hanjin, "K" Line and Yangming) to form CKYHE.

Figure 3-8: Example of Two Transhipment Move Systems



Consolidation amongst shipping lines affects the services offered in their destinations. In an alliance, shipping lines reassess their services and the ports they serve, in an attempt to optimize the combined market coverage. Alliances further reassess the type and numbers of vessels being deployed on the services. Combined with the trend of increasing vessel sizes, this is likely to lead to concentration of transhipment activity, as alliances aim to optimize utilization to/from the transhipment hub ports.

Future Container Trade in BMC Ports

Increasing vessel sizes and the continued consolidation of shipping will lead to a greater use of transhipment in the Caribbean basin. The major transhipment ports Kingston, Colón, Cartagena, Caucedo and Freeport are likely to prevail as the major hubs. In addition, the maritime sector has high expectations of Port Mariel, given its proximity to the US East Coast and the availability of low cost labour.

For the gateway ports of the Borrowing Member Countries, this trend implies that the ports will remain dependent on the major transhipment hubs, as they are now.

The vessels used for the Intra-Caribbean trade are also expected to get larger. This in turn could imply that some ports will be able to continue to accommodate these vessels; whereas others would require another transhipment move to smaller vessels. This leads to greater regional transhipment. Herein lies the opportunity for ports to capture this regional transhipment trade.

In the OECS countries, there exists a need for regional transhipment. This need is likely to persist in the future in line with the increased use of hub and spoke systems and the increase in vessel sizes[16]. From an economic perspective, transhipment is most efficient when concentrated in a central location. Currently, the port of Philipsburg in St. Martin is a transhipment hub for CMA-CGM.

As OECS ports are looking to add cargo, the transhipment volumes in Philipsburg are a target. However, not all ports can attract such transhipment volumes. Regional transhipment ports would require at least two mobile harbour cranes and two operational berths. The two mobile harbour cranes are required to ensure a high number of berth moves per hour, reducing the length of the port call. Further, having two mobile harbour cranes would ensure that in case of a breakdown, one would still be available. Two berths are required so as to prevent any waiting time for the vessel with transhipment cargo.

Whichever port 'wins' the transhipment cargo is irrelevant from a regional perspective. It is more important that the OECS ports realize their future position and invest accordingly. Resources would be wasted if multiple ports invest in new infrastructure and compete for the same cargo. As the OECS countries and ports are already financially challenged, prudent investment decisions are absolutely warranted.

In fact, given the footloose nature of transhipment, it is recommended to ports that aim to invest in transhipment cargo to come to a long- term agreement with the shipping lines, or even better, have the shipping lines co-invest in the facility. As such, a level of guarantee is created on future volumes.

In addition to the OECS counties, the ports of Georgetown and Paramaribo will remain largely dependent on regional transhipment as long as their ports remain at their current locations. PPOS is likely to remain a regional transhipment hub, serving Guyana and Suriname and neighbouring islands.

[16] With a draught of 11.5m, the 2,500 TEU vessels could face accessibility constraints to ports such as Grenada and Saint Lucia (at -9.0m C.D. and -10.0m C.D. respectively). However, it should also be noted that when vessels are not fully loaded, the maximum draught of the vessels is not always reached.

3.5 TRAFFIC FORECAST FOR THE BMC PORTS

In order to evaluate the sufficiency of port infrastructure in the Caribbean region, Section 3.5 presents a cargo demand forecast for the individual countries. Additionally, the demand forecast aims to provide insight into potential cargo growth differences between identified country groups.

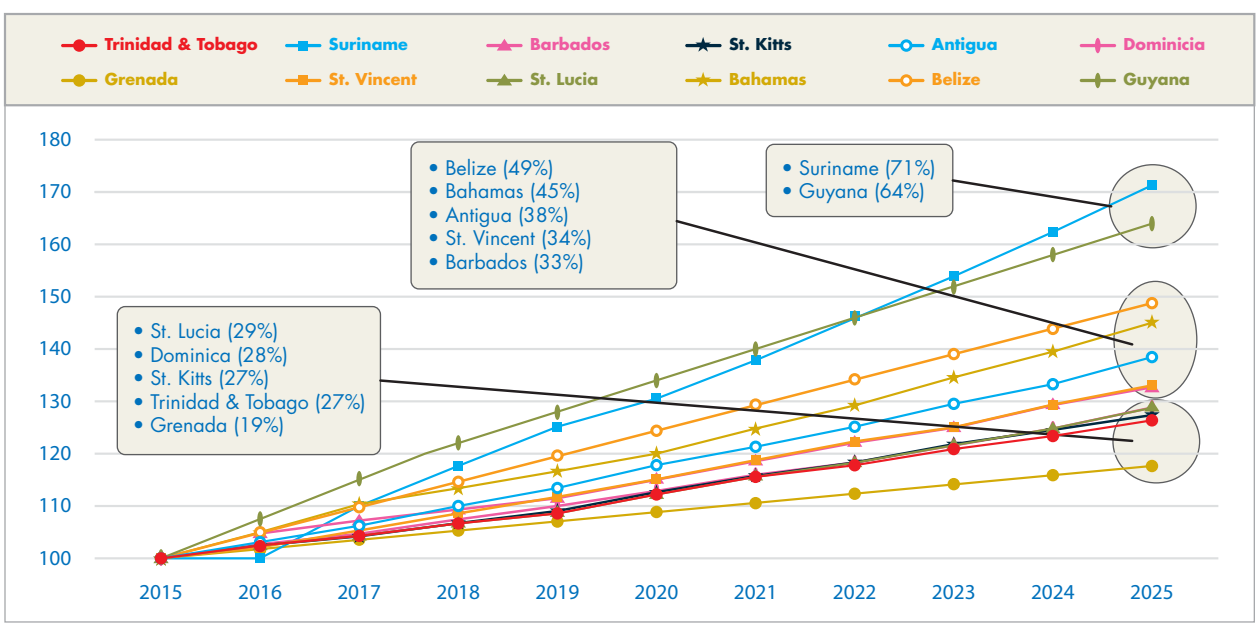
As the analysis focuses on containerized cargo trade, the cargo forecast will comprise solely containerized cargo. The main demand forecast disregards transhipment containers, as transhipment cargo and gateway containers are driven by different factors (transhipment cargo growth is driven mainly by port service levels, physical characteristics of ports, shipping lines' loops, and tariffs; growth of gateway containers is driven by country specific factors, such as GDP and population growth).

A threefold approach has been applied to arrive at a top-down gateway container forecast. This approach comprises the following steps:

- An assessment of macro-economic variables, such as GDP growth. To this end, figures from the IMF's World Outlook (October 2015) have been employed (the IMF's figures forecast GDP growth to 2020; GDP growth figures have subsequently been projected to 2025, based on MTBS' estimates).
- A regression analysis has been applied to identify multipliers in GDP growth and container (TEU) growth for each country. These multipliers have subsequently been amended where necessary, based on MTBS' market knowledge.
- Application of amended multipliers to historical cargo demand figures to arrive at the gateway container forecast.

Figure 3-9 provides an overview of the gateway container forecast; the figures have been indexed

Figure 3-9: Indexed Gateway Container Growth Forecast



(year 2015 = 100) in order to enable comparison of growth between individual countries. From the figure, a substantial range in estimated outcomes may be noted. By 2025, Suriname's gateway container demand is estimated to grow by approximately 70%; whereas Grenada's cargo demand is estimated to grow by approximately 20%.

Based on estimated growth, countries have been ranked and grouped. The following three groups have been identified:

- High growth group: Suriname and Guyana.
- Medium growth group: Belize, the Bahamas, Antigua, Saint Vincent, and Barbados
- Low growth group: Saint Lucia, Dominica, St. Kitts, Trinidad & Tobago, and Grenada.

It may be noted from the identified groups that the OECS countries generally underperform in projected cargo growth, as compared to other countries included in the assessment. This is to be expected since the smaller island nations typically have very small populations, low population growth, and weak GDP growth.

The table below provides an overview of estimated container demand per country (excluding transhipment cargo). The table anticipates that several countries are estimated to experience substantial demand growth, potentially resulting in (worsening) constraints due to a lack of sufficient infrastructure and equipment.

It is expected that the smaller OECS countries, despite their relatively slow demand growth (as compared to the other countries), will potentially still face issues as a result of the increasing cargo demand. This is mainly caused by the lack of expansion potential, as the areas surrounding the current ports are either not suited as port areas, or privately owned and used for other purposes. This constraint is further aggravated by issues resulting from tropical

Table 3-4: Gateway Container Demand Forecast

	2010	2015	2016	2017	2018	2019	2020	2025	CAGR
Antigua	14.9	15.0	15.5	15.9	16.5	17.1	17.7	20.7	3.24%
Bahamas	N/A*	136.8	144.4	151.2	155.4	159.7	163.7	198.4	3.79%
Barbados	74.6	60.9	64.2	65.4	66.6	68.1	70.2	81.1	2.91%
Belize	31.9	45.4	47.9	50.4	52.6	54.8	56.9	67.7	4.09%
Dominica	12.2	13.4	13.7	14.0	14.4	14.8	15.2	17.2	2.51%
Grenada	15.0	16.5	16.7	17.0	17.3	17.6	18.0	19.6	1.74%
Guyana	59.9	68.8	74.1	78.7	83.5	87.4	91.5	112.4	5.04%
St. Kitts	7.2	9.8	10.0	10.2	10.5	10.8	11.0	12.5	2.44%
Saint Lucia	30.6	64.0	32.4	33.0	33.7	34.6	35.4	40.4	2.33%
Saint Vincent	17.0	17.6	18.1	18.6	19.1	19.7	20.3	23.5	2.94%
Suriname	91.6	104.9	105.7	115.3	124.1	131.4	137.1	179.8	5.54%
Trinidad & Tobago	172.3	167.7	171.4	175.3	179.5	184.0	188.8	212.8	2.41%

*Nassau Container Port (NCP) was not yet operational in 2010.

Table 3-5: Gateway Container Demand – Sensitivity Analysis

	2010	2015	2016	2017	2018	2019	2020	2025	CAGR
Guyana (base case)	59.9	68.8	74.1	78.7	83.5	87.4	91.5	112.4	5.04%
Guyana (low case)	59.9	68.7	66.0	69.3	72.5	75.0	77.5	89.7	2.70%
Suriname (base case)	91.6	104.9	105.7	115.3	124.1	131.4	137.1	179.8	5.54%
Suriname (low case)	91.6	104.9	104.9	112.8	119.7	125.1	128.8	158.8	4.24%

storms. When storms pass through the OECS, ports are often required to decrease container stacking height to 1 container, thereby severely limiting container capacity in the port. These capacity issues can be resolved through implementing one of the following 3 options (ranging from low to high impact):

- **Low impact:** more efficient yard management, resulting in lower container dwell time. Additionally, consignees could be forced to pick up containers if a storm is active in the region.
- **Medium impact:** an inland container freight station (CFS) could be developed, in order to rapidly move containers out of the port, thereby relieving congestion in the port area.
- **High Impact:** the port could be relocated to a more suitable location, which offers adequate space for projected demand growth. However, this option will likely entail prohibitively high investments for many of the assessed countries.

The mainland ports are expected to exhibit the largest growth in container throughput (both in relative and absolute terms). Due to limited expansion areas at the port sites, Suriname and Guyana are expected to face substantial capacity constraints in the medium term.

Sensitivity

Due to the substantial projected cargo demand increase for Suriname and Guyana and the implied impending capacity constraints, a sensitivity analysis was carried out for these countries. This analysis controls for potentially optimistic economic growth factors and validates the identified need for port expansion in these countries.

More specifically, projected GDP growth is decreased by 1 percentage point for Suriname and Guyana. Results of the low case demand growth estimation are presented in the table below.

Despite a substantial decrease in projected economic growth for the countries, the projected growth in container demand is still significant for both countries. Hence, substantial development efforts will still be required to handle projected cargo demand.

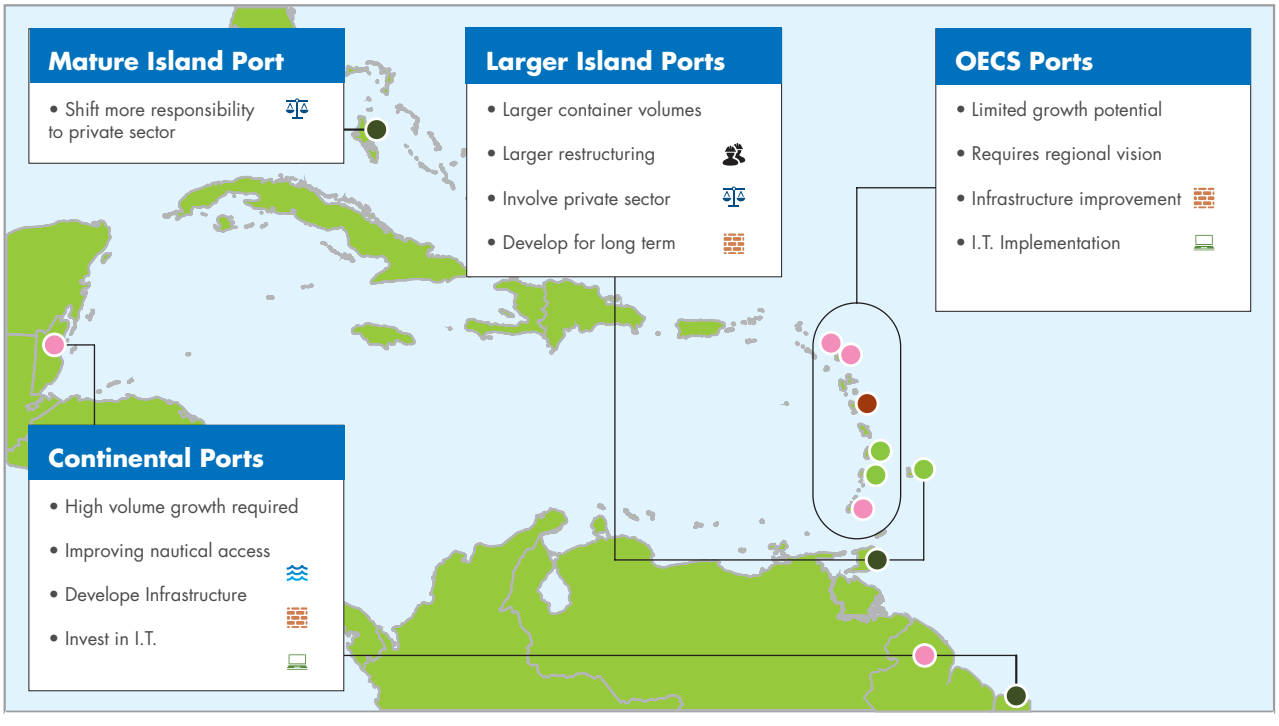
4 PORT DEVELOPMENT OPTIONS

This chapter presents the port development options to enhance port efficiency. The options are based on the identified bottlenecks (section 2.4), the enhancement measures (section 2.5) and the development vision postulated in Section 4.1.

4.1 DEVELOPMENT VISION

This section postulates the development vision for the various categories of ports. The development visions are based on the current status of the ports, their efficiency and the trends that have been identified for the future. The development vision provides a framework for the development options in the following sections.

Figure 4-1: Shows an Overview of the Four Groups of Ports that have a Comparable Development Vision.



OECS countries to optimize operations within their means, prudent investments toward the future

The OECS ports are faced with limited growth potential and outdated infrastructure. While the Antigua Port Authority is investing heavily in a new port facility, other ports are advised to develop within their means and optimize current port operations within the context. Developing new port facilities should always be preceded by detailed studies in order to investigate whether the economic benefits outweigh the costs. In case of large port investments, PPP options should be considered in order to attract capital and operational excellence. However, given the limited volumes, the private sector is not likely to assume a large investment responsibility.

Continental ports Belize, Guyana and Suriname need to improve nautical accessibility and infrastructure

The continental ports are expected to grow significantly in terms of container throughput, based on high economic growth expectations. Given their bottlenecks with respect to nautical accessibility and the capacity and condition of the port infrastructure, port developments are necessary. The access channels require deepening in order to accommodate large vessels and benefit from economies of scale. Port infrastructure development is required in Belize and Guyana, and even Paramaribo should consider expansion possibilities. In developing a modern container facility, Georgetown should consider a PPP structure in order to raise capital and develop operational excellence. It is recommended that the port of Belize combine development in container operations with the dry bulk handling facilities in order to create additional volumes to warrant the investments.

Larger island ports: Ports of Bridgetown and Port of Spain to modernize port labour, involve private sector and develop for long term

The labour costs in Bridgetown and Port of Spain are excessively high and do not match the modern ambitions of the ports. Labour restructuring should allow for more cost-effective operations. Especially in PPOS, which fulfils a regional transhipment function, the reduction in costs will affect the entire chain, hence also the import of containers into other islands. The labour restructuring can be coupled with increase in private sector involvement. This is a hot topic politically. Private sector involvement should aim to achieve the operational excellence and low operational costs that would contribute to long-term economic growth of these countries.

Further, for both ports, development plans exist. For Barbados Port Inc., the development includes the creation of a new cruise facility, to separate cruise from cargo operations and an upgrade of the current cargo terminal. In Trinidad & Tobago, the future development of the ports is unclear, and hence also for Port of Spain. As long as the government cannot agree on a long- term development plan, it is difficult for the Port Authority of Trinidad & Tobago to invest in port development in Port of Spain. The need for deep water facilities on Trinidad & Tobago is evident, if the country wishes to retain its regional transhipment function.

Mature island port Nassau: more responsibilities to private sector

The container port of Nassau is a prime example of a well-developed modern island port. The involvement of the private sector has been key in moving from a situation of six stevedoring companies without modern facilities to a modern facility with one stevedoring company. The former stevedores are still involved but limited to yard management. The government still has a shareholding position in the port company, retaining a level of control over developments. Future developments in the Port of Nassau could entail shifting additional responsibilities to the private sector, such as marine services and breakwater maintenance

4.2 DEVELOPMENT OPTIONS

For each port, this section presents the development options which should contribute to the realization of the development vision and achieve higher operational efficiency.

For each investment project, a high level estimate of the costs is provided. Further, the extent to which the CDB could be involved in financing investments is indicated. Lastly, the envisaged timing of the investments is indicated.

Antigua, St. Johns

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Finance labour restructuring** - Renegotiation with labour union to reduce workforce and modernize working conditions in order to lower overall labour costs and improve reliability of services. Funds required to finance redundancy packages. Gradual decrease advised.	5	Antigua Port Authority	2016-2020
2	**Acquisition of a MHC** - Acquisition of new MHC in order to be able to continuously offer MHC stevedoring services. This is on the condition that Tropical Shipping would commit transhipment volumes to the APA.	3	Antigua Port Authority	Q3 2016
3	**Acquisition and implementation of Port IT system** - Implementation of terminal operating system and integration with customs to reduce the manual labour required and speed up the procedures for port users.	2	Antigua Port Authority	2016

Bahamas, Nassau

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Rehabilitation of the breakwater:** the breakwater currently is under the responsibility of the Port Authority, which is not providing the desired nautical protection.	20	Port Department The Bahamas	2016-2017

Barbados, Bridgetown

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Financing Labour Redundancy:** BPI is in the process of negotiating a labour rationalization program with the labour unions. The gang sizes need to be modernized and the working conditions need to be redefined in line with modern operations in order to reduce the labour costs for the port.	10-20	Barbados Port Inc	2016-2020
2	**Development Cruise Pier:** The BPI has had conversations with a cruise operator to develop the Sugar Point Terminal into a modern cruise facility. The PA would invest in the reclamation of 15 acres and construct 3 piers, amounting to a total cost of 200M USD. The operator would invest in the shopping mall and cruise centre 50-100M USD. No funding has been secured as yet.	200	Barbados Port Inc	2017-2020
3	**Further development of cargo port** In the Master Plan of BPI, three projects remain to be developed, namely: (1) the removal of the sheds near the quay; (2) the addition of quay length; and (3) development of the CFS station. It could be investigated whether capital can be raised with implementation of a PPP structure.	100	Barbados Port Inc	2016-2020

Belize, Belize Port

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Financing dredging works** – The port authority is not dredging the access channel to the port. Depending on the required works, costs could be substantial. Further, it is dependent on the development vision of the new entrant in the Belize Port, who will purchase the shares from the Lender who will operate the port.	10-50	Port Authority Belize	2017
2	**Funding labour restructuring** – The amount of work available for the labour union is too little to sustain 150 workers. Downsizing is required. In addition, agreements on modern working standards would require compensation.	5-10	Belize Port Limited	2016-2018

Dominica, Roseau

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Development Masterplan and feasibility studies** – As DASPA is faced with old infrastructure and dispersed operations, development of a port master plan and feasibility studies are recommended to structure future port development.	1	Dominica Air & Sea Port Authority	2016
2	**Funding of port development** – Any port development resulting from the studies mentioned above should be coupled with port reform in order to provide DASPA with more autonomy.	unknown	Dominica Air & Sea Port Authority	Long term

Guyana, Georgetown

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Development Masterplan and feasibility studies** – As the Port of Georgetown is faced with old infrastructure and dispersed operations, a port master plan and feasibility studies are recommended in order to structure future port development.	1	Guyana National Shipping Association	2016
2	**Funding of port development** – Any port development resulting from the studies mentioned above should be coupled with port reform in order to structure the port sector. Estimates in Guyana indicated a $350M project.	50-150	New consortium	Long term

Grenada, St. George's

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Reduce labour costs** Current labour agreements result in prohibitively high operating costs. The high labour costs are attributable to: (i) large gang sizes; and (ii) high wages for stevedoring and shorehandling labourers. These issues can be resolved in the following ways: • Renegotiating labour agreements, opting for smaller gang sizes and lower wages. • Reducing the labour force through offering severance packages or not replacing retiring workers.	5 -10	Grenada Ports Authority	2016 - 2018
2	**Improve terminal layout** The outdated terminal layout limits operational efficiency and throughput capacity. Additional yard space can be achieved through removing the warehouse on the apron area. Dwell time can also be reduced by improving yard management and customs clearance times.	1/ 10 -20	Grenada Ports Authority	Medium Term
	Alternatively, an inland CFS could be developed to handle Less-than-Container Load (LCL) cargo, thereby relieving stress from the port (investment costs for this option are likely substantially higher).	1	Grenada Ports Authority	2016 - 2018
3	**Rehabilitate deteriorated pavement** Parts of the pavement have deteriorated and should be rehabilitated in the short to medium term, in order to ensure safe operations			

St. Kitts, Basseterre

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Study on Rehabilitation of cargo pier** – SCASPA would require rehabilitation of the cargo pier, coupled with the demolition of the warehouse on the quay.	1	St Christopher Port Air & Sea Authority	2016
2	**Rehabilitation of cargo pier** – Depending on the studies mentioned above, construction works will require financing. It is unlikely that this will happen in a PPP, given the limited volumes.	20-50	St Christopher Port Air & Sea Authority	Long term
3	**Acquisition and implementation of IT system** – SCASPA would benefit from the implementation of IT system in order to optimize cargo operations and reduce administrative labour.	2	SCASP St Christopher Port Air & Sea Authority	2016

Saint Lucia, Castries

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Increase the autonomy of SLASPA through Institutional reform** The lack of autonomy, especially in financial management, limits the organization's capabilities to establish efficient port operations. Corporatization of the organization could help in distancing the role of government from the business operations of the port. Alternatively, the port could be developed through a Public Private Partnership (PPP), by attracting a private party that can be given the autonomy to develop the port in an efficient manner.	unknown	Saint Lucia Air & Sea Ports Authority	2016 - 2020
2	**Procure an additional mobile harbour crane** In order to reduce vessel waiting time and accommodate the growing cargo demand, a second MHC should be procured in the medium term.	2.5-5.0	Saint Lucia Air & Sea Ports Authority	2018 - 2020
3	**Feasibility Study Structural Integrity Berth 5** In order to employ a MHC on berth 5, the structural integrity of berth 5 should first be assessed (and improved if necessary). To this end, a Feasibility Study should be carried out.	0.5-1.0	Saint Lucia Air & Sea Ports Authority	2016 - 2018

Saint Vincent, Kingstown

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Improve terminal layout** The outdated terminal layout limits operational efficiency and throughput capacity. Additional yard space can be achieved through removing the warehouse on the apron area. Dwell time can also be reduced by improving yard management and customs clearance times.	1/ 10-20	Saint Vincent & the Grenadines Port Authority	2016-2018
2	Additional layout updates, through land reclamation or operations relocation, would entail substantially higher investments. **Pavement rehabilitation of the main ports** Some parts of the pavement in both the Port of Kingstown and CPCP have deteriorated, and should be rehabilitated to ensure safe operations.	2.5-5.0	Saint Vincent & the Grenadines Port Authority	2016-2018
3	**Implementation Port Rationalization Study – Port Relocation** A Port Rationalization Study has been carried out. The preferred option for the new port development is still uncertain. The investment would allow for concentrated operations.	53-100	Saint Vincent & the Grenadines Port Authority	2017-2020

Suriname, Paramaribo

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Economic Feasibility Study on Deepening River** – A detailed study is required to assess the economic viability of deepening the river. The study should include a hydrographic survey to determine the volumes to be dredged.	1	Maritime Authority Suriname / Port Authority	2016
2	**Financing dredging work** – Depending on the studies mentioned above, dredging works would require funding.	20-50	Maritime Authority Suriname / Port Authority	Long term
3	**Acquisition and implementation of Port Community System** – The Port Authority would benefit from the implementation of an IT system to optimize cargo operations and reduce administrative labour.	2	Port Authority	2016
4	**Port Master Plan study on expansion** – The current port has an estimated capacity of about 130,000 TEU. The TEU throughput is expected to reach 180,000 by 2025. There is a need for expansion. Depending on the outcomes, funding for expansion may be required.	1	Port Authority	2017
5	**Expand the truck gate to add capacity** - To relieve the public areas of congestion by the trucks, an additional gate would create more capacity at the 'front door' of the port. This investment should be coupled with a proper truck waiting area and a bonus/malus system (via the port community system) for on-time pickups of trucks.	2	Port Authority	2016

[17] Providing financial incentives for truckers when the container is picked up in the correct timeslot and/or give penalties to truckers that make a pick-up outside the timeslot.

Trinidad & Tobago, Port of Spain

No.	Description of project	Costs (M USD)	Recipient	Timing
1	**Develop National Port Masterplan** – There have been various studies in the past on port development. However, this has not led to a National Port Masterplan that is embraced by stakeholders. The need is evident but changing political preference has hampered development.	1	Ministry of Transport	2016-2017
2	**Financial Assistance in labour restructuring** – The PPOS requires labour restructuring. Redundancy packages could be financed by the CDB. As the organization is large (1150 workers) the total costs could be substantial.	15-30	Port Authority Trinidad & Tobago	Long term
3	**Financing acquisition of new equipment** – The PPOS requires investments in new gantry cranes. Each gantry crane costs about 10-15M USD.	20-30	Port Authority Trinidad & Tobago / PPOS	2016-2018

5 CONCLUSIONS & RECOMMENDATIONS

This chapter presents the conclusions and recommendations of the Study. The recommendations will be presented in two sub-sections. Section 5.2.1 presents the recommendations of the Caribbean Development Bank and section 5.2.2 presents the recommendation to policy makers.

5.1 CONCLUSIONS

Ports of Borrowing Member Countries vary and each port offers unique features and challenges

The twelve ports of the Borrowing Member Countries are each unique entities with specific sets of characteristics, stages of development and challenges. Each port development program should therefore be tailored to the local context.

Port efficiency varies across ports

The level of port efficiency varies substantially. Measured on seven dimensions that include statistics on berth productivity, labour productivity, equipment, nautical accessibility, autonomy and the presence of IT, the analysis shows that the most efficient ports are the Bahamas, Trinidad & Tobago, Suriname and Barbados. Saint Lucia and Belize form the middle of the pack.

The other OECS countries and Guyana record lower than average efficiency scores.

Figure 5-1: Efficiency Score

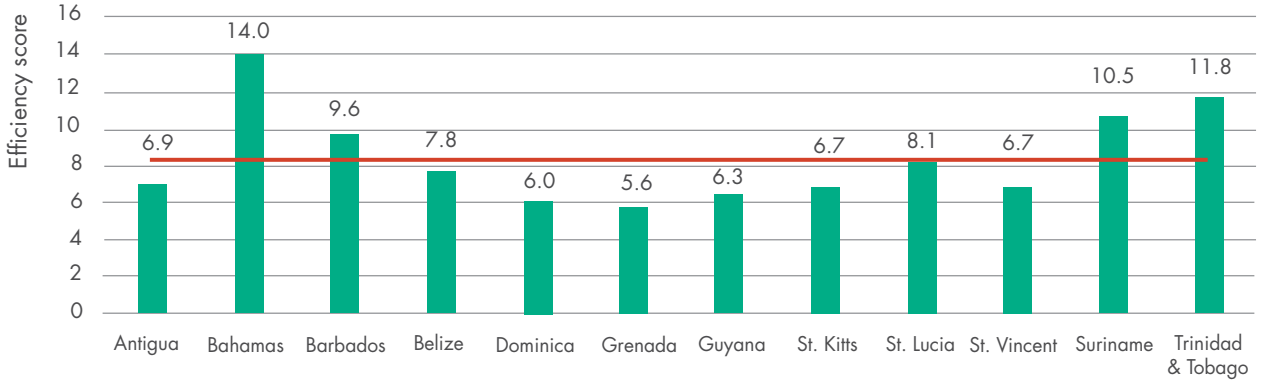
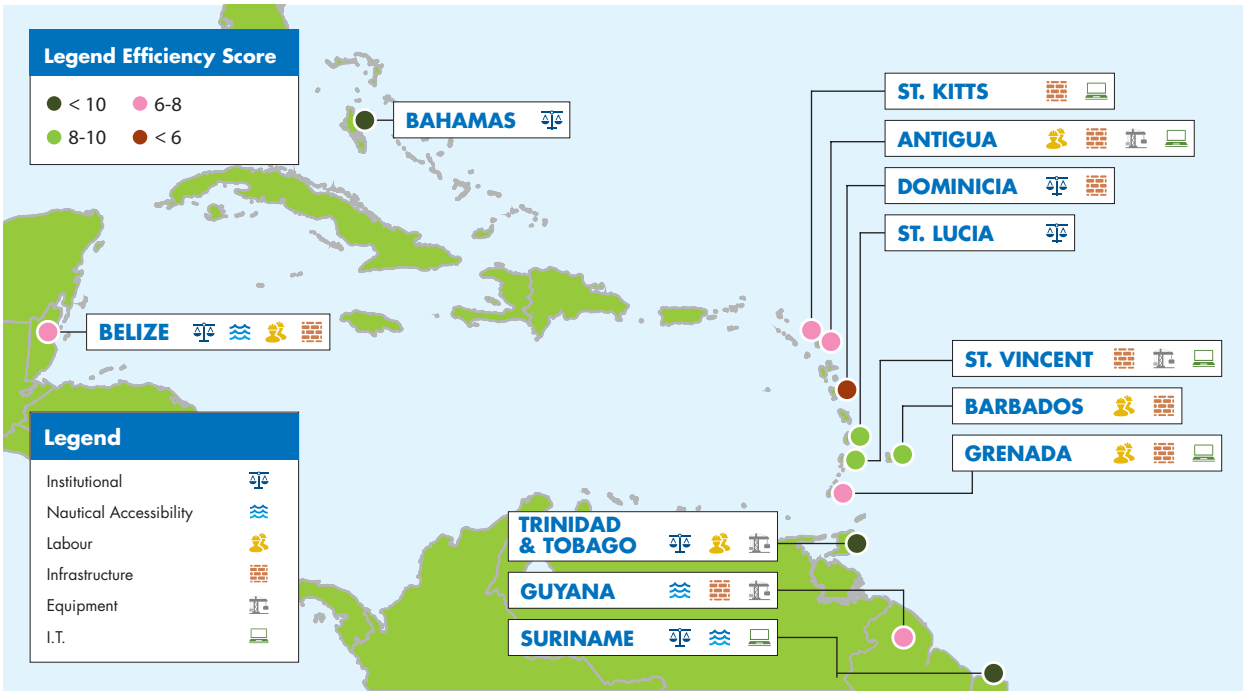


Figure 5-2: Main Bottlenecks in Port Efficiency



The main bottlenecks to efficiency are indicated in the Figure 5-2 above.

The main bottlenecks to port efficiency are:

1. **Private sector involvement is still limited in Barbados and Trinidad & Tobago**
   Private sector involvement is still limited in the ports of Bridgetown and the Port of Spain, even though these ports have sufficient volumes to generate a valuable proposition to the private sector. In the ports that have successfully included the private sector, ports of Nassau and Paramaribo, the privatisations were coupled with port investment (in equipment and/or infrastructure) and resulted in a higher level of port efficiency.
2. **Limited nautical accessibility hampers economies of scale**
   The continental ports of Georgetown, Paramaribo and Belize face nautical accessibility constraints. The siltation of the rivers limits the accessibility for larger vessels. As a result, maritime transport cannot enjoy economies of scale, which reduce costs per unit.
3. **Inadequate infrastructure causes inefficient cargo handling**
   The OECS ports still operate on breakbulk terminals which have a warehouse on the quay. This obstructs efficient cargo handling and occupies valuable container storage area. The port of Georgetown has five separate terminals which all lack modern facilities.

4. **Traditional labour conditions and strong unions increase costs of operations**
   The traditional labour conditions and strong unions have a direct effect on the cost efficiency of the cargo handling in the ports. Unfortunately, policy makers often view port organizations as places for providing employment, even when additional labour may not be required. This hampers not only immediate cost efficiency but also long-term development. The port of Nassau is an example of a port in which the labour unions have limited power and hence labour costs are low and productivity levels high.

5. **Not all ports make optimal use of IT, resulting in increased administrative costs and time**
   The implementation of IT not only limits administrative costs, but it also enables port organizations to detect the major inefficiencies in the port operations. In some OECS ports, there is no IT system. Other OECS ports have successfully implemented IT systems and benefited therefrom.

The removal or reduction in these bottlenecks should be central in the formulation of the lending options by the Caribbean Development Bank.

The maritime connectivity of the ports is limited to the main transhipment hubs

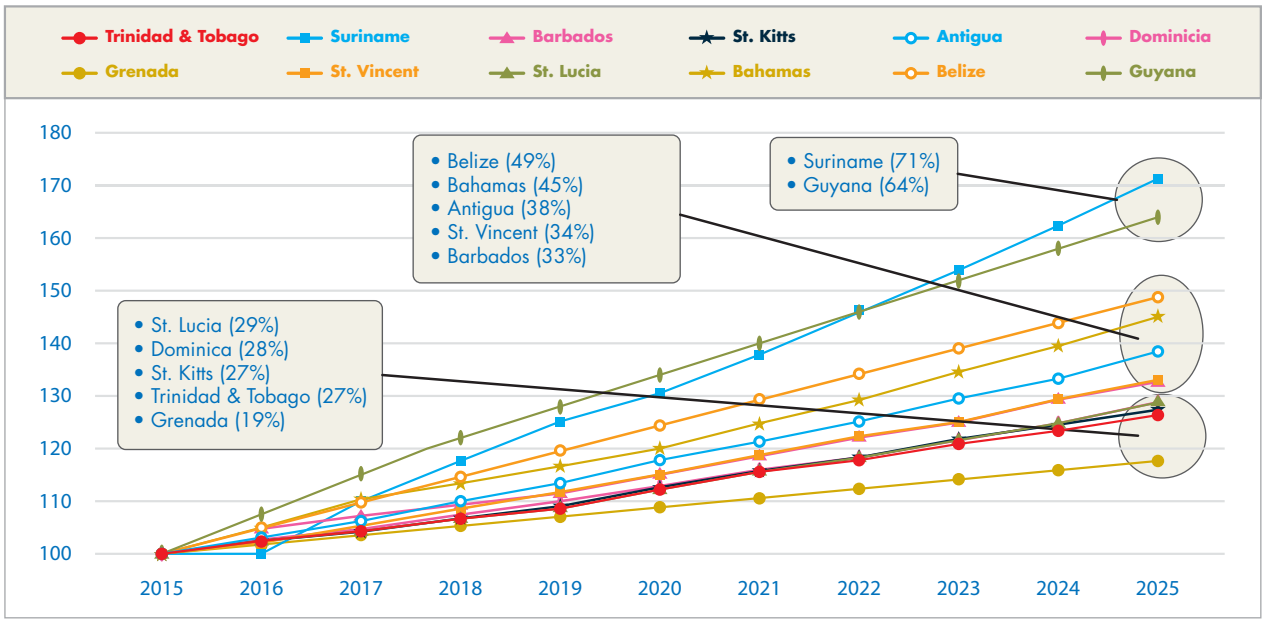
The Caribbean basin hosts some of the largest transhipment ports in the world. Transhipment is an important dimension of the container transport industry in the Caribbean. Shipping lines use the hub-and-spoke system in order to optimize supply chain cost and network coverage.

The ports in the sample are therefore mostly connected to the global markets through the transhipment hubs. Miami, the Everglades and Kingston are frequently used hub ports by the shipping lines that call upon the ports. In the twelve port sample, Trinidad & Tobago is best connected with 24 services followed by Barbados with 13. The worst connected ports are St. Kitts, Grenada and Saint Vincent. Generally, low connectivity increases the costs of maritime trade, as competition among shipping lines is limited, and more transhipment moves are required for the containers to arrive at their destination.

The trends of transhipment and increasing vessel sizes will continue

The main trends in the Caribbean maritime sector are the increasing vessel sizes and consolidation among shipping lines. These trends are expected to continue. In fact, double transhipment moves inside the Caribbean basin (which occur already) are likely to become more prevalent as shipping lines aim to optimize the utilisation of the larger vessels. In order to do so, shipping lines will call at only several large and conveniently situated ports with the largest vessels. Subsequently, medium-sized vessels will serve several regional hubs, and small vessels will be employed to serve small regional ports. As such, it is reasonable to expect that in the future, one or two regional transhipment hubs will become the main suppliers for the OECS ports.

Figure 5-3 Indexed Gateway Container Growth Forecast



Traffic Forecast for the BMC Ports

Figure 3-9 provides an overview of the gateway container forecast; the figures have been indexed (year 2015 = 100), to enable comparison of growth between individual countries. From the figure, a substantial range in estimated outcomes can be noted. By 2025, Suriname's gateway container demand is estimated to increase by approximately 70%, whereas Grenada's cargo demand is estimated to grow by approximately 20%. The high growth in the continental ports is expected to generate capacity constraints, even after carrying out a sensitivity analysis that controls for potentially optimistic economic growth projections.

From the identified groups, the OECS countries included in the assessment generally underperform in projected cargo growth, compared with other countries included in the assessment. This is expected since smaller island nations typically have very small populations, low population growth, and experience low GDP growth.

There is a long list of lending options in enhancing port efficiency

The Study presents a long list of lending options which can contribute to port efficiency.

The list on the following page presents a summary of the lending options with cost estimates.

Table 5-1: Longlist of Lending Options

No.	Description of project	Costs (M USD)	Recipient	Timing
Antigua	Finance labour restructuring	5	Antigua Port Authority	2016-2020
Antigua	Acquisition of a mobile harbour crane	3	Antigua Port Authority	Q3 2016
Antigua	Acquisition and implementation of Port IT system	2	Antigua Port Authority	2016
Bahamas	Rehabilitation of the breakwater	20	Port Department Bahamas	2016-2017
Barbados	Financing labour restructuring program	10-20	Barbados Port Inc	2016-2020
Barbados	Development cruise pier Sugar Point	200	Barbados Port Inc	2017-2020
Barbados	Implementation of the Master Plan for the cargo port	100	Barbados Port Inc	2016-2020
Belize	Financing dredging works	15	Port Authority Belize	2017
Belize	Funding labour restructuring	5-10	Belize Port Limited	2016-2018
Dominica	Development of Port Masterplan	1	Dominica Air & Sea Port Authority	2016
Dominica	Funding of port development	unknown	Dominica Air & Sea Port Authority	Long term
Grenada	Reduction in labour costs	5 -10	Grenada Ports Authority	2016 - 2018
Grenada	Improved terminal layout	1 / 10 – 20	Grenada Ports Authority	Medium Term
Grenada	Rehabilitation of deteriorated pavement	1	Grenada Ports Authority	2016 – 2018
Guyana	Development of Port Masterplan	1	Guyana National Shipping Association	2016
Guyana	Funding of port development	50-150	New consortium	Long term
St. Kitts	Study on rehabilitation of cargo pier	1	St. Christopher Air & Sea Port Authority	2016
St. Kitts	Rehabilitation of cargo pier	20-50	St. Christopher Air & Sea Port Authority	Long term
St. Kitts	Acquisition and implementation of IT system	2	St. Christopher Air & Sea Port Authority	2016
Saint Lucia	Increased autonomy of SLASPA through Institutional reform	unknown	Saint Lucia Air & Sea Ports Authority	2016 - 2020
Saint Lucia	Procurement of an additional mobile harbour crane	2.5 – 5.0	Saint Lucia Air & Sea Ports Authority	2018 - 2020
Saint Lucia	Feasibility Study of Structural 5 Integrity of Berth	0.5 – 1.0	Saint Lucia Air & Sea Ports Authority	2016 - 2018
Saint Vincent	Improved terminal layout	1 / 10 – 20	Saint Vincent & the GrenadinesPort Authority	2016 – 2018
Saint Vincent	Pavement Rehabilitation of the main ports	2.5 – 5.0	Saint Vincent & the Grenadines Port Authority	2016 - 2018
Saint Vincent	Implementation of Port Rationalization Study – Port Relocation	53-100	Saint Vincent & the Grenadines Port Authority	2017-2020
Suriname	Economic Feasibility Study on Deepening River	1	Maritime Authority Suriname / Port Authority	2016
Suriname	Financing dredging work	20-50	Maritime Authority Suriname / Port Authority	Long term
Suriname	Acquisition and implementation of Port Community System	2	Port Authority	2016
Suriname	Expansion of the truck gate	2	Port Authority	2016-2017
Trinidad & Tobago	Development of National Port Masterplan	1	Ministry of Transport	2016-2017
Trinidad & Tobago	Financial Assistance in labour restructuring	15-30	Port Authority	Long term
Trinidad & Tobago	Financing acquisition of new equipment	20-30	PATNT / PPOS	2016-2018

5.2 RECOMMENDATIONS

Port investments and modernisation are required

This study has revealed the need for port investments in a majority of the ports. To a large extent, the bottlenecks identified can be addressed although this often requires political support as well as financial resources.

Combine Funding with port reform where applicable

Some of the ports require institutional or labour reform programs, which are often politically sensitive topics. In Suriname, the rehabilitation of the quay wall (€27M EURO) was financed by the EU on the condition that the port moved towards a modern landlord structure. As a development bank, the CDB would encourage realizing port and/or labour reform in order to work towards more efficient port operations. Development banks have financed labour rationalization programs in the port sector.[18]

The formulation of a regional port strategy for the OECS should be considered

Given the limited volumes being handled in the OECS ports, port infrastructure investments are not always financially feasible. Investments should be made under prudent guidance and with an awareness of regional developments. It would be a waste of public resources if all the OECS countries invested in deep-sea facilities. Making use of existing development and working together on a joint operational vision (including customs) could more readily contribute to overall chain efficiency and optimize use of financial resources.

Furthermore, OECS ports are faced with limited volumes; the financial feasibility of port investments can therefore be challenging. There might be a viability gap in which return on investment is insufficient. The CDB may support financially infeasible port development projects by providing Viability Gap Funding (VGF). This VGF would provide a grant to financially infeasible port projects (economic benefits outweigh the costs).

Early involvement in port infrastructure planning by regional organisations is strongly recommended

CDB would be willing to finance the feasibility and/or master plan studies. In a number of ports, there is a dire need for developmental studies in order to give direction to investments.

[18] For example, the World Bank funded a labour rationalization program in Karachi, Pakistan. Further, see the World Bank Port Reform Toolkit for additional examples on labour reform and restructuring
http://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/module7/index.html

The allocation of funds for port labour training

Various ports in the sample have indicated that the lack of training has a negative effect on the level of port efficiency and productivity. Especially publicly run ports have lacked training of the operational staff on IT and equipment operation and maintenance. Insufficient training on operation and maintenance of equipment often leads to equipment break downs, increasing the downtime of the port. As the publicly run ports are financially challenged, the provision of financial resources can lead to a more structured approach to training. It also provides a platform for knowledge exchange between the participants. Training could be organized in certain centralized locations for on-the-job training as the Nassau Container Port has done.

5.2.2 RECOMMENDATIONS TO POLICY MAKERS

This section presents recommendations to policy makers based on the findings of the Study.

Policy makers are advised to consider the regional and competitive environment

Port development projects are capital intensive, requiring prudent investment decisions. Regional development can have a large influence on the role and function of the ports. In making decisions on port development, it is therefore crucial to adopt a regional perspective, understanding regional dynamics and the role of the respective port. OECS ports, which are highly connected, should especially consider the regional perspective.

Policy makers are advised to grant port organizations greater autonomy

Ports have a responsibility to maximize operational efficiency in order to minimise costs. Further, port organizations have a long-term perspective (20-40years) since investment in infrastructure assets is geared for the long term. Political interference is found to limit the port authority's ability to operate on an efficient basis or to establish a long-term vision. Port authorities, for example, are required to collect sufficient revenues in order to fund long-term investments. When such revenues are captured by the general budget, port authorities are unable to make timely investments in order to guarantee a high level of service.

Policy makers are advised to recognise the need for labour restructuring and work towards a viable long-term solution

In numerous ports, labour is still functioning under traditional conditions that were devised in the break-bulk era. In modern container handling terminals, less labour is required. Strong labour unions, backed by political support, have resisted modernization. High labour costs weigh heavily on port operations and are unsustainable in the long term. Policy makers are advised to assist in developing a long-term solution. In designing a labour rationalization program, allow for a phased approach, make optimal use of natural attrition and agree to a fair compensation package for redundant workers.

Policy makers are advised to embrace a long-term port development vision

In a number of countries, there is no long-term port development vision embraced and being executed by the various stakeholders. The Barbados Port Inc. is an example of a port authority that has a clear development plan, and is working towards implementation. Most pressing is the need in Trinidad & Tobago where various (conflicting) port development ideas and visions exist simultaneously. The lack of a common long- term vision hampers development as investors are uncertain of the future. Changing governments also have the tendency to change port policy. Since port developments have a longer time horizon than typical government administrations, it is vital that the port policy survive changes in governments.

6 ANNEX I – PORT FACT SHEETS

6.1.1 ANTIGUA, ST. JOHN'S

Port Factsheet

General Description

The Port of St. John's was constructed in 1968 and opened to commercial traffic in 1969. The Port of St. John's is located northwest of the centre of St. John's city within a protected harbour area. The Port of St. Johns is operated by the Antigua Port Authority. The port offers three berths. The port serves as the main gateway for the island of Antigua and handles transhipment cargo to Barbuda.

Institutional Setting

The Antigua Port Authority (APA) is the public authority under the portfolio of the Prime Minister. The APA has a board which appoints the CEO of the organization.

The APA is responsible for all activities related to port management and port operations except for the stevedoring done with board cranes.

Terminal characteristics

Terminal surface		6 ha
Cargo quay length		366m
Quay depth		10.6m
Entrance channel depth		11.5m
Entrance channel length		5,557m
Roles & Responsibilities	PA	Private TO
Infrastructure planning	X	
Superstructure (buildings)	X	
Equipment	X	
Operational labour	X	X
Towage	X	
Pilotage	X	
Mooring	X	
Nautical access	X	
Hinterland access	X	
Port Management	X	

Operations

Infrastructure

The port was built in 1968, a couple of years before the first container. Hence, it is a breakbulk facility. The warehouse constructed impedes efficient container handling. Further, the dirt on the terminal where paving is absent creates respiratory problems during dry and windy weather.

Equipment

The port has 1 mobile harbour crane with 104t lift capacity (Liebherr 320). For the horizontal movement, it owns 2 reachstackers.

Labour

The APA has about 260 workers, of whom 160 are involved with operations. Labour costs represent about 62% of operational costs, which was higher in the past. A stevedoring gang totals 20 workers.

Labour is heavily unionized and the union is strong. The APA has spent about 2M USD in labour restructuring to reduce the labour force.

Shipping

The Port of St. Johns is serviced by Tropical Shipping and Seaboard. The port is exploring the possibility of attracting Tropical Shipping's transhipment activities from Phillipsburg St. Martin.

Adequacy of Skills

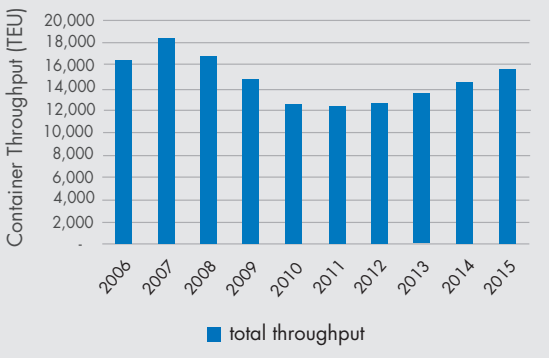
The operational labour is not yet sufficiently trained in operation and maintenance of the mobile harbour crane, leading to high maintenance costs.

IT

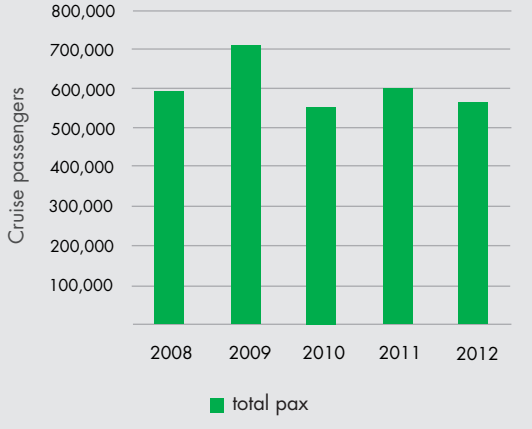
There is no port IT system in place. As a result, it is difficult to monitor the efficiency of the container operations. The customs officers at the port also do not use ASYCUDA World.

Historic Performance

Throughput



Cruise



Port Efficiency

The figure to the right presents the port efficiency score on the seven dimensions as discussed in Chapter 2. The port of Antigua scores high on equipment, given the availability of a mobile harbour crane, and the level of nautical access as the natural depth is currently 10.6m. The port scores low on the efficiency of labour and IT.

Cruise

The cruise vessels berth at separate berths in St. Johns. The cruise berths are currently sufficient to handle the traffic. As such, cargo and cruise operations remain separate.

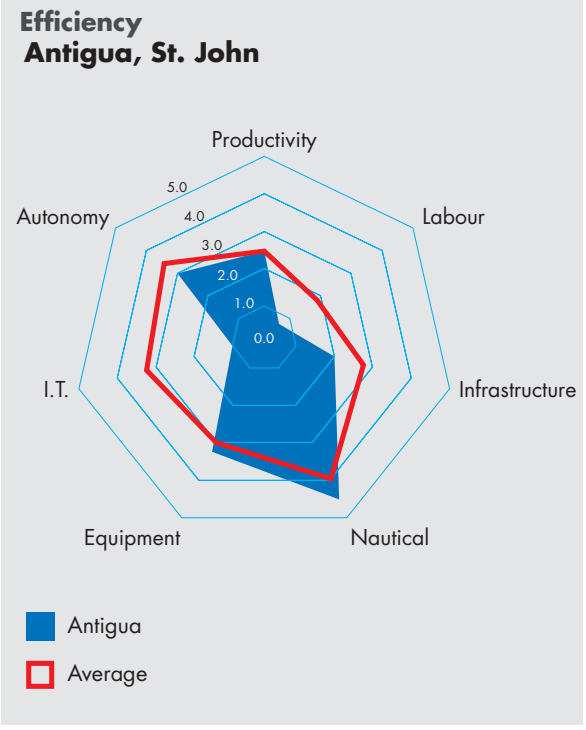
Tariffs

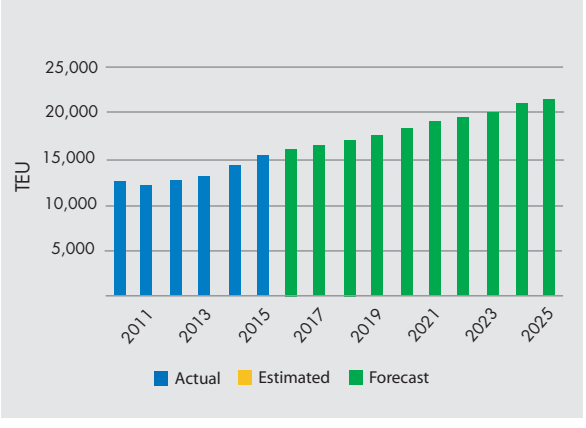
Item	Unit	#
Full		
Import '20ft	USD/Box	237
Import '40ft	USD/Box	474

Forecast

Antigua is projected to be a medium growth economy by the IMF, averaging 2.5% annual GDP growth to 2021. With an average multiplier of 1.3, this leads to an annual TEU growth of 3.2%.

If Antigua manages to attract transhipment, the port could handle an additional 20,000 TEU – 40,000 TEU depending on the size of operations. Given the expansion works planned, it should be possible to accommodate the additional volumes.





Development – Cargo pier rehabilitation and extension

The China Civil Engineering and Construction Company (CCECC), vied to have the China Ex-Im Bank provide the US$97 million dollars required for expansion of the seaport. The construction will include the creation of 2 berths at 12.0m C.D., sufficient for the expected vessels. Further, the development will allow for a separation between the stevedoring activities and the truck pick-up activities. The development will require about four years and should start in May 2016.

Recommendations

The port development as described above is already financed by the Chinese government.

1. **Acquisition of new MHC**
   If APA manages to attract Tropical Shipping for transhipment activities in the Port of St. John, a new mobile harbour crane will be required. The acquisition thereof can be financed by CDB. Estimated cost: 3M USD

2. **Provision of training for operation and maintenance MHC**
   The APA currently does not obtain the desired output from its equipment, mainly because the workers are not trained sufficiently to handle and maintain the equipment. Training of employees should lead to lower future operational costs. Estimated cost: $0.2M USD

3. **Implementation of port IT system**
   In a move towards a modern container terminal facility, there is a need for IT-supported operations. It is recommended that the APA acquire a Terminal Operating System and that the customs connect to the ASYCUDA World system. Estimated cost: $2M USD

6.1.2 BAHAMAS, NASSAU

Port Factsheet

General Description

The Port of Nassau is situated near the Bahamian capital of Nassau, on the Northern side of the island of New Providence, approximately 300km Northeast of Miami. The port handles a wide variety of cargo types, including containers and liquid bulk. Additionally, the port has become a major cruise port, providing 7 cruise berths.

The Port of Nassau is the second largest port in the Bahamas, behind the Port of Freeport, which acts as a transhipment hub for the region.

Terminal characteristics

Nassau Container Terminal	
Container Terminal Surface	13.1 ha
Bulk Terminal Surface	3.0 ha
Breakbulk Terminal Surface	3.9 ha
Total Port Area	22.9 ha
Total quay length	801 m
Quay depth	8.0 m
Power Capacity	3 MW
Reefer Slots	72

Source: APD

Wharf (# of Berths)	Length (m)	Depth (m)	Commodities
Cruise Pier I (2)	366	10.9	Cruise / Passenger
Cruise Pier II (S) (1)	332	10.9	Cruise / Passenger
Cruise Pier II (N) (1)	369	10.9	Cruise / Passenger
Cruise Pier III (3)		7.1 – 7.9	Cruise
NCP Container Terminal (3)	356	8.5	Containers
NCP Bulk Terminal (1)	243	8.0	Cement / Bitumen
NCP Breakbulk Terminal (1)	193	8.0	Breakbulk / RoRo

Source: IHS Fairplay Ports & Terminals (2014); APD

Roles & Responsibilities	PA	TO
Infrastructure planning		X
Superstructure (buildings)		X
Equipment		X
Operational labour		X
Towage	X*	X*
Pilotage	X*	X*
Mooring	X*	X*
Nautical access		X
Hinterland access		X
Port Management		X

*These services are the responsibility of the Port Department / Maritime Authority. However, due to low service levels, the activities are mainly performed by APD.

Institutional Framework

The Bahamas Port Department, a governmental department, acts as the Port Authority for all ports in the Bahamas. The Port Department is responsible for enforcing safety measures and conducting inspections on vessels registered in the islands' ports. As such, its activities are intertwined with those of the Bahamas Maritime Authority, which is responsible for vessel registration and inspections.

Additionally, the Port Authority is responsible for dredging, and owns tug boats to facilitate berthing operations. However, in practice, towage services are rarely provided by the Port Authority, due to substantial downtime of the (dilapidated) vessels. Similarly, dredging activities are usually performed by the operator, due to the Port Authority's budgetary constraints.

The Port Department aspires to become a corporatized entity, in order to reduce the current political influence.

Cargo

The main container and bulk terminals (Nassau Container Port) are owned and operated by APD.

Currently, APD is structured as a Joint Venture between Arawak Cay Port Development Holdings Limited (40 percent equity stake), the Government of the Bahamas (40 percent equity stake), and members of the Bahamian public (20% equity stake). To ensure public support, the company's board of directors consists of 3 government-appointed Directors, 3 Directors appointed by APD, and 1 independent Director.

Formed in 2009, the company is responsible for the design, development, construction, management, operation, and maintenance of the 56.6 acre Nassau Container Port. However, some stevedoring operations have been outsourced to Arawak Stevedoring, Arawak Bulk Terminal Co, MSC, and Tropical Shipping.

APD can freely increase its tariffs periodically, in order to ensure a 10% IRR. However, if an IRR of more than 10% is realized, tariffs have to be decreased.

Several smaller, fully Bohemian, operators are also active on the premises (although physically separated from the main container yard); these operators are subject to different regulations, but are only allowed if they remain under a certain size threshold.

Cruise

The cruise terminal is separated from the cargo operations, and is fully owned and operated by the Port Department.

Operations

Infrastructure & Superstructure

The Nassau Container Port provides 3 container berths, with a total length of approximately 356m.

The terminal has a backup power generator, in order to maintain power supply during storms.

Equipment

The Nassau Container Port facilities provide 3 104 ton Liebherr Mobile Harbour Cranes. Additionally, reach stackers, top picks, and forklifts are provided by the terminal operators.

Labour

In total, approximately 450 labourers are active in the container port, including workers from the terminal operators.

Approximately 60% of APD's workers are fulltime employees; the remaining 40% is sourced from a labour pool.

Typical gang sizes consist of 1 tally man (APD), 1 crane operator (APD), 4 shore handlers (TO), 1 top pick driver (TO), and 1 reach stacker driver (TO), for a total of 8 labourers.

Labourers from MSC, Arawak Stevedoring, and Tropical Shipping have different labour unions. This leads to continuing operations, as cargo shifts between operators when one of the labour forces is on strike.

The Port Department currently employs 125 people

Operations

While APD handles the crane operations, the three terminal operators carry out horizontal terminal moves. In order to do so in a structured way, each operator manages its own container yard. MSC handles containers from MSC vessels; Tropical Shipping handles containers from Tropical Shipping Vessels; and Arawak Stevedoring handles containers from other vessels. Currently, Tropical Shipping handles approximately 50% of the containers; Arawak Stevedoring handles approximately 20%; and MSC handles the remaining 30%.

Operational Efficiency

The Nassau Container Port offers 8 hour daily office hours (Monday through Friday, from 08.00h to 16.00h), but cargo operations can continue 24/7.

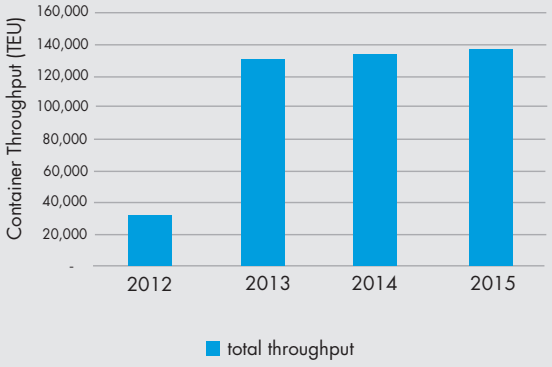
According to the Caribbean Shipping Association's 2015 productivity report, the Nassau Container Port reaches an average 24.62 berth moves per hour, using its Mobile Harbour Cranes (2 cranes are used 50% of the time; only 1 crane is used for the remaining 50%). This productivity puts NCP comfortably ahead of other ports in the region.

Capacity

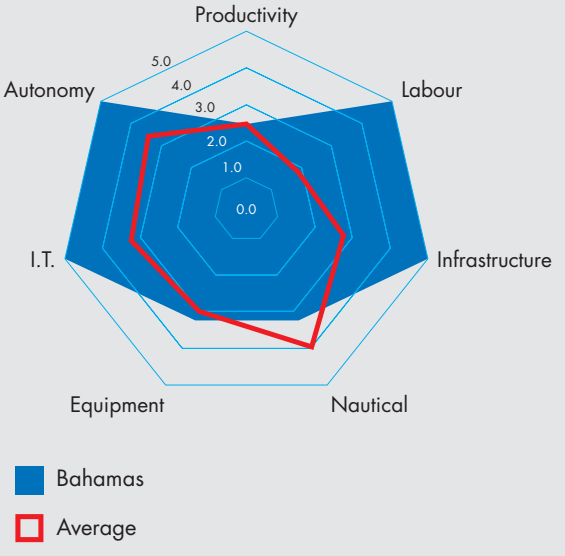
Due to efficient yard management and operations, the NCP currently faces no capacity restraints.

Historic Performance

Throughput



Productivity



Tariffs

Fee	Value Wharfage / Landing Fee	Unit
20' Container	148	USD / Box
40' Container	296	USD / Box

Source: APD, 2016

Adequacy of Skills

The Bahamas Port Department and Bahamas Maritime Authority offer several types of training.

The Nassau Container Port offers comprehensive on the job training. In order to provide personnel with training that leads to optimal performance in the experienced working conditions and with available assets, representatives from crane manufacturers travel to Nassau Container Port and train NCP personnel on site, instead of personnel training in simulators.

NCP management further breaks down every operational task, in order to monitor and improve skills and performance where required.

IT

APD employs Navis N4 and XPS yard management IT systems that allow them to accurately track the container throughout the terminal, and enables cargo owners to declare cargo before the vessel arrives (the system is fully integrated with current customs IT systems).

Cruise

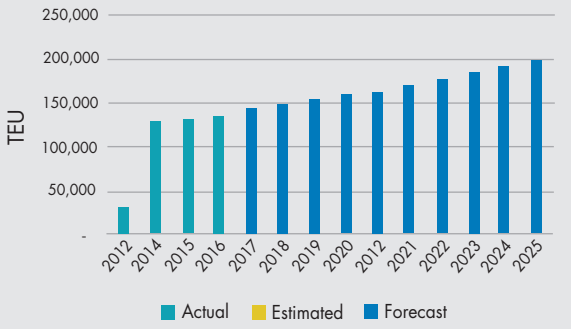
Nassau Port is the largest cruise port in the Bahamas, in terms of passenger throughput, with nearly 3 million cruise passengers per annum.

Nassau cruise port terminal serves major cruise lines as their port of call. The ships that dock at the terminal are operated by Carnival, Royal Caribbean, Disney, Norwegian Cruise Lines, Costa Cruises, Discovery and Celebration.

Main Operational Bottlenecks

- Breakwater: the breakwater is exhibiting some minor fractures, which results in downtime during Northwest winds. Rehabilitation of the breakwater falls under the responsibility of the Port Department; however, the Port Department has not been able to carry out rehabilitation works due to financial constraints.

TEU Forecast



Source: MTBS; IMF

Forecast

The Bahamas is expected to exhibit slow economic growth, with a GDP growth of approximately 2.5% per annum.

Consequently, container throughput is estimated to increase from approximately 136.8 kTEU in 2015 to approximately 198.4 kTEU in 2025 (CAGR (2015 – 2025): 3.79%).

It is expected that the additional cargo will not lead to congestion in the port.

Recommendations

1. **Increase the autonomy of APD through Institutional reform**

   Currently, APD pays port dues to the Port Authority for activities including dredging, pilotage, and maintenance of the breakwater. However, due to financial constraints, the Port Authority is unable to perform its activities. Hence, the activities are carried out by APD (or outsourced by APD). Consequently, the tasks could be formally transferred to APD, thereby removing APD's obligation to pay port dues to the Port Authority. This could, in turn, lead to lower tariffs at the port.

6.1.3 BARBADOS, BRIDGETOWN

Port Factsheet

General Description

The Bridgetown Port is the major port of entry for approximately 90% of the goods used in the manufacturing and retail sectors in Barbados. A major part of its responsibility has been dedicated to supporting businesses in the import/export trade, a job that it carries out without any government subsidies, unlike the majority of Ports around the Caribbean.

Terminal characteristics

Terminal surface	...
Cargo quay length (berths 2-5)	620m
Quay depth	11.0m
Storage area	
Containers	4.7 ha
Covered storage	1.6 ha
Reefers	96 plugs

Berth	Length	Depth	Commodities
Breakwater	522	11.5	Passengers.
Sugar Berth	307	9.75	Bulk sugar, molasses
Berth 1	152	9.75	Naval, auxiliary
Berth 2	183	11.0	Passengers, breakbulk
Berth 3	183	11.0	Breakbulk, containers
Berth 4	184	11.0	Containers
Berth 5	65	11.0	Containers

Roles & Responsibilities	Gov't	BPI	Private
Infrastructure planning		X	
Superstructure (buildings)		X	
Equipment			
Operational labour		X	X
Towage		X	
Pilotage		X	
Mooring			
Nautical access		X	X
Hinterland access		X	
Port Management		X	

Institutional Setting

The port of Bridgetown is developed, managed and operated by Barbados Port Inc (BPI). BPI is a corporatized port authority. The sole shareholder is the Government of Barbados. BPI operates under a long term lease of 51 years (since 1979) with a possibility for extension of 49 years. BPI also owns a 30% share of Bridgetown Cruise Terminals, Inc.

There are 6 stevedoring companies, which hire dockers and equipment from the BPI. The 6 stevedoring companies are in competition with one another, but do not supply equipment to the operations.
Operations

Equipment

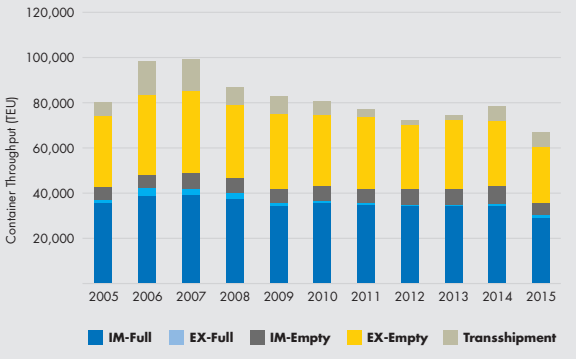
BPI owns 1 STS gantry crane and 1 mobile harbour crane. It has recently purchased an additional STS gantry crane which should be assembled and operational in 2016.
The container yard is operated by straddle carriers.

Performance

The STS gantry cranes achieve about 25 moves per hour and the MHC about 16-18 moves per hour. On larger vessels, both cranes are deployed achieving about 40 moves per hour. Typical call sizes are between 160-200 TEU. With a TEU factor of 1.5x. This would imply that vessels can be handled within 4 hours.

Historic Performance

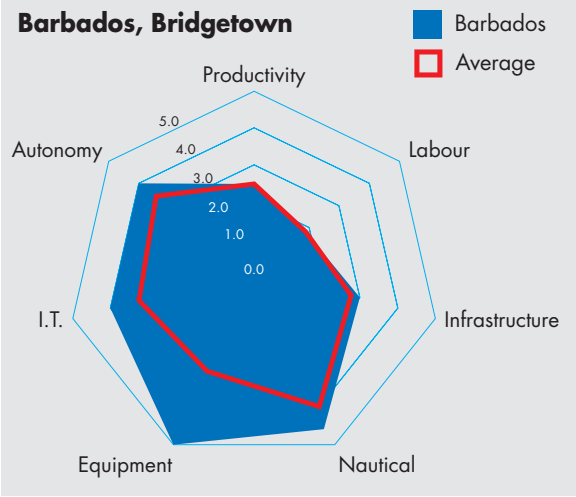
Throughput



The total traffic of Barbados port has decreased since 2007 from nearly 100,000 TEU to about 70,000 TEU in 2014. The decrease stems mainly from a decrease in import demand, in line with economic crisis, and the decrease in transhipment volumes. Exports of full containers have increased from about 6,000 TEU per annum to 7,500 TEU in 2014.

Efficiency

The port of Bridgetown scores high on equipment, given the availability of a gantry and mobile harbour crane. Autonomy is higher than average due to the corporatized structure. IT implementation scores relatively high as BPI uses Klein cargo management system and has integrated it with the customs system.



Shipping

Barbados is not (yet) a transhipment hub in the region, but it does handle some transhipment cargo for King Ocean destined to Guyana and Suriname. Tropical calls Barbados along an inter-island route. The import cargo from Asia reaches Barbados via Kingston where MSC and ZIM tranship. Imports from USA and EU travel through Miami or Freeport. Point Lisas is used as transhipment hub for breakbulk cargo.

Largest vessels calling Barbados are of 8,000 TEU capacity.

Export containers are mostly empty. The exports in containers are destined for China. Export products are beer (regional) and rum (global).

Cruise

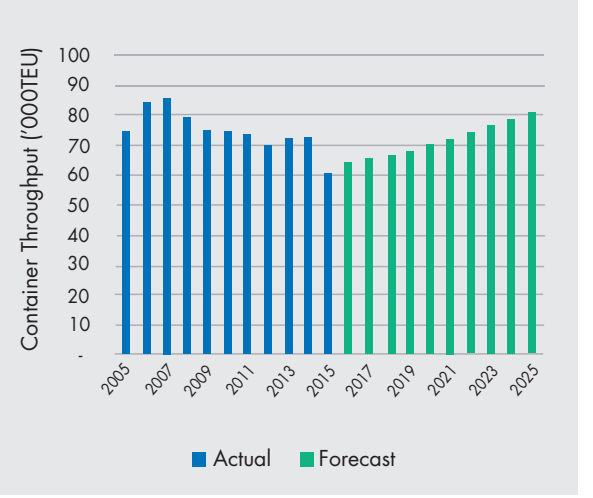
The port of Barbados receives between 300-400 cruise ship calls per annum and handles between 700,000 and 800,000 passengers. Cruise vessels berth on the cargo berths and on the breakwater. Cruise vessels receive preferential treatment over cargo vessels, putting pressure on cargo handling.

Labour

BPI employs around 500 people of whom 130 are port operational workers. The labour unions are strong in Barbados. As a result, traditional gang sizes and operational standards are still upheld in port operations today. Gang sizes per crane are higher than modern standards, and unstuffing operations are limited to 12 TEU per day per gang, regardless of the efficiency of operations.

Labour costs make up of about 60%-65% of the operational costs of the organization, which is above modern practice standards.

BPI is active in training their personnel in order to maximize productivity. Workers are encouraged to attend courses at the Caribbean Maritime Institute to receive training.



Forecast

Barbados is expected to be a low-medium growth economy. IMF projects an average GDP growth of 1.5% per annum for 2015-2021. With an average multiple of 1.94x, the TEU growth is expected to be around 2.9% per annum.

Given the historic volumes of nearly 90,000 TEU, it is not expected that Barbados Port Inc. will face capacity constraints in the near future.

Sugar Point Terminal

Development Cargo Port

The current master plan foresees three more cargo port improvement projects to enhance efficiency and increase capacity:

- Removal of sheds near quay
- Adding quay length near berth 5
- Development of CFS station

Development Cruise Port

BPI is considering the development of a new cruise terminal at Sugar Point. The development entails construction of 3 piers and a new cruise terminal building. Total investments are estimated between 250M – 300M USD. A picture is presented below.

Recommendations

- **Labour**
  BPI is in the process of negotiating a labour rationalization program with the labour unions. The gang sizes need to be modernized and the working conditions need to be redefined in line with modern operations in order to reduce the costs of labour for the port. No compensation has been discussed yet in case of lay-offs.
  Estimated cost of labour rationalization program: 10 M USD

- **Cruise pier development**
  The BPI has had conversations with a cruise operator to develop the Sugar Point Terminal into a modern cruise facility. The PA would invest in the reclamation of 15 acres and construct 3 piers, totalling 200M USD. The operator would invest in the shopping mall and cruise centre 50-100M USD. No funding has been secured as of yet.

- **Further development of cargo port**
  In the Master Plan of BPI, three projects remain to be developed, namely: (1) the removal of the sheds near the quay; (2) the addition of quay length; and (3) development of the CFS station. This should allow BPI to efficiently handle its cargo, limiting unnecessary movement and create additional quay capacity. The total costs are estimated at $100 M USD.

- **Increase involvement of private sector**
  The BPI has been corporatized but remains 100% Government owned. Increased participation of the private sector is recommended, preferably in the operations of the terminal. Hence, a separate operating company could be established and the shares offered to the market.

6.1.4 BELIZE, BELIZE PORT

Port Factsheet

General Description

The Belize City Port is situated near the estuary of the Haulover Creek, a branch of the Belize river. The port is Belize's main port of entry and, as such, handles various cargo types.

The port's imports comprise mainly building materials, (containerized) consumer goods, food, machinery, and petroleum products.

Exports mainly consist of bananas, citrus fruit, clothing, fishery products, and sugar.

Terminal characteristics

Container Storage Area	50,000 m2
Reefer Plugs	24 Reefer Plugs
Storage Warehouse	7,000 m2
Breakbulk Terminal Surface	3.9 ha
Total Port Land Owned (Belize Port Ltd)	25 ha

Source: Belize Port Ltd

Berths	Length (m)	Depth (m)	Commodities
King Pier			
Head of Dock	66.5	8.5	Containers / Bulk
RoRo Facility	27.4	3.1	RoRo
Loyola (Tanker) Terminal (Offshore)			
Loyola Tanker Berth	183.0	6.0	Petroleum Products

Source: IHS Fairplay Ports & Terminals (2014); Port of Belize Ltd; Caribbean Shipping Agencies Ltd

Roles & Responsibilities	PA	TO
Infrastructure planning		X
Superstructure (buildings)		X
Equipment		X
Operational labour		X
Towage		X
Pilotage		X
Mooring		X
Nautical access	X*	
Hinterland access		X
Port Management		X

*The responsibility to carry out dredging works is formally allocated to the BPA; however, due to constraints, this task is often carried out by the operators.

Institutional Setting

The Belize Port Authority (BPA) is a governmental entity, which was established as a department under the Ministry of Works and Transport. Following the privatization of the Belize City Port in 2002, many of the port's responsibilities shifted to the operator, Port of Belize Ltd. However, the port authority still has substantial responsibility with respect to ensuring a well-functioning port. Currently, the BPA's main responsibilities comprise:

- maritime safety;
- International Ship and Port Facility Security Code (ISPS) compliance;
- port security;
- licensing and registration of vessels;
- licensing of masters; and
- regulatory oversight for Ports.

Since its privatization in 2002, the Belize City Port is owned and operated by Port of Belize Ltd.

Operations

Infrastructure

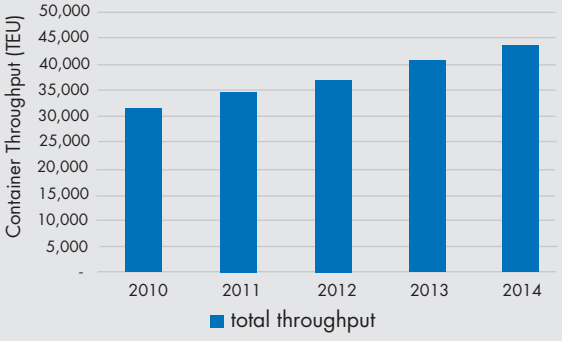
The port provides a berthing area that can accommodate vessels of up to 149m in length. The berthing area is situated 800m from the shore, with a long trestle connecting it to the mainland; as such, it has no storage area directly adjacent to it. As a result, terminal tractors have to constantly transport containers from the berth to the storage area (with only one small passing area), thereby limiting operational efficiency.

The container yard is unpaved; this results in substantial potholes during rains. This further limits operational efficiency.

Berth depth was measured at 10.0m CD; water depth has since declined to 8.5m CD (2013). This is adequate for the vessels calling at the port.

Historic Performance

Throughput



Source: Port of Belize Ltd, 2015

Vessel type	Unit	2010	2011	2012	2013	2014
Container	Calls	194	220	211	205	146

Source: Port of Belize Ltd

Equipment

The Belize City Port provides 2 Mobile Harbour Cranes. Additionally, a total of 2 reachstackers, 2 container handlers, 5 forklifts, and several trucks and trailers are provided. This is deemed sufficient for current operations.

Some of the equipment is outdated; however, most of the equipment is in an adequate state.

Equipment	Quantity
Mobile Harbour Cranes	2
Reachstackers	2
Container Handlers	2
Forklifts	6

Source: Port of Belize Ltd

Labour

Port of Belize Ltd currently employs approximately 94 full time employees and 160m part time stevedoring employees. These employees facilitate operations at both the Belize City Port and the Commerce Bight Port. Hence, the amount of employees active in the Belize City Port is likely to be slightly lower. Labour costs at the port amount to approximately 55-60% of total OPEX.

The port struggles with the strong stevedoring labour union that represents approximately 150 of the port's employees. The unions prescribe 15 man gangs for the stevedoring operations (excluding a crane operator), whereas 10 man gangs would suffice. Additionally, an outdated 'one gang per vessel' system is still in place, resulting in the gang sometimes working 24 hours straight. This leads to inefficient and dangerous working conditions. Ongoing discussions with the union have not yet resulted in an agreement concerning a shift system.

Furthermore, container vessel gangs only work 31 days per year, as the union represents far more gangs than are required per week. As workers are required to work a minimum of 50 days per year to qualify for social welfare, the gangs are currently not eligible for such benefits.

The BPA employs 76 workers. This is deemed sufficient by the authority. A substantial amount of personnel is required due to the lack of IT systems, resulting in large amounts of manual work.

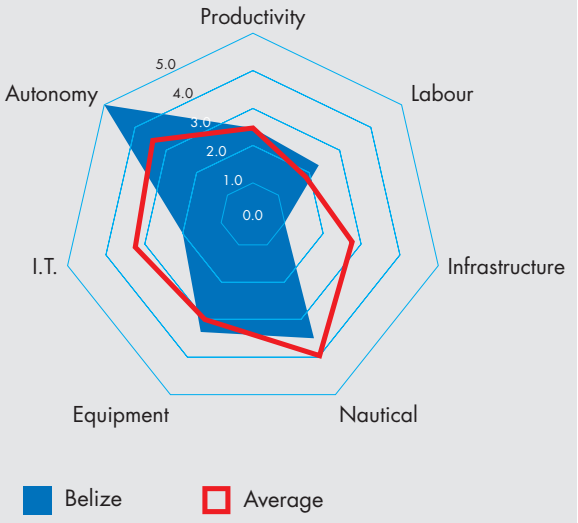
Efficiency

The Port of Belize Ltd offers 24 hours daily operations (Monday through Sunday) at the Port of Belize. With two mobile harbour cranes, the terminal operator reaches an average efficiency of 16 container moves per hour. Additionally, the operator estimates an average vessel turnaround time of 14 hours.

Capacity

The yard has an approximate capacity of 2,000 TEU, with a stacking height of 3-4 containers.

Productivity



Tariffs

Fee	Value Stevedoring	Unit
Full Import	350	BZD
Full Export	225	BZD
Empty	125	BZD

Source: Port of Belize Ltd

Shipping

CFS (1 vessel per week) and a combination of Hyde and Seaboard Marine (2 vessels per week) are the main lines that call the port. Typically, vessels have a 200 TEU call size for imports at the Port of Belize City.

Adequacy of Skills

On the job training is provided for all stevedoring personnel. Crane operators receive training once every two years. Additional general training (such as safety trainings) are also provided.

IT

The port uses its own internally developed cargo system; this system is not integrated with any customs IT systems.

Cruise

The Port of Belize City started cruise activities in 2000; the activities were taken over by Royal Caribbean in 2004.

Currently, the Port of Belize City provides a dedicated cruise terminal, which handles approximately 1 million passengers per annum (up from approximately 50,000 passengers in 2000).

Passengers have to be transported from the cruise vessels to the mainland, due to limited water depth in the cruise terminal. This limits the amount of people that spend money on the mainland, and results in several cruise lines refusing to call at the port.

In order to accommodate the growing amount of passengers, and remedy the issues regarding tendering operations, a 100 million USD project has been proposed by the Feinstein Group and Royal Caribbean to develop a deep sea cruise port at Stake Bank, approximately 4 nautical miles southeast of Belize City.

However, this project is currently on hold, due to ongoing trials.

Alternatively, Royal Caribbean wishes to develop a new docking facility to avoid transport operations in the future. Initial development costs for this project are estimated at USD 17m – 18m, including 2 berths, dredging, and a shopping mall.

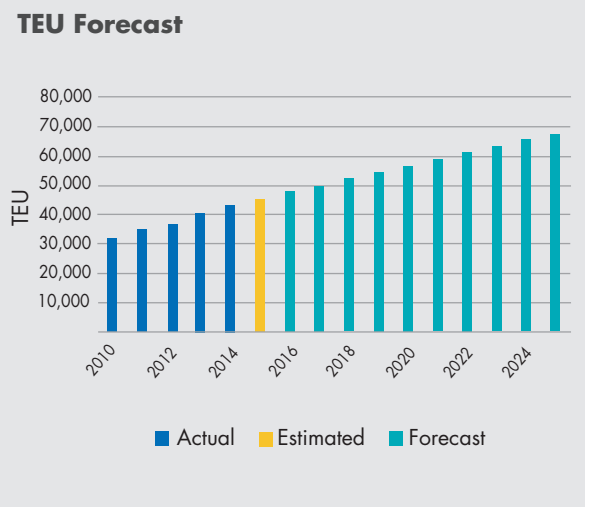
Main Operational Bottlenecks

- one-way causeway/trestle
- unpaved storage area
- labour issues

Forecast

Belize is expected to exhibit slow economic growth, with a GDP growth of approximately 2.3% per annum.

However, container throughput is still estimated to increase from approximately 45.4 kTEU in 2015 to approximately 67.7 kTEU in 2025 (CAGR (2015 – 2025): 4.09%). This is caused by a relatively high



TEU-GDP multiplier, as observed from available historical data.

Due to the lack of a modern paved stacking area, and a small berthing area connected to the mainland by an 800m causeway, a substantial increase in cargo demand may lead to congestion and capacity restraints.

This may be remedied by developing the nearby reclaimed land, which currently has no clear purpose (although this would entail substantial investments).

Recommendations

1. **Financing dredging works**
   The port authority is not dredging the access channel to the port. Depending on the required works, costs could be substantial. Further, it is dependent on the development vision of the new entrant in the Belize Port, who will purchase the shares from the Lender who will operate the port. Estimated Costs: USD 10m – 50m

2. **Funding labour restructuring**
   The amount of work available for the labour union is too little to sustain 150 workers. Downsizing is required. In addition, agreements on modern working standards would require compensation. Estimated Costs: USD 5m – 10m

6.1.5 DOMINICA, ROSEAU

Port Factsheet

General Description

Port of Roseau is located 1.4 miles from the centre of Roseau, the capital city. Woodbridge Bay Port is located on the South West Coast line of the island about one mile North of the capital Roseau

Dominica Air and Sea Port Authority (DASPA) oversees all ports and airport facilities of Dominica.

Terminal characteristics

Terminal surface	4.3 ha
Cargo quay length	244m
Quay depth	9.75m
Entrance channel depth	11.0m
Entrance channel length	5,557m

Berth	Length	Depth	Commodities
Berth	Length	Depth	Commodities
Berth 1	200m	7.22	Containers, breakbulk
Berth 2	200m	7.22	Containers, breakbulk

Roles & Responsibilities	PA	Private TO
Infrastructure planning	X	
Superstructure (buildings)	X	
Equipment	X	
Operational labour	X	
Towage	X	
Pilotage	X	
Mooring	X	
Nautical access	X	
Hinterland access	X	
Port Management	X	

Institutional Setting

DASPA is a public authority under the Ministry of Public Works and Ports. The CEO of the port is appointed by the Minister. All decisions by the board of DASPA require approval of the Minister. After board approval, decisions must be approved by the Minister.

DASPA Authority was established by Act No.8 of 2006 (see below). It is a merger of the air and sea port services. DASPA oversees the ports in Portsmouth, the cruise terminal in Roseau, the ferry terminal in Roseau, the cargo terminal in Roseau and the Marigot port (mainly fish).

There is no private sector involvement in the port operations.

Infrastructure

The pier, built in 1976, is currently undergoing some rehabilitation works which were required after the storm Erica. The cost of the works is $12M USD. The pier, however, is not strong enough to accommodate a mobile harbour crane. The terminal area is occupied by two warehouses of which the right one (in the picture) is not being used currently. As a result, container storage is distanced from stevedoring operations.

Equipment

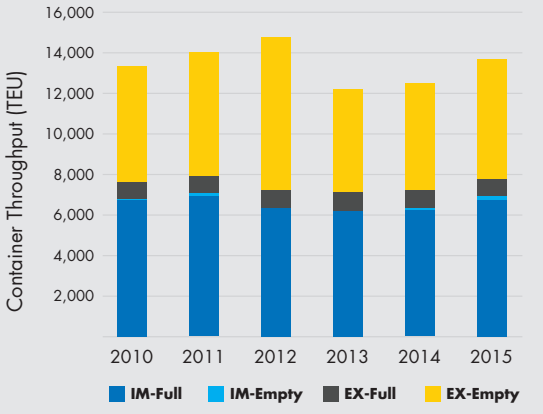
The lack of mobile harbour cranes makes the berth productivity susceptible to wave conditions. With higher waves, the vessel move more, making loading/unloading with board cranes even more difficult. As such, like Barbados, Dominica employs the Free-Alongside-System, which implies that any additional costs because of slow seaside operations are charged to consignees, not the shipping lines. DASPA owns two reach stackers, of which one is an old Fantuzzi.

Labour

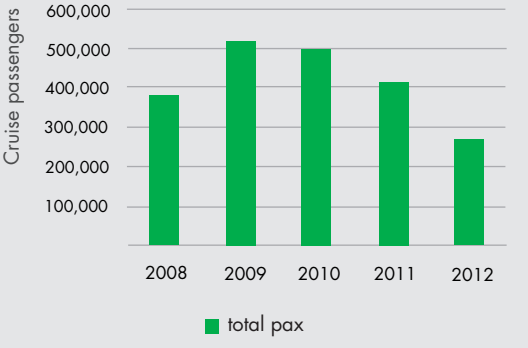
DASPA has about 405 employees of whom 260 are in the Seaport department. Labour has been restructured in Dominica since 2007. As a result, gang sizes have been decreased and performance standards

Historic Performance

Throughput



Cruise



increased. The costs for labour are still high (about 60% of operational costs) but this is mainly due to the inefficient use of infrastructure (multiple locations over the island which require security).

Shipping

The liners calling Dominica are Tropical Shipping, CMA CGM, King Ocean, and Geest Line.

IT

DASPA employs the KLEIN cargo management system which also connects to the Customs systems of ASYCUDA. It does not yet connect with the financial accounts. This is planned for near future.

Cruise

DASPA used to receive over 500,000 passengers (pax) per year, with Carnival calling all year around. Since they quit the year round services, pax have been around 300,000 per annum. The cruise pier in Roseau is too short for the largest vessels. Sometimes cruise vessels move to the cargo pier; this subsequently leads to night-time work on the cargo vessels. DASPA does not receive its share of the head tax, which creates a financial burden on the organization.

Efficiency

The port of Roseau scores low on

- the level of autonomy, as all board decisions require approval from the Minister;
- labour productivity, as operations on multiple locations require high amount of labour; and
- equipment, as there is no stevedoring equipment available.

Forecast

Dominica is expected to be a low growth economy in the next ten years. The forecast estimates an average growth of 2.5% per annum. The expected throughput in 2025 is about 17,000 TEU. The container yard is expected to be able to handle 17,000 TEU.

Recommendations

1. Increase the autonomy of DASPA through Institutional reform

The lack of autonomy, especially in financial management, limits the organization's capabilities to establish efficient port operations. Corporatization of the organization could help in distancing the role of political government in the business operations of the port. The generation of revenues from non-core activities (such as cruise tour operations) could empower the organization to move towards a sustainable authority.

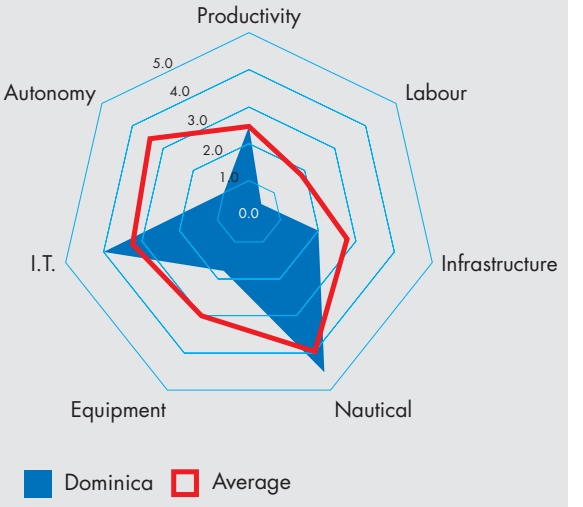
2. Work towards a master plan

Given the various cargo operations on different locations in the country, it would make sense to concentrate activities when investments in infrastructure are considered. The current $12M USD in rehabilitation is being invested without knowing the development path of the ports in the future. Costs of masterplan $0.5M USD

3. Optimize current logistics

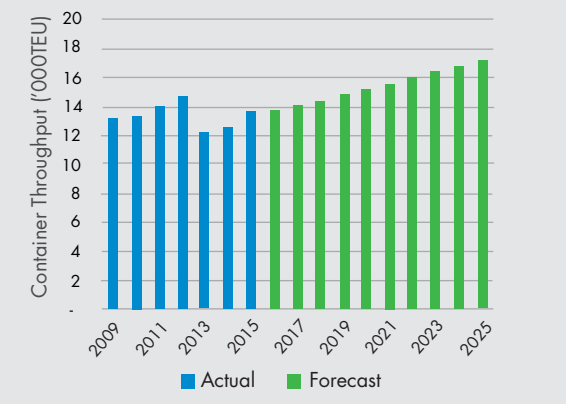
The demolition of the banana shed would allow for containers to be stored closer to the quay, creating more efficient cargo handling operations. Estimated costs: 5M USD

Efficiency
Dominica, Roseau



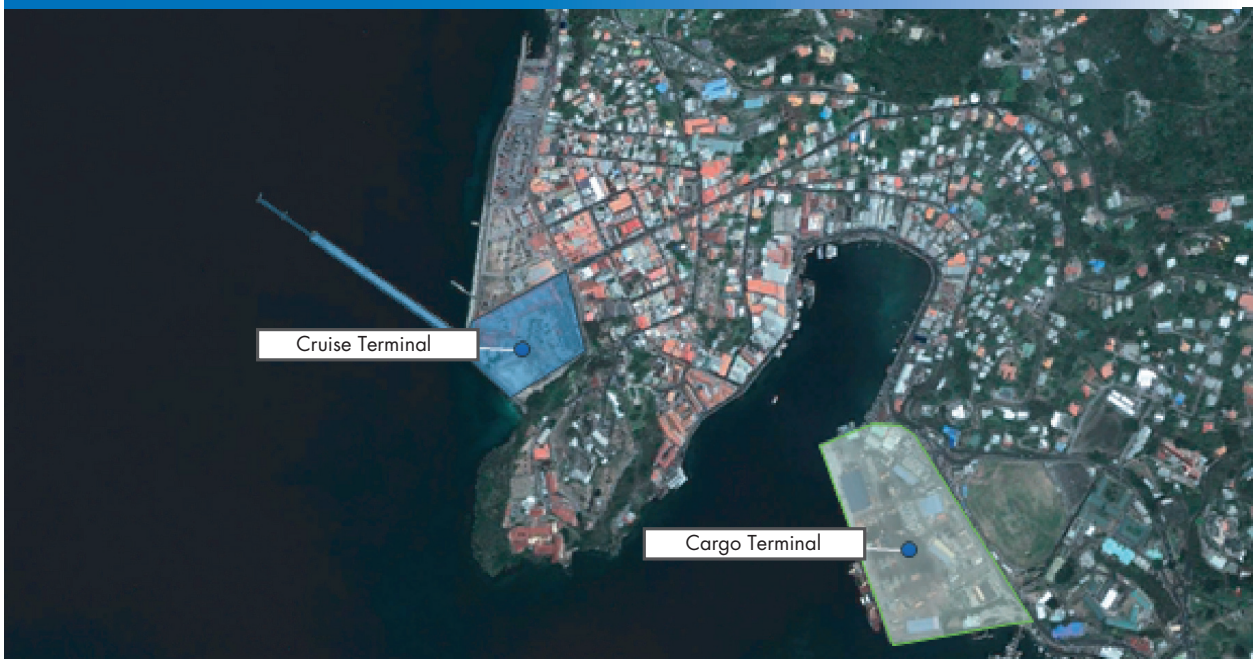
Tariffs

Item	Unit	#
	Full	
Import '20ft	USD/Box	415
Import '40ft	USD/Box	933



6.1.6 GRENADA, ST. GEORGE'S

Port Factsheet



General Description

Grenada is one of the windward island countries. The country is situated south of the Grenadines, and north of Trinidad and Tobago. Grenada covers an area of approximately 344 km2 and has a population of approximately 110,000 inhabitants.

The Port of St. George's is located in the country's capital city, which has approximately 7,500 inhabitants. The port is situated along the southwestern shore of Grenada, in a natural bay.

The Port of St. George's is the country's largest port and handles both cargo and cruise vessels. Besides the Port of St. George's, the country has five other ports of entry. These other ports are the Port of Prickly Bay, the Port of Grenville, the Port of Tyrell Bay, the Port of Hillsborough, and the Port of St. David's Harbour.

The Port of St. George's mainly imports various consumer goods; exports comprise mainly agriculture products, such as nutmeg and cocoa, as well as other consumer products.

Terminal characteristics

Open Storage	
Container Stacking Area	2.0 ha
Other Open Storage	0.3 ha
Reefer Points	25
Sheds	
Transit Shed 1	0.2 ha
Queens	0.1 ha
CARICOM Shed	0.1 ha
Old Shed 3	0.1 ha

Source: Grenada Ports Authority

Berth	Length (m)	Depth (m)	Commodities
Cargo			
Main Quay	335	8.3 – 9.8	General Cargo / Containers
Schooner Berth	76	5.5	Inter-island traffic
Grand Mal Tanker Berth			Petroleum Products
Queen's Park Tanker Berth			Petroleum Products
Melville Street Cruise Terminal			
North Berth	375	10.3	Cruise / Passenger
South Berth	325	10.0	Cruise / Passenger

Source: IHS Fairplay Ports & Terminals (2014); Grenada Ports Authority

Roles & Responsibilities	PA	TO
Infrastructure planning	X	
Superstructure (buildings)	X	
Equipment	X	
Operational labour	X	
Towage	X	
Pilotage	X	
Mooring	X	
Nautical access	X	
Hinterland access	X	
Port Management	X	

Source: Grenada Ports Authority

Institutional Setting

The Grenada Ports Authority (GPA) is a statutory body that operates under the Minister of Finance. The Authority is governed by Cap. 247 of the 2010 Revised Edition of the Laws of Grenada. The Grenada Ports Authority is responsible for overseeing all Grenadian ports.

More specifically, the core functions of the Authority include: i) operation and administration of ports under its jurisdiction; ii) regulation and control of navigation within the limits of such ports; iii) maintenance, improvement, and regulation of ports and services therein; iv) and provision of pilotage services and navigational aids for the ports and their approaches.

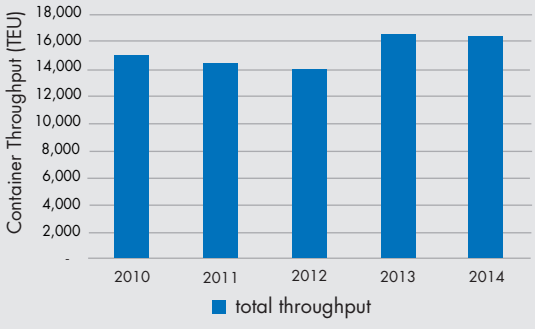
In addition to its core corporate functions, the Authority is responsible for the administration of the Shipping Act Cap.303, and co-administration of the Yachting Act Cap.345.

Despite being a statutory body, the GPA has autonomy to reinvest revenues towards port development up to a certain point. Above a certain reserve, profit flows from the GPA to the central government for central budgeting.

Private involvement in the port is limited, as private parties (consignees and agents) are only involved in customs clearance and the move from the stack to the gate.

Historic Performance

Throughput



Source: Grenada Ports Authority

Operations

Infrastructure

The port's main cargo quay dates back to '58/'59, but was rehabilitated in 2000.

The port is fully paved; however, some of the pavement dates back to the '90s and has deteriorated substantially.

Overall, the port has good depth alongside the berth, although the cargo berth occasionally needs some dredging (once every 15 years approximately), due to sediment from the city sewer system flowing into the port at the corner of the Schooner Berth. The cruise berth was developed in 2005 and is currently being monitored for dredging requirement.

Besides a connection to the regular power grid, the port provides a backup generator to keep operations going if the power grid is damaged during storms.

The port is currently investing in a more power efficient and sustainable port environment, by replacing old air-conditioning machines and placing LED powered high mast flood lights.

Equipment

The Port of St. George's provides 2 reachstackers, 1 top lift, and 14 forklifts. The Port Authority is planning to procure a 100 ton Mobile Harbour Crane in the medium term.

Currently, the port owns no tugs, as procurement costs are prohibitively high. However, without tugs, some vessels refuse to call at the port, due to perceived safety issues.

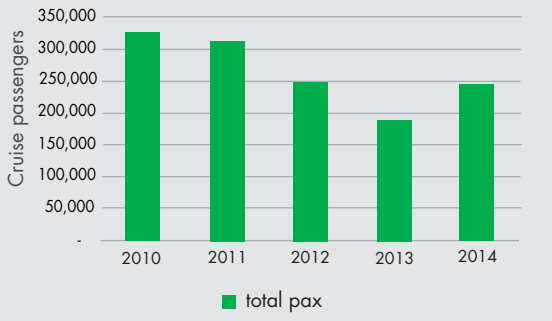
Labour

Before 2000, The GPA only employed labour for overhead and storage activities; labour for stevedoring and shorehandling activities was provided by a private company that represented the active shipping lines. In 2000, the private entity and labour union reached a stalemate, forcing the government (through the GPA) to take over the labour pool.

Hence, the GPA currently works with two separate labour pools:

- 66 employees for storage and overhead staff (original activities before 2000).
- 122 employees for stevedoring and longshoring activities (flexible labour pool; hired according to requirement).

Cruise



Vessel Calls

Vessel typeCalls	(2014; Grenada Ports consolidated)
Cargo	1,101
Cruise	255

Source: Grenada Ports Authority

Equipment

Equipment	Quantity
Reachstackers	2
Top Lifts	1
Forklifts	

Source: Grenada Ports Authority

Typically, gang sizes of 23 labourers are employed to service container vessels (including a labourer that works the vessel's crane).

Both labour pools have their own union; the labour pool representing storage and overhead employees organizes strikes more often, as wages for this labour pool are generally lower.

However, strikes generally don't last long, and management takes over basic functions to keep operations ongoing.

Labour costs in the port are prohibitively high, resulting from agreements dating from the time that the flexible labour pool was provided by a private entity.

In the 1970's, when containerization started, the stevedoring / shorehandling labour union demanded that labour be paid an equal amount to discharging / loading breakbulk cargo (e.g., if the contents of a container would have taken 1.5 hours to offload in breakbulk form, the union demanded that labour was paid for 1.5 hours of work for handling the container).

This situation has slightly improved since the GPA has taken over the labour pool; however, the GPA still pays a very high flat rate per container for its labour pool (as opposed to paying labour per hour worked).

Working Hours and Overtime

Typically, discharging and loading is done between 7AM and 11PM; however, vessels can be serviced outside these hours if required.

For work outside regular hours, overtime charges apply:

- For the traditional labour pool, overtime charges apply from 4 PM onwards.
- For the flexible labour pool, a 25% tariff premium will be applied per box to compensate labour (as labour is paid per box instead of per hour)

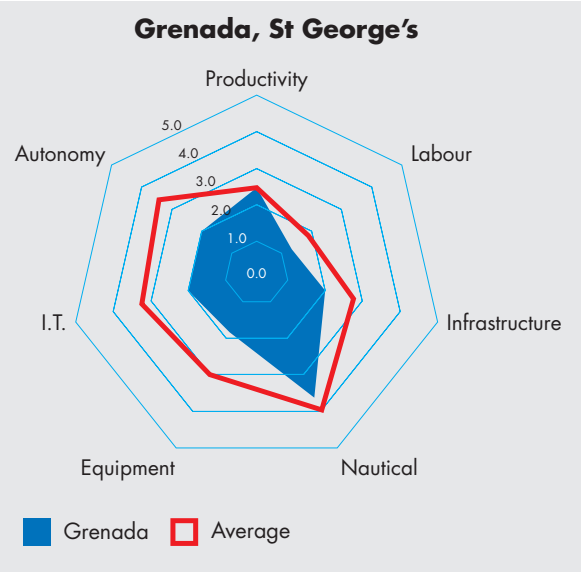
Operational Efficiency

According to the Caribbean Shipping Association's 2015 port productivity report, the Port of St. George's reaches 7.58 berth moves per hour on average.

The GPA does not keep any performance indicators itself; however, it wishes to do so in the future.

Capacity

The Port of St George's occasionally faces capacity constraints due to the limited space available for handling cargo. This constraint is aggravated during storms, when 1 container stacking height system needs to be applied for safety reasons.



Source: Grenada Ports Authority

Tariffs

Fee	Value	Unit
	Ship to Truck	
Containerized Cargo	6.89	XCD / Metric Ton
Terminal Use		
20' Container	27.24	XCD / Box
40' Container	54.19	XCD / Box
	Storage	
Free Days	5	Days
20' - Fee (0 – 2 Days)	30.55	XCD / Box
20' - Fee (> 2 Days)	20.98	XCD / Box
40' - Fee (0 – 2 Days)	60.36	XCD / Box
40' - Fee (> 2 Days)	47.48	XCD / Box

Adequacy of Skills

The GPA provides both internal and external training regarding, inter alia, safety and operations.

IT

The Authority operates a computerised information system for the receipt and delivery of cargo.

However, the IT system is not integrated with the ASYCUDA World system used by customs. As such, it is required that clear copies of the manifest are submitted to the Authority not less than 48 hours before arrival to ensure smooth operations.

Cruise

Construction of the Melville Street dedicated cruise ship complex was finished in 2005, allowing cruise ship calls to be kept completely separate from cargo handling operations.

The new cruise terminal comprises a 375 metre long jetty capable of handling either four small cruise ships, or two large ships and one medium-sized ship (however, only 350m of the jetty is currently functioning properly).

The combined ports of Grenada handled 244,715 cruise passengers (255 calls) in 2014, up from189,627 passengers (216 calls) in 2013.

However, Grenada struggles with the fact that they are typically one of the last countries to be visited by cruise vessels. This results in a low average spend per passenger, as passengers have already seen and done all typical activities, and have spent most of their money.

Main Operational Bottlenecks

- Deteriorated pavement: some parts of the yard pavement date back to the 90's and have deteriorated substantially.
- Insufficient terminal space: the main cargo terminal lacks adequate operating space.
- Outdated labour agreements: current agreements with stevedoring and shorehandling labourers result in prohibitively high OPEX, thus severely limiting competitiveness of the port.

Forecast

Grenada is expected to experience slow economic growth, with a GDP growth of approximately 2.5% per annum.

Consequently, container throughput is estimated to increase from approximately 16.5 kTEU in 2015 to approximately 19.6 kTEU in 2025 (CAGR (2015 – 2025): 1.74%).

It is expected that the port will be able to handle the additional cargo if it modernizes the terminal layout (by removing inefficiently placed warehousing) and improves its yard management (cargo dwell times and efficient placement).

Recommendations

1. **Reduce labour costs**

   Current labour agreements result in prohibitively high operating costs. The high labour costs are attributable both to: (i) large gang sizes; and (ii) high wages for stevedoring and shorehandling labourers. This issue can be counteracted in two ways:

   - Renegotiating labour agreements, opting for smaller gang sizes and lower wages.
   - Reducing the labour force through offering severance packages or not replacing retiring workers.

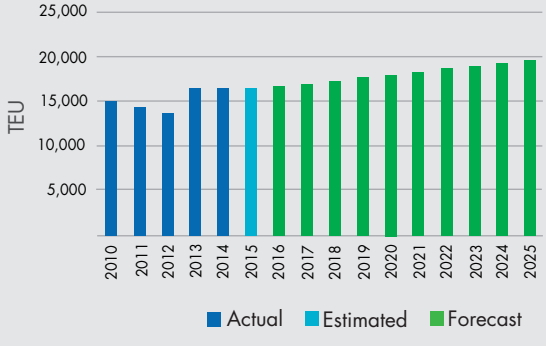
2. **Improve terminal layout**

   The outdated terminal layout limits operational efficiency and throughput capacity. Additional yard space can be achieved through removing the warehouse on the apron area. Dwell time can also be reduced by improving yard management and customs clearance times. Estimated Costs: USD 1m (it is noted that, while reducing dwell times may not entail high CAPEX, it may reduce storage revenues, which account for a large share of revenues in small ports). Alternatively, an inland CFS could be developed to handle LCL cargo, thereby relieving stress on the port. Estimated Costs: USD 10m – 20m

3. **Rehabilitate deteriorated pavement**

   Parts of the pavement have deteriorated and should be rehabilitated in the short to medium term, in order to ensure safe operations. Estimated Costs: USD 1m.

TEU Forecast



Source: MTBS; IMF

6.1.7 GUYANA, GEORGETOWN

Port Factsheet

General Description

The Port of Georgetown is situated on the north coast of Guyana, along the East Bank of the Demerara River. It stretches for 16 km inward from the river estuary, with an average depth of 4.5 metres at low tide.

The Port of Georgetown is the country's main port of entry, handling approximately 90% of cargo; the other 10% is handled by the country's other 2 ports.

The port mainly handles imports of containerized cargo (foodstuff, clothing and textiles, general merchandise and hardware, and motor vehicles), break Bulk, petroleum, and heavy duty machinery; exports mainly comprise sugar, rice, bauxite, rum, marine products, gold, lumber, and scrap metal.

Institutional Setting

Institutional Setting

The Port of Georgetown has a number of independent pier operators, either privately owned or public

Berth	Length	Depth	Commodities
Demerara Shipping	125	3.2 – 4.6	Containers
Demerara Sugar	122	4.8 – 6.0	Bulk Sugar
DIDCO Trading	150	5.5	Food products
Guyana Fertiliser	115	3.1 – 4.2	Fertiliser
GNIC	193	3.6 – 5.1	Containers/Breakbulk
GNSC	279	3.1 – 6.0	Containers/Breakbulk
John Fernandes Ltd	230	4.0 – 6.1	Containers/Bulk/RoRo
Muneshwers Ltd	154	4.9 – 5.6	Containers
Guyana Power & Light (Kingston)	29	5.2 – 5.7	
Guyana Power & Light (Garden of Eden)	30	4.0 – 4.5	
National Milling Co	8	5.5	
Caribbean Molasses Co	55	2.3 – 4.1	
Shell (Eccles)	6.9	5.7 – 6.7	Tanker Berth
Guyana Oil Co	16.4	3.6 – 4.9	Tanker Berth
Texaco West Indies	38.4	4.6 – 4.9	Tanker Berth
Esso	28.7	3.1 – 3.5	Tanker Berth

Source: IHS Fairplay Ports & Terminals (2014); Shipping Association of Guyana; Laparkan

corporations. The larger operators include John Fernandes Ltd; Muneshwers Ltd; Guyana National Shipping Corporation Ltd (GNSC), Guyana National Industrial Company Inc (GNIC); Demerara Shipping Company Ltd; Demerara Sugar Terminals Ltd; and Deo's International Distribution Company Ltd (DIDCO). Additionally, the Guyana Sugar Corporation and Caribbean Molasses Company Ltd operate bulk handling facilities for sugar and molasses, respectively.

No operators provide fully dedicated container handling facilities; however, some of the operators do handle containers. Of these container cargo operators, Demerara Shipping, GNIC, GNSC, John Fernandes, and Muneshwers constitute the largest parties in terms of container throughput. For the purpose of this study, the two largest container handling operators, John Fernandes and GNSC, have been further assessed.

The Maritime Administration Department (MARAD), part of the Ministry of Public Infrastructure, acts as the port's authority. Its main responsibilities include:

- registering and licensing ships;
- pilotage;
- hydrographic surveys;
- accident investigation; and
- search and rescue.

The MARAD was established in 2003, and operates under the mandate of the 1997 Merchant Shipping Act. Previously, the Transport & Harbours Department, another department of the Ministry of Public Infrastructure, was tasked with the Port Authority responsibilities.

As there is no clear structure for overseeing and regulating the operations, the individual public/private operators have substantial autonomy in developing their independent terminals.

Operations

Equipment

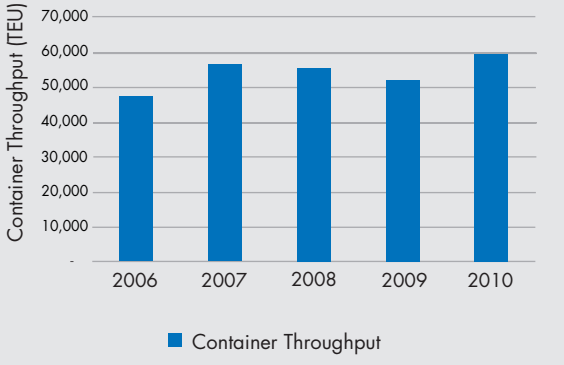
The 5 largest container handling facilities provide a total of 10 crawler and harbour cranes with varying lifting capacities; however, none of these cranes has sufficient reach and lifting capacity to service container vessels. Besides the cranes, a total of 11 reachstackers and 52 forklifts is provided.

Roles & Responsibilities	PA	Private/Public TO
Infrastructure planning		X
Superstructure (buildings)		X
Equipment		X
Operational labour		X
Towage	X	
Pilotage	X	
Mooring	X	
Nautical access	X*	
Hinterland access		X
Port Management		X

*The responsibility to carry out dredging works is formally allocated to the MARAD; however, due to constraints, this task is often carried out by the operators.

Historic Performance

Throughput



Labour

All individual operators have their own workforces. There have been discussions regarding setting up a shared labour pool; however, no such cooperative approach has been implemented yet.

The largest operators, John Fernandes and GNSC, employ approximately 550 and 210 employees, respectively (John Fernandes' labour costs amount to approximately 58% of total OPEX).

Equipment	Quantity
Demerara Shipping	
Crawler Cranes (30 Ton)	1
Reachstackers	2
Forklifts	11
Guyana National Industrial Co. (GNIC)	
Crawler Cranes (30 Ton)	2
Crawler Crane (90 Ton)	1
Reachstackers (5 High)	2
Forklifts	5
Tugs	2
Guyana National Shipping Co. (GNSC)	
Crawler Cranes (32 Ton)	1
Crawler Crane (40 Ton)	1
Reachstackers (5 High)	1
Empty Handler (4 High)	1
Side Loader (33 Ton)	1
Forklifts	16
John Fernandes Ltd.	
Mobile Harbour Cranes (100 Ton)	2
Reachstackers	4
Forklifts	12
Muneshwers Ltd.	
Mobile Harbour Cranes (30 Ton)	1
Mobile Harbour Cranes (80 Ton)	1
Reachstacker	1
Forklifts	8

Source: IHS Fairplay Ports & Terminals (2014); Shipping Association of Guyana; Laparkan

In order to carry out operations, gangs of approximately 15 labourers are employed (John Fernandes). Typically two gangs are employed to handle a vessel (one gang per vessel crane).

There is an active labour union, which represents employees of several operators; however, not all operators' employees are represented by the union (e.g., John Fernandes employees are not affiliated to the union).

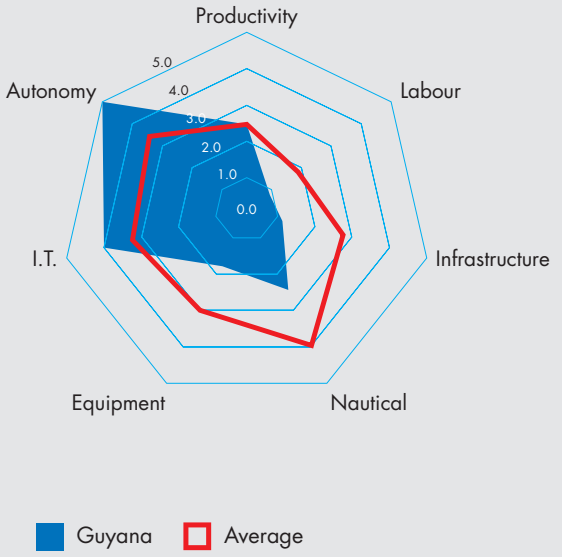
Operational Efficiency

All individual operators decide on their own preferred working hours and days. Using Ship's Own Gear (SOG), GSNC typically reaches 12 – 14 container moves per hour. John Fernandes reaches 13.6 container moves per gang per hour, for a total of 27.2 berth moves per hour (when employing 2 gangs).

Vessel type	Annual Calls
Container	466
Tankers	265
Breakbulk	112
Bulk	40
Cruise	3

Source: Shipping Association of Guyana

Productivity
Guyana, Georgetown



Capacity

GNSC's yard has a capacity of approximately 500 TEU, when stacking containers 5 high at most); John Fernandes provides a yard capacity of nearly 2,000 TEU with the same stacking height.

Currently, the yard size does not pose a serious restriction on the ports' throughput; however, the substantial dwell time (30 days at John Fernandes; 14 days at GNSC) may hamper potential throughput growth.

Adequacy of Skills

Some training is provided. Training is often given in the port in Guyana, instead of sending personnel abroad to work with simulators.

IT

John Fernandes uses its own internally developed container control system. Customs use a SWAPS (single window) system; however, the customs system is not linked to the container control database.

Cruise

The Port of Georgetown only handles a few cruise vessels per annum. All cruise vessels are handled by GSNC; the GSNC terminal can accommodate cruise vessels with up to 300 passengers, which land at the cargo berth.

Tariffs

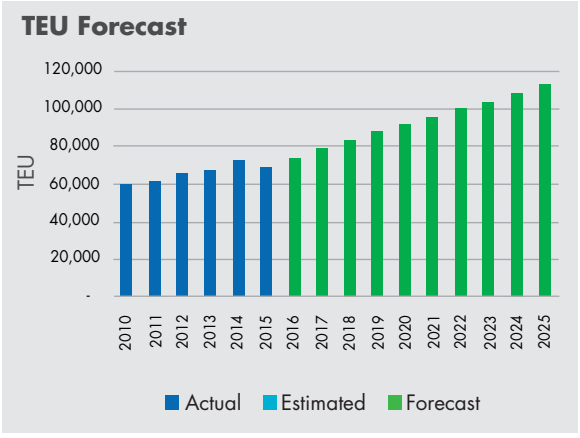
As operations are fragmented over multiple operators, no unified tariffs are available.

Main Operational Bottlenecks

- Fragmented operations: the lack of a coordinated approach in the ports has resulted in all operators procuring their own equipment and employing their own labourers. The total amount of equipment and labourers is substantially higher than justified by the total combined cargo throughput.

- Inadequate water depth: currently, water depth is only 6.2m alongside the berths at low tide (John Fernandes); the access channel depth has deteriorated even further, to 4.5m CD at low tide. This lack of water depth prohibits larger vessels from entering the port, thus severely restricting operational efficiency and economies of scale.

- Lack of modern terminals: most terminals use concrete pile structures with wooden decks for quay structures. These quays entail substantial maintenance requirements, and limit the use of heavy equipment. Additionally, lack of proper maintenance may result in safety issues (some holes were identified between wooden planks). John Fernandes is currently replacing the wooden structure by a paved apron area, in a phased sequence.



Forecast

Guyana is expected to exhibit moderate economic growth, with a GDP growth of approximately 3.0% per annum.

However, container throughput is still estimated to increase from approximately 68.7 kTEU in 2015 to approximately 112.4 kTEU in 2025 (CAGR (2015 – 2025): 5.04%). This is caused by a relatively high TEU-GDP multiplier, as observed from available historical data.

Due to the fragmented and inefficient operations, it is expected that this cargo growth will likely result in a capacity constraint in the Port of Georgetown. Hence, the port needs to (re)develop in order to accommodate the growing cargo demand.

Recommendations

1. **Development Masterplan and feasibility studies**
   As Guyana is faced with old infrastructure and dispersed operations, it is recommended to develop a port master plan and feasibility studies in order to structure future port development. Estimated Costs: USD 1m

2. **Funding of port development**
   Any port development resulting from the studies mentioned above should be coupled with port reform in order to restructure the port sector. Estimates in Guyana indicated a $350M project. Estimated Costs*: USD 50m – 150m

*Estimated project costs are substantially lower than estimates indicated in Guyana, as a smaller scale project may be more viable.

6.1.8 ST. KITTS, BASSETERRE

Port Factsheet

General Description

The port of Basseterre is the main cargo port for St. Kitts & Nevis. The port is managed and operated by the SCASPA.

The port features a relatively modest cargo pier (133m in length) where vessels berth alongside. It also features a large cruise terminal, with a single pier that can accommodate the largest vessels.

The population of St. Kitts is about 46,000.

Terminal characteristics

Terminal characteristics	
Terminal surface	10 ha
Cargo quay length	133m
Cargo Quay depth	12.0m
Cruise pier length	335m
Cruise pier depth	8.5m

Berth	Length	Depth	Commodities
Berth 1	200m	7.22	Containers, breakbulk
Berth 2	200m	7.22	Containers, breakbulk

Institutional Setting

SCASPA is the public authority under the Ministry of Public Infrastructure, Post, Urban Development and Transport.

Since 2007, stevedoring has been handled by a firm owned by the shipping agents, Port Service Limited. This step was taken to prevent the formation of a stronger labour union than the one already in existence.

Before 1993, the airport and seaport operated as two separate entities, the seaport under the name of the St. Christopher & Nevis Ports Authority and the airport. Since, 1993, the St. Kitts port authority and airport authority merged into SCASPA. Nevis is managed by its own authority: the Nevis Air & Sea Ports Authority.

Operations

Infrastructure

The cargo pier is about 34 years old. Some rehabilitation works were done in 1998/99 but the pier requires further rehabilitation. On the pier, a warehouse was constructed. This stems from the breakbulk era. The warehouse presents an obstacle with regard to operations, as reachstackers need to drive longer distances from quay to stack.

Equipment

The port does not offer any cranes. It relies on onboard cranes and RoRo cargo. For the horizontal movement of containers, the port uses 2 reachstackers.

Labour

About 227 workers are employed in the port of Basseterre. This number used to be around 400. A redundancy package was offered to the workers in 2009 and was accepted by many.

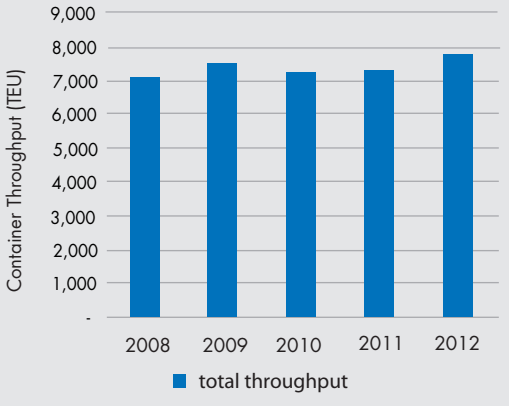
Shipping

The port receives about 4-5 calls per week, mainly from Tropical Shipping, King Ocean, CMA-CGM and Geest Line. The average call size is about 40-60 TEU

Roles & Responsibilities	PA	Private TO
Infrastructure planning	X	
Superstructure (buildings)	X	
Equipment	X	
Operational labour	X	X
Towage	X	
Pilotage	X	
Mooring	X	
Nautical access	X	
Hinterland access	X	
Port Management	X	

Historic Performance

Throughput



Adequacy of Skills

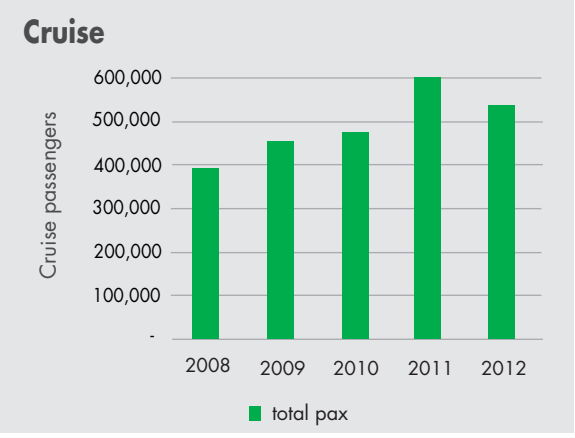
Limited training is provided. The budget does not allow for annual training programs. Rather, training occurs ad hoc. Additional training on operation and maintenance of equipment could save future costs.

IT

There is no port IT system in place. Customs makes use of ASYCUDA World.

Cruise

The cruise terminal is operated by a JV of a private developer and the government. On occasion, the cargo pier is used as a third berth, creating scheduling conflicts with cargo-passenger traffic.



Efficiency

The port of Basseterre scores high on operational productivity and nautical access. The port scores relatively low on the TEU/Full Time (employee) Equivalent (FTE) measure. Further, as the port has no stevedoring equipment, it receives a low score for this measure.

Tariffs		
Import '20ft	USD/Box	452
Import '40ft	USD/Box	904

Forecast

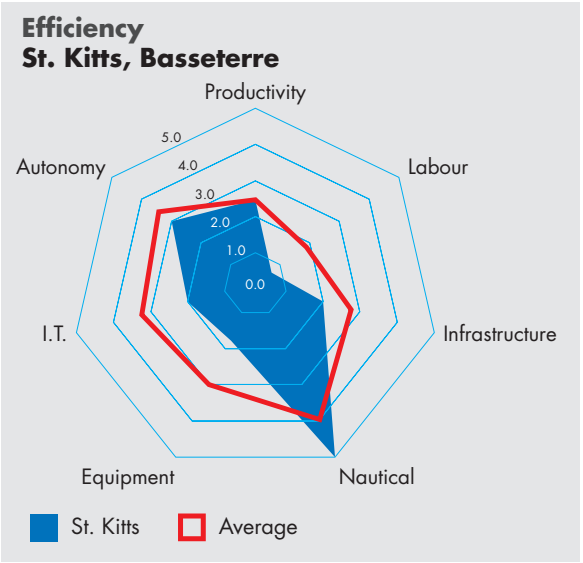
The annual economic growth forecast for St. Kitts is around 2.4%. However, past statistics show a low GDP/TEU multiple, leading to a conservative TEU growth estimate of 2.5% per annum.

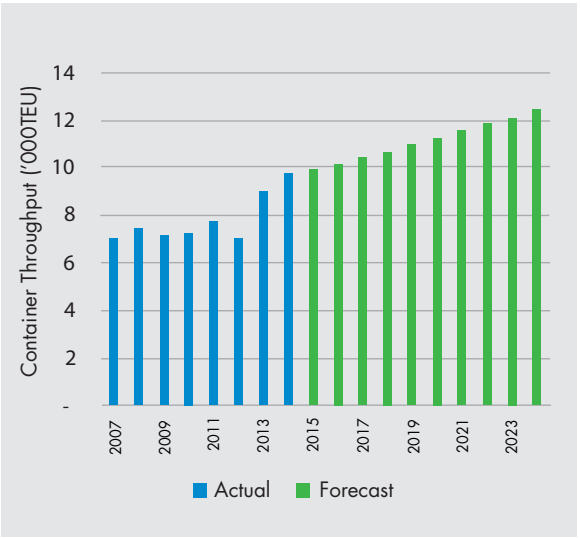
Developments

The only planned port development is the expansion of the cruise port, with the construction of an additional pier. However, the state of this development is currently unclear.

Recommendations

1. **Restructuring cargo pier**
   This includes the demolition of the warehouse and creation of container yard stack. Estimated cost is $10M USD.
2. **Rehabilitation cargo pier**
   The cargo pier is old and requires substantial rehabilitation works. The extent of the works can vary depending on the engineering survey. Costs: 10-30M USD.





3. **Implementation of IT system**
   Implementation of a modern IT system can reduce the amount of administrative work required by the port organization. Implementation of the IT system can cost between $1M and $3M.

6.1.9 SAINT LUCIA, CASTRIES

Port Factsheet

General Description

The Port of Castries is the main port of entry in Saint Lucia; as such, it handles most of the country's gateway cargo. Additionally, the port handles the majority of cruise activities.

The country's other large port, Vieux Fort, handles most of the country's transhipment cargo.

Terminal characteristics

Warehousing	
Covered Storage Space	30,480 m2
Container Yard Area	1.6 ha
Yard Storage	
TEU Ground Slots	400 #
Reefer Slots	27 #

Source: SLASPA (2016)

Berth	Length (m)	Depth (m)	Commodities
Cargo			
Berth 1	60.96	5.48	Ferries / Cruise / Cargo
Berth 2 + 3	219.45	8.23	Ferries / Cruise / Cargo
Berth 4	151.79	9.75	General Cargo
Berth 5	158.49	9.75	General Cargo
Schooner Berth	136.55	9.14	General Cargo
Cruise (Pointe Seraphine)			
Cruise Berth 1	121.92	10.97	Cruise
Cruise Berth 2	91.44	10.36	Cruise

Source: IHS Fairplay Ports & Terminals (2014); SLASPA (2016)

Institutional Setting

The Saint Lucia Air And Sea Ports Authority (SLASPA) was established by an Act of Parliament in 1983. SLASPA is responsible for regulating and operating the island's two principal seaports, Castries and Vieux Fort, and the George FL Charles and Hewanorra International Airports. Additionally, SLASPA is responsible for the country's smaller ports and marinas,which are located in Soufriere, Marigot, and Rodney Bay.

SLASPA's governing Act prescribes that, above a certain reserve to be kept for (re)investments, net profits are to be paid to central government. However, in practice, 50% of revenues (30% for cruise activities) flow to central government for central budgeting purposes.

Additionally, as a statutory body, SLASPA is highly dependent on central government for decision making. This severely limits SLASPA's ability to carry out required (re)investments in the port.

Operations

Equipment

For ground operations, the Port of Castries provides 4 reachstackers and 23 forklifts.

Vessels are serviced by SLASPA's Liebherr 104 tons mobile harbour crane (MHC), which was procured in 2000 and refurbished in 2015. The MHC is only used on cargo berth 4, as other berths do not offer sufficient carrying capacity. However, SLASPA aspires to strengthen berth 5 and procure a second MHC.

Additionally, SLASPA owns and operates two tugboats.

Labour

All stevedoring activities are performed by SLASPA. Labour is recruited from the Seaman's Union. Normal working hours are from 7:00 a.m. to 4:00 p.m. with overtime provided on request.

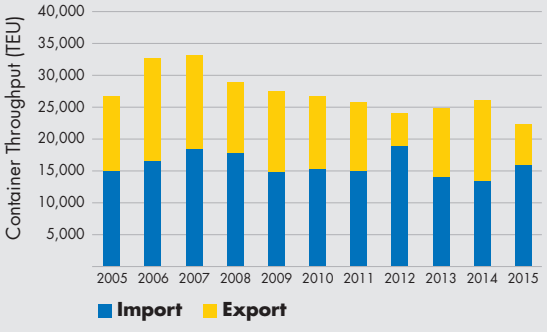
No shift system is currently in place; gangs are employed for the duration of servicing a vessel.

Roles & Responsibilities	PA	TO
Infrastructure planning	X	
Superstructure (buildings)	X	
Equipment	X	
Operational labour	X*	X*
Towage	X	
Pilotage	X	
Mooring	X	
Nautical access	X	
Hinterland access	X	
Port Management	X	

*operational labour is recruited from private parties (through a labour union); the operations are however carried out by SLASPA.
Source: SLASPA

Historic Performance

Throughput



*More recent figures to be received from SLASPA.
Source: SLASPA

*More recent figures to be received from SLASPA.
Source: SLASPA

However, SLASPA is at an advanced stage of negotiations with the union regarding implementation of a 24 hours shift based system.

Gang sizes are currently dictated by the private labour companies, and typically comprise 15 labourers. The large gangs result in high personnel costs (approximately 50% of total OPEX)

In order to reduce the personnel OPEX, the following two measures are currently being taken:

- An early retirement plan is in effect.
- More tasks are being automated.

Operations

Stevedoring activities are carried out between 07.00h and 16.00h; customs activities are performed between 08.00h and 16.00h. Overtime is provided on request.

Pilotage is required for vessels over 100 GRT; regular pilotage working hours are from 08.00h to 16.30h, but overtime can be requested.

Operational Efficiency

According to the Caribbean Shipping Association's 2015 port productivity report, the Port of Castries achieved an average 8.36 berth moves per hour.

Shipping

The Port of Castries receives the following 5 shipping lines:

- Tropical
- Sea Freight
- CMA CGM
- King Ocean
- Geest

Capacity

As yard management is carried out in an orderly fashion, the port does not face congestion issues.

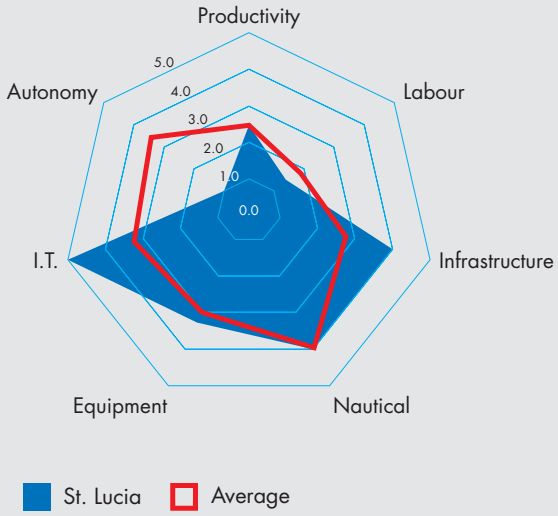
Adequacy of Skills

Required training is provided by SLASPA. However, it is hard to attract new talent to the organization.

Equipment	Quantity
Reachstackers	4
Forklifts	23
MHC (104 Tons)	1

Source: SLASPA

Productivity
St. Lucia



Tariffs

Currently, outdated tariffs (dating back to the 1980s) apply. However, SLASPA can autonomously alter applicable tariffs; hence, tariffs are currently being reviewed to assess a potential update.

Source: SLASPA

IT

SLASPA uses Unitrack for its yard management; the system is integrated with the customs' ASYCUDA World system, enabling consignees to clear cargo beforehand.

SLASPA aspires to further develop the IT systems, in order to enable accurate tracking of containers on the premises of the port.

Cruise

The Port of Castries offers two dedicated cruise berths at Pointe Seraphine (on land owned by Invest St Lucia). However, the largest cruise vessels are unable to berth at these cruise berths; as such, larger cruise vessels berth at the main terminal's berth 1, 2, and 3 combined (these berths are typically used for inter-island ferries).

The Port of Castries received 630,444 passengers (346 calls) in 2011, down from 670,043 passengers (380 calls) in 2010.

SLASPA has a Memorandum of Understanding with Royal Caribbean to develop a new cruise village. However, nothing has materialized as of yet.

Revenues received from the cruise operations consist only of passenger tax. Of these revenues, 30% has to be paid to central government for waste management.

Main Operational Bottlenecks

- **Dependence on central government**
  SLASPA is required to pay substantial amounts of its revenues to central government, and is highly dependent on central government for decision making. This severely limits SLASPA's ability to effectively take investment decisions, and thus results in lagged and inadequate port development.

- **Insufficient amount of cranes**
  Currently, the Port of Castries operates one MHC. However, 2 to 3 container vessels occasionally enter the port simultaneously, resulting in substantial waiting time for vessels. A second MHC could substantially improve vessel waiting times.

Forecast

St Lucia is expected to exhibit slow economic growth, with a GDP growth of approximately 2.5% per annum.

Consequently, container throughput is estimated to increase from approximately 29.6 kTEU in 2015 to approximately 38.1 kTEU in 2025 (CAGR (2015 – 2025): 2.3%).

It is expected that the additional cargo will not lead to severe congestion in the port.

Recommendations

1. Increase the autonomy of SLASPA through Institutional reform

The lack of autonomy, especially on financial management, limits the organization's capabilities to establish efficient port operations. Corporatization of the organization could help in distancing the role of Government in the business operations of the port.

Alternatively, the port could be developed through a Public Private Partnership (PPP), by attracting a private party that can be given the autonomy to develop the port in an efficient manner.

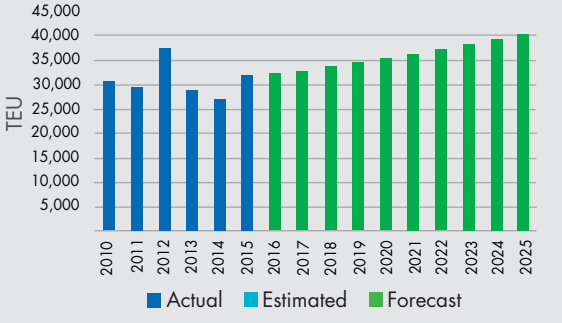
2. Procure an additional crane

In order to reduce vessel waiting time and accommodate the growing cargo demand, a second MHC should be procured in the medium term. Estimated Costs: USD 2.5m – 5.0m

3. Feasibility Study Structural Integrity Berth 5

In order to employ a MHC on berth 5, the structural integrity of berth 5 should first be assessed (and improved if necessary). Thereto, a Feasibility Study should be carried out. Estimated Costs: USD 0.5m – 1.0m

TEU Forecast



Source: MTBS; IMF

6.1.10 SAINT VINCENT & THE GRENADINES, KINGSTOWN

Port Factsheet

General Description

Saint Vincent and The Grenadines comprises 32 islands and cays, of which 9 are inhabited. The largest is Saint Vincent, where the nation's capital, Kingstown, is located. The country covers 389 km2 and has approximately 110,000 inhabitants.

The Port of Kingstown is the country's main port of entry, handling the majority of imports (mainly consisting of consumer goods, vehicles, and cement) and exports (mainly consisting of bananas), as well as most of the cruise vessels calling at the group of islands.

In 1995, the Campden Park Container Port (CPCP) was developed to handle transhipment containers. Currently, the CPCP mainly handles gateway containers. However, due to a lack of warehousing at CPCP, LCL containers are required to be brought to the Port of Kingstown for stripping.

As CPCP is vital for the country's container trade, this factsheet will discuss both the Port of Kingstown and CPCP.

Terminal characteristics

Warehousing	
Transit Shed	1500 m2
Queen's Warehouse No. 2	
Container Yard (Kingstown)	
Container Yard (Campden Park)	
Reefer Plugs (Campden Park)	13 #

Source: SVGPA (2015)

Institutional Setting

The Saint Vincent and the Grenadines Port Authority (SVGPA) was established through an Act of Parliament in 1975, and was tasked with overseeing and operating the country's ports.

Most of the operational activities are carried out by the SVGPA, except for stripping (stripping activities are left to the consignees) and shipside operations (crane operators are employed by a local company).

The SVGPA is a corporatized entity; as such, it has autonomy to make investment decisions and can allocate the port's revenues thereto. However, there is still some centralized input in decision making

Operations

Infrastructure

The Port of Kingstown has a current capacity of approximately 200 TEU, applying a stacking height of 3 containers (full and empty). The port further offers a water depth alongside the berths of approximately 12m CD.

CPCP has an approximate capacity of 850 TEU, applying a stacking height of 4 or 5 containers, for full and empty containers respectively. The port offers a water depth alongside the berths of approximately 9m CD.

Equipment

The Port of Kingstown provides 1 reachstacker, 1 old top pick as backup, and 7 forklifts.

CPCP employs 2 reachstackers, 9 forklifts with various carrying capacities, and 1 100t Mobile Harbour Crane.

Labour

The SVGPA employs 79 operational employees in the Port of Kingstown, and 68 operational employees in CPCP. In total, approximately 270 staff members are employed by SVGPA.

Typically, a gang size of 13 employees (including 1 non SVGPA crane operator) is adhered to.

Berth	Length	Depth	Commodities
	Cargo		
Deepwater Berth	274	9.75	Containers / breakbulk
Schooner Berths			
	Cruise		
Cruise Berth (South)	260*	11.35	Cruise passengers
Cruise Berth (North)	100*	7.1	Cruise passengers

*Concerns the max LOA of vessels that may be accommodated
Source: IHS Fairplay Ports & Terminals (2014); SVGPA (2015)

Roles & Responsibilities	PA	TO
Infrastructure planning	X	
Superstructure (buildings)	X	
Equipment	X	
Operational labour	X*	X*
Towage	X**	
Pilotage	X	
Mooring	X	
Nautical access	X	
Hinterland access	X	
Port Management	X	

*Most operational activities are carried out by SVGPA. Stripping is left to consignees, but labour for stripping can be hired from the SVGPA workforce. Additionally, crane operations are carried out by employees of a local private party.
**Towage is arranged by SVGPA, but carried out by an external party, due to the high costs of procuring a tugboat.

Historic Performance

Throughput

Source: SVGPA (2012 Statistic Digest)

There are two labour unions that each represent a share of the SVGPA labour. Usually, one of the two labour unions represents the majority of labourers. In the recent history, there has only been 1 strike (organized by the smaller union).

Overall, the SVGPA has been successful in modifying outdated labour arrangements through discussions with the labour unions.

In the past, labourers had to be hired two days a week throughout the year, regardless of the cargo volumes. Currently, casual labourers are hired on a monthly basis, in line with volumes.

Due to the agreements with the unions, personnel costs have been reduced to approximately 45% of total OPEX.

Operational Efficiency

According to the Caribbean Shipping Association's 2015 port productivity report, the Port of Kingstown reached an average of 8.21 berth moves per hour, using Ship's Own Gear (SOG).

Shipping

The Port of Kingstown regularly receives container shipments by Geest Line, which generally has a call size of 21 boxes (in + out).

CPCP regularly receives vessels from the following 5 shipping lines:

- SeaFreight
- Tropical
- Crowley
- King Ocean
- CMA CGM

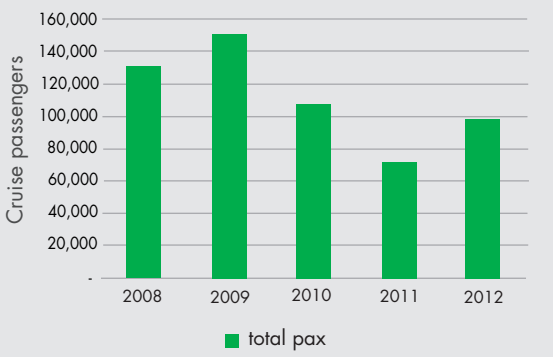
Capacity

Due to an outdated terminal layout and limited space, the port occasionally suffers from congestion. As a result, the SVGPA is currently investigating the possibility of relocating some (or all) of the operations.

Adequacy of Skills

External and internal training is provided (e.g., concerning operations and safety).

Cruise



Vessel type	Calls (2012)
Container	238
Reefers	53
RoRo	30
Bulk	5
Cruise	47

Source: SVGPA (2012 Statistics Digest)

Equipment	Quantity
Port of Kingstown	
Reachstackers	1
Top Picks	1
Forklifts	7
Mobile Harbour Cranes	0
Campden Park Container Port	
Reachstackers	2
Top Picks	0
Forklifts	9
Mobile Harbour Cranes	1

Source: SVGPA (2016)

IT

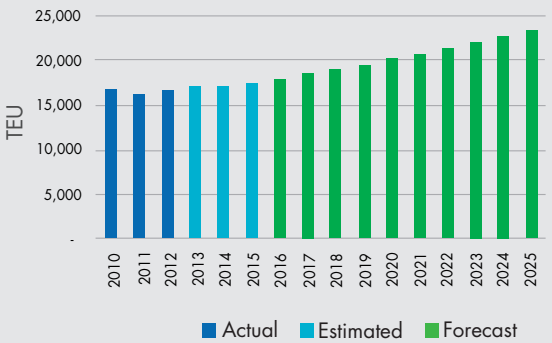
The SVGPA uses Unitrack in both the Port of Kingstown and CPCP. At both ports, ASYCUDA is employed by the customs department. However, the SVGPA and customs IT systems have not been integrated.

Cruise

The Port of Kingstown offers a dedicated cruise pier, to keep cruise activities separated from cargo operations.

A total of 77,179 cruise passengers arrived in the SVGPA's ports in 2012, against a total of 89,482 passengers in 2011 (these figures also comprise passengers visiting the Grenadines).

TEU Forecast



Source: MTBS; IMF

Forecast

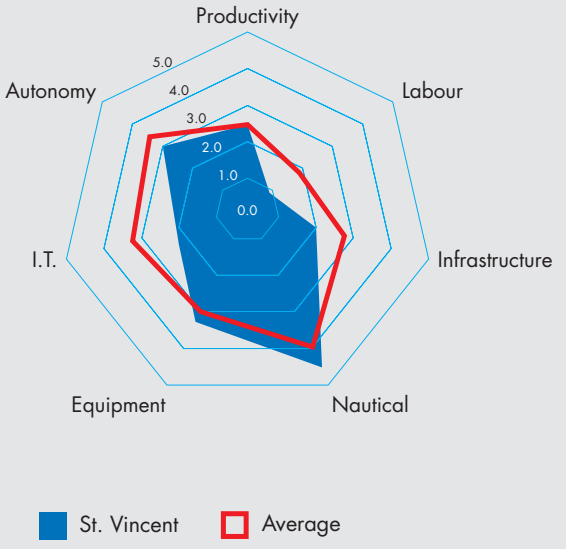
Saint Vincent & the Grenadines is projected to experience moderate economic growth, with a GDP growth of approximately 3.0% per annum.

Consequently, container throughput is estimated to increase from approximately 17.6 kTEU in 2015 to approximately 23.5 kTEU in 2025 (CAGR (2015 – 2025): 2.94%).

It is expected that the port will be able to handle the additional cargo if it modernizes the terminal layout (by removing inefficiently placed warehousing) and improves its yard management (cargo dwell times and efficient placement). Additionally, the terminal layout can be substantially modernized by reclaiming land between the yard area and the main cargo berth; however, it is to be noted that this may entail substantial investments.

Alternatively, the SVGPA is currently looking into relocating operations.

Productivity
St. Vincent & The Grenadines, Kingstown



Recommendations

1. **Improve terminal layout**

   The outdated terminal layout limits operational efficiency and throughput capacity. Additional yard space can be achieved through removing the warehouse on the apron area. Dwell time can also be reduced by improving yard management and customs clearance times. Estimated Cost: USD 1m (it is noted that, while reducing dwell times may not entail high CAPEX, it may reduce storage revenues, which account for a large share of revenues in small ports).

   Additional layout updates, through land reclamation or operations relocation, would entail substantially higher investments.

2. **Rehabilitation of the main ports**

   Some parts of the pavement in both the Port of Kingstown and CPCP have deteriorated, and should be rehabilitated to ensure safe operations. Estimated Costs: USD 2.5m – 5.0m

6.1.11 SURINAME, PARAMARIBO

Port Factsheet

General Description

The Nieuwe Haven in Paramaribo is the major port of Suriname and located on the Suriname river, about 21 nautical miles away from the river entry at the Atlantic Ocean. Being a river port, nautical accessibility remains a challenge. The depth at the river estuary is 7.0 meters at high tide, limiting vessels to enter the rivers in specific tidal windows. The quays of the Nieuwe Haven are dredged to 7.22 meters LWS (low water spring tide).

The Nieuwe Haven was rehabilitated in 2010 and functions as the main gateway of the country. The rehabilitation works included the extension of the container yard and expansion of the storage yard. The modern container terminal is operated by three private stevedores:

- Integra Port Services, the largest concession holder (DP World acquired a 60% share in 2011);
- NV VSH Transportmij;
- Continental Shipping Agencies NV.

Terminal characteristics

Terminal surface	18 ha
Cargo quay length	600m
Quay depth	7.22m
Storage area	
Containers	0.9 ha
Reefers	119 plugs

Berth	Length	Depth	Commodities
Berth 1	200m	7.22	Containers, breakbulk
Berth 2	200m	7.22	Containers, breakbulk
Berth 3	200m	7.22	Containers, breakbulk

Institutional Setting

The Port Authority of Suriname (Havenbeheer NV) is corporatized. The sole shareholder is the Government of Suriname. The authority of the PA is limited to the land. Nautical accessibility is the responsibility of the Maritime Authority, Suriname (MAS). As such, MAS is responsible for provision of marine services, navigational aids and dredging.

The landlord port structure was formalized in 2007 as a condition to a 28 M EUR grant by the EU, meant to fund part of the rehabilitation of the infrastructure. The PA has invested in the terminal infrastructure leaving investments in equipment to the private sector.

Since the rehabilitation, private sector participation has been formalized according to the landlord model, in which the three operators are responsible for cargo handling. The PA is managing the reefer storage area, although horizontal transport is often executed by the private operators.

Operations

Equipment

The port of Nieuwe Haven features four mobile harbour cranes. IPS operates with 3 Gottwald mobile harbour cranes and 3 RTG cranes. VSH has 1 mobile harbour crane.

Labour

The Port Authority currently has 182 employees. IPS has about 200 employees. IPS utilizes modern gang size of 15-18 workers (including planners, RTG operators, reachstackers operator.). Labour unions have been flexible in the past to move towards modern cargo operations. The port operates on a 24/7 basis. However specifically at gate, peak hours are in the afternoon.

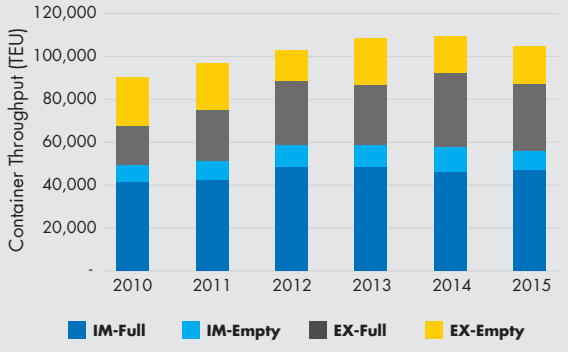
Shipping

The port of Paramaribo is called by 10 different services, mainly coming from the major transhipment hubs Miami, Kingston, Colón and Port of Spain. It is also connected to Europe with the Geest Line.

Roles & Responsibilities	PA	MAS	Private TO
Infrastructure planning	X		
Superstructure (buildings)	X		
Equipment			X
Operational labour			X
Towage		X	
Pilotage		X	
Mooring		X	
Nautical access		X	
Hinterland access	X		
Port Management	X		

Historic Performance

Throughput



Capacity

The Port Handbook states an annual capacity of 100,000 TEU. The IPS terminal has reported capacity of 110,000 TEU throughput.

Adequacy of Skills

The PA does not feel that sufficient training is provided to the employees due to funding constraints.

IT

The Port Authority is in the process of implementing an internal Port System. This is to be operational in 2016. The next step is to develop a Port Community System, which would allow all stakeholders to communicate with one another.

Cruise
The port of Paramaribo receives a small amount of cruise vessels on an annual basis.

Productivity
Before the rehabilitation, container handling was done per ships gear by 16 different stevedoring companies. After the rehabilitation, two operators were provided the right for terminal operations. Both operators have invested in Mobile Harbour Cranes. IPS realizes a productivity of 20.4 crane moves/hr and 30 berth moves per hour. Call sizes average about 400 TEU. With an estimated TEU factor of 1.5 and an average of 23 moves per hour, the terminal is able to handle a vessel within a single tidal window of 12 hours. Truck turnaround time is about 30minutes.

Tariffs
The stevedoring tariffs are commercially set.

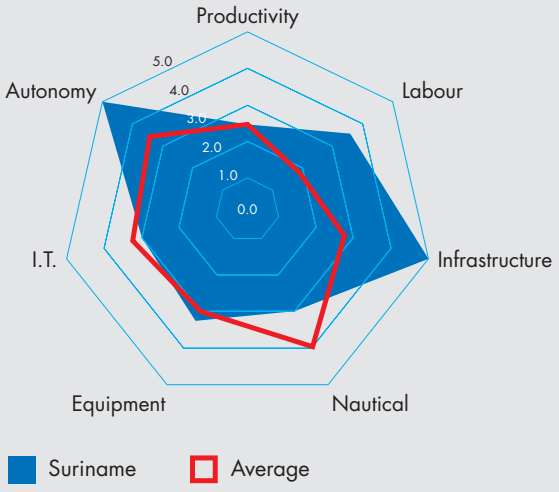
Main Operational Bottlenecks
Current operations
The main operational bottleneck experienced in the port is the congestion forming at the gates when trucks come in to pick up their cargo. Although the port is operational 24/7, trucks still tend to pick up their cargo in the afternoon. As the port has only one gate, this creates congestion on the public roads.

For long term development, the port is hampered by its nautical depth. If it wishes to play a hub role for its neighbouring countries, then it has to be able to accommodate larger vessels.

Further, the port is currently limited in its land. A landlord port can only thrive if it has sufficient port area in order to develop new business or grow existing businesses.

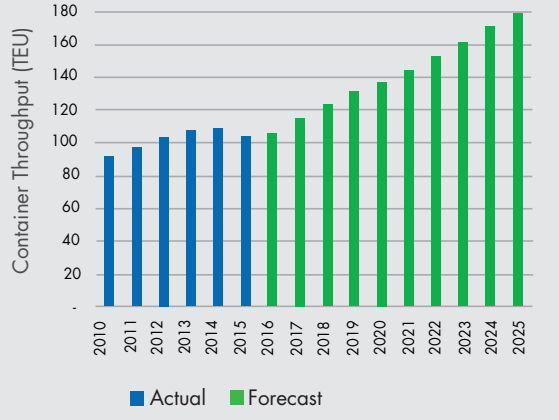
Traffic Forecast
Suriname is expected to be a high growth country. The GDP growth expectations of the IMF exceed 5% for 2017 and 2018. Afterwards, the GDP is expected to average around 4% up to 2025. With an average multiplier of 1.4, this equals an average growth in container through of 5.5%.

Efficiency
Suriname, Paramaribo



The port of Paramaribo scores low on nautical accessibility, given the siltation of the river. It scores high on the level of autonomy and labour, given the private sector involvement. Further, the quality of infrastructure is rated high.

TEU Forecast



The current container terminal is not able to handle 180,000 TEU, as the current capacity is estimated at around 130,000 TEU. Hence, there is a need for a port expansion plan.

Recommendations

1. **Develop and implement a Port Community System**
   The development of a port community system that allows stakeholders to communicate on a common platform electronically. Coupled with the implementation of this system should be a training program that will enable stakeholders to utilize this program to the fullest. Estimated cost: 2 M USD

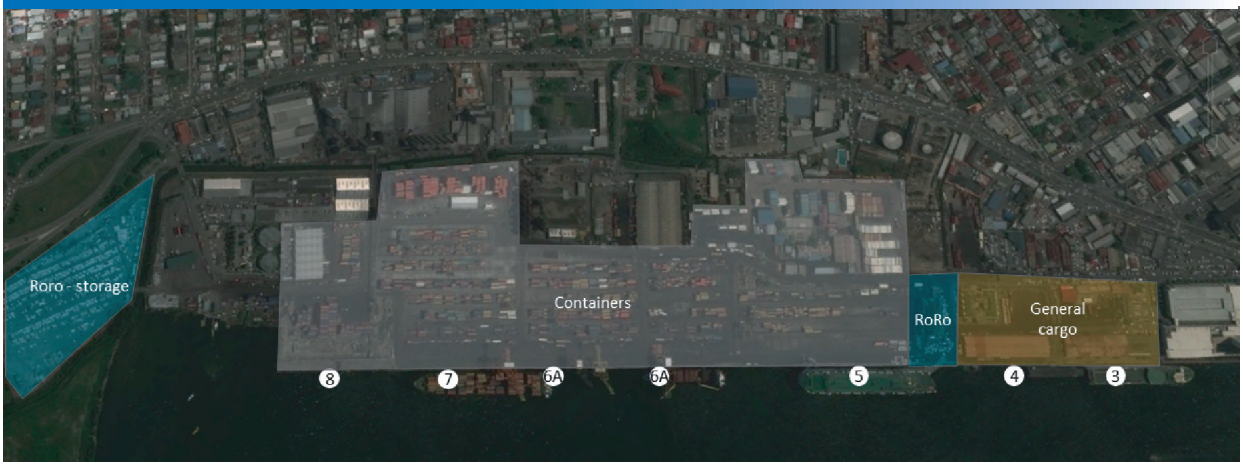
2. **Expand the truck gate to add capacity**
   To relieve the public areas of congestion by the trucks, an additional gate can be created to provide more capacity at the 'front door' of the port. This investment should be coupled with a proper truck waiting area and a bonus/malus system (via the port community system) for on-time pickups of trucks. Estimated cost: 2M USD

3. **Prepare a Port Masterplan with a detailed economic feasibility for improving nautical accessibility**
   For long-term development, the Nieuwe Haven port should aim to improve nautical accessibility in order to reduce maritime transport costs and add additional land to its current port in order to increase terminal capacity. A master plan study that also investigates the economic costs and benefits of improving nautical accessibility should be carried out. Estimated cost for conducting a masterplan with economic feasibility study is 1.5M USD.

4. **Limit the amount of stevedores to optimize economies of scale**
   Furthermore, the port should aim to decrease the amount of stevedores to a single stevedore, to maximise scale economies, in an already small-medium sized port. The current inefficiency created by two operators with their own equipment, which is not fully utilized, increases costs of operations. As the current concessions will expire in 10 years, the Port should already start considering its development plan (in line with the Master Plan). A competitive tender under a fixed tariff regime should yield competitive bids that minimize costs of transport.

6.1.12 TRINIDAD & TOBAGO, PORT OF SPAIN

Port Factsheet



General Description

The port of Port of Spain (PPOS) is the largest port in Trinidad & Tobago in terms of containers handled. The port is situated in the capital city surrounded by the urban environment. The port features terminals for passengers, breakbulk, containers, dry bulk and cars.

The PPOS functions as a regional transhipment hub, as 40% (in 2015) of the handled containers are destined elsewhere other than Trinidad & Tobago.

The port offers a maximum quay depth of C.D. 12.0m. The port is approached via a one-way access channel.

The port has a modern gate facility, with canopies and pre-gate parking for trucks.

Labour

PPOS has 1146 employees, of whom 832 are operational labour. Operational labour is unionized. Labour costs represent 75% of the operational costs of PPOS. Two factors contribute to relatively high employment. First, PPOS operates a 3 shift system of 8 hours per shift, which requires more men and more overtime than operating under a 12hr shift system. Second, gang sizes have not yet been adjusted to modern standards, as PPOS currently employs a 23 men gang size for the stevedoring and transfer of containers to the yard. Furthermore, as the operational workforce is on average well-aged, there is need for additional training with modern IT systems. Training targets are not yet met.

Terminal characteristics

Terminal characteristics	
Terminal surface	48.1 ha
Total quay length	1,500m
Quay depth	12.0m
Storage area	
Full containers	14.6 ha
Empty containers	6.4 ha
Cars	2.4 ha
Warehouses	2.2 ha

Berth	Length	Depth	Commodities
Berths 3-4	400	9.0	Passenger, break bulk
Berths 5-6	400	9.0	Car, containers
Berth 6A	300	12.0	Containers
Berth 7	200	12.0	Containers
Berth 8	200	12.0	Dry Bulk
6A, 7, 8,	800		

Institutional Setting

PPOS is a business unit under the Port Authority of Trinidad and Tobago (PATNT). The PATNT is a state enterprise. The PATNT has implemented a landlord structure by creating a Landlord body in Port of Spain Infrastructure Company (POSINCO) and an operator in PPOS.

The Port of Spain Infrastructure Company (POSINCO) plays the strategic role of Port Landlord, managing the Port Authority's 151 hectares of real estate and creating opportunities, through port infrastructure development and maintenance, to boost cargo. Additionally, POSINCO provides the ancillary services of towage, harbour management and cruise shipping terminal operations.

PPOS is the cargo handling business unit of the PATNT. PPOS provides berthing for container vessels, breakbulk, roll-on/ roll-off, dry and liquid/bulk cargo vessels, as well as towage services, container freight services and warehousing.

Traffic

During 2007 to 2014, PPOS handled about 350 kTEU per annum, with 180 kTEU transhipment TEU on average. As the transhipment activity dropped from 186 kTEU in 2014 to 110 kTEU in 2015, the total throughput dropped accordingly. The import of full containers has been steady at around 80 kTEU. The full export decreased from 23 kTEU in 2007 to 7 kTEU, corresponding with the decline of economic activity on the island.

Cruise

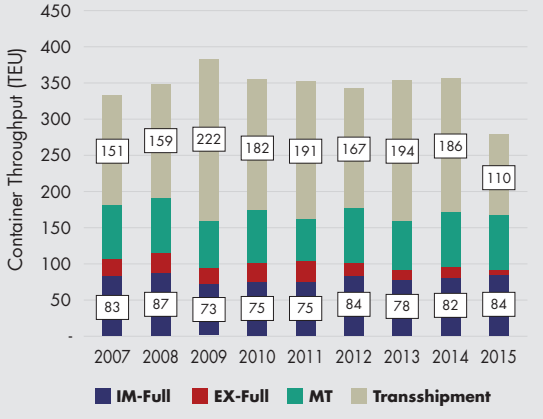
Cruise is handled at a separate berth (3 and 4). This does not affect the cargo handling operations. In 2014, PPOS received around 13,000 passengers. Given the low volume of passengers, there does not seem to be a bottleneck.

Equipment

PPOS currently employs 4 Ship to Shore (STS) cranes and 1 Mobile Harbour Crane (MHC) for its quayside operations. Two of the STS cranes are outdated and have limited reach and height, prohibiting their use

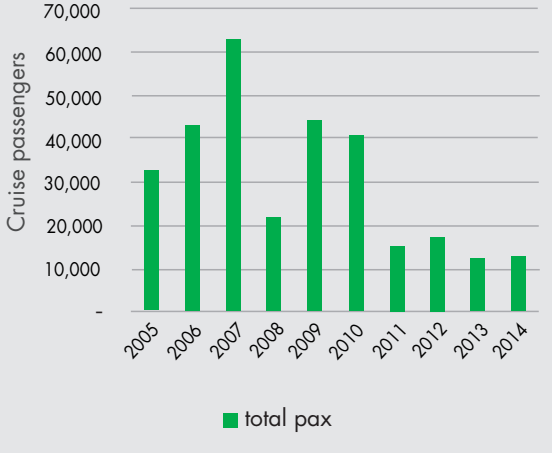
Roles & Responsibilities	PATNT	POSINCO	PPOS
Infrastructure planning		X	
Superstructure (buildings)			X
Equipment			X
Operational labour			X
Towage		X	X
Pilotage	X		
Mooring		X	X
Nautical access		X	
Hinterland access	X		
Port Management	X		

Traffic



Source: PPOS 2015, numbers exclude repostioning moves

Cruise



for servicing the 5,000 TEU vessels that are accommodated at PPOS; only one of the STS cranes can be employed to load and offload containers that are stacked 7 high on deck on the 5,000 TEU vessels.

For its landside operations, PPOS employs 14 Rubber Tyre Gantry (RTG) cranes, 8 reach stackers, and 9 empty handlers. Similar to the quayside cranes, the RTGs are outdated and have limited height (currently employed RTGs have a maximum stacking height of 4 boxes, compared to more modern RTGs that can handle stacking height of up to 7 boxes), limiting the density and efficiency of yard operations. Additionally, the RTGs often have maintenance issues due to their age, further limiting their use.

Operational Performance

Berth productivity has been increasing over recent years. In 2007, berth productivity averaged 13.2moves/hr whereas in 2015 PPOS averaged 21.7 moves per hour.

Gate Handling

The terminal gate is open from 06.00 to 23.00 hrs. There is a time slot system in place to plan container pick-ups efficiently. However, in practice, the slotting system is not utilized. 93% of the containers are picked-up before 19.00hrs, with the major peak between 16.00 and 19.00hrs. The current dwell time of the import container is about 7 days.

Operational Capacity

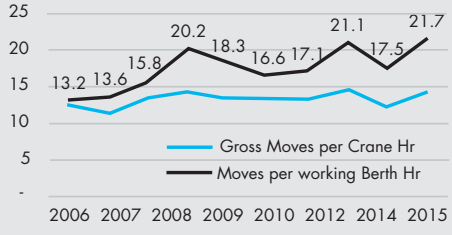
PPOS provides an estimated annual operational capacity of 491 kTEU, based on current average crane productivity, utilization assumptions, and operational hours. Assuming crane productivity rates in line with industry benchmarks, quayside capacity could be increased to 750 – 900 kTEU per annum (employing the current amount of quay cranes).

The current capacity, however, may be limited further by the annual capacity of the port's yard operations. The port's management has indicated that, due to limited yard capacity, the port is operating near its capacity.

Equipment

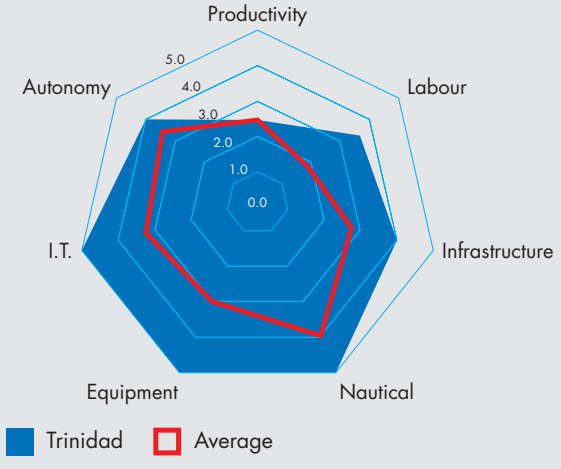
Item	#
Marine	
Ship To Shore Crane	4
Mobile Harbour Crane	1
Landside	
Rail Mounted Gantry Cranes	0
Rubber Tyre Gantry Cranes	14
Reach Stacker / Empty Handler	17

Operational Performance
PPOS Quay Side Productivity



Source: PPOS, 2015

Efficiency
Trinidad & Tobago, Port of Spain



Tariffs

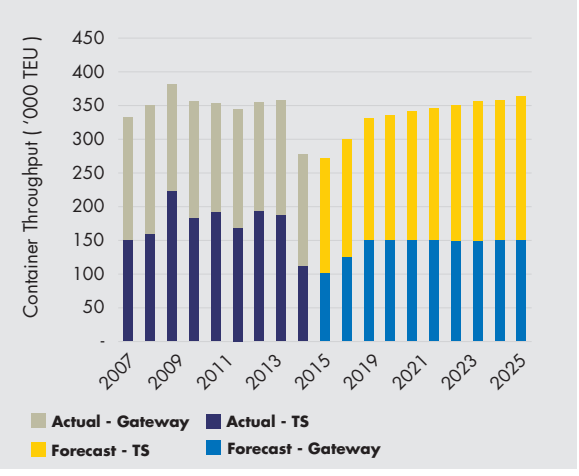
Full		
Import Offloading (Vessel - Storage)	USD/Box	183
Export Loading (Storage - Vessel)	USD/Box	119
Empty		
Import Offloading (Vessel - Storage)	USD/Box	53
Export Loading (Storage - Vessel)	USD/Box	113

IT Systems

PPOS employs a NAVIS system for the container operations. Furthermore, PPOS offers a Single Window System. However, as Customs and Immigration are not yet part of the system, the system is not fully functional as yet. The lack of electronic communication between Customs and PPOS also generates additional dwell time of the containers.

Efficiency

Compared to other ports in the sample, PPOS scores relatively high on efficiency in terms of labour, IT and equipment. However, the equipment is not optimally utilized. This is not reflected in the graph. Despite the large labour force, the TEU/FTE productivity ratio is relatively high. The level of autonomy, operational productivity and nautical access score comparatively low.



Forecast

The IMF economic growth forecast suggests average GDP growth of 1.6%. With a GDP/TEU multiplier of 1.5x, the gateway containers are predicted to grow at an annual rate of 2.4%. The transhipment traffic is projected to increase to 150,000 TEU by 2018.

Recommendations

1. Develop a National Port Masterplan

There is a dire need for a National Port Masterplan that clearly outlines the future development Trinidad ports. In the past, changes in Government have led to changes in the course of port development. For PPOS, the masterplan should indicate whether the port will stay in its current location or will be relocated to Sea Lots. Clarity on this also dictates investments in upgrades on the current infrastructure. Cost of a National Master Plan is estimated at 1M USD.

2. Privatization of PPOS

To be able to function more efficiently and effectively, it is recommended that PPOS continue its institutional development and move towards privatization. As a private company, PPOS would better manage its performance and development. Political resistance is expected. Estimated costs of hiring technical assistance to aid in the privatization of PPOS is 5 M USD.

3. Develop a modern deep-sea port to maintain hub-function

If PPOS wishes to continue its function as a regional hub, there is a clear need for an infrastructure upgrade in order to enable accommodation of the expected 13,000 TEU vessels. There are various development options to realize accommodation of such vessels:

- The development of berths 9 & 10, perpendicular to the current berths would cost 900M USD (source: Port Rationalization Study, 2014).
- Extension and deepening of berth 8, depending on the difficulty of dredging works, would cost between 20M and 50M USD.
- The last alternative is a complete relocation to Sea Lots. Construction of a new port would easily exceed 1 bn USD.

4. Decrease dwell time to optimize current use of the facilities

The current port can enhance its capacity relatively easily by decreasing the dwell time. Although the ASYCUDA World System has been implemented in the ports, advance cargo manifest reporting is still not possible, resulting ultimately in longer dwell time. Further integration of ASYCUDA with the Single Electronic Window will also enhance efficiency.

5. Modernize port labour

The aging profile of operations workers, the lack of adequate training, the large gang sizes and the high propensity for overtime work increase the costs of container handling. Modernisation of port labour is difficult. The labour unions have rejected modernisation proposals in the past.

Options:

- Acquiring trainers for on-the-job training for workers: 0.5 M USD

- Offering attractive redundancy packages (e.g. 2x annual salary) could trigger personnel leaving the organization. For 200 workers, this implies an investment of 12M USD.

7 ANNEX II – SOURCES USED

LIST OF INTERVIEWEES

	Person	Function, Organization
Antigua, St. Johns	Mr. Darwin Telemaque	CEO, Antigua Port Authority
Bahamas, Nassau	Mr. Mike Maura	CEO, Nassau Container Port
	Mr. Cyril Roker	Port Controller, Port Department Bahamas
Barbados, Bridgetown	Mr. Ian Stewart	Terminal Operations Manager, Barbados Port Inc.
	Mr. Atherly	Corporate Strategy, Barbados Port Inc.
Belize, City of Belize	Mrs. Martinez,	Port Commissioner, Belize Port Authority
	Mr. Arturo Vasquez	CEO, Port of Belize Limited
	Mrs. Franzine Waight	Operations Manager, Port of Belize Limited
	Mr. Elad Aharon	General Manager, Cruise Port Belize
Dominica, Roseau	Mr. Benoit Bardouille	CEO, Dominica Airport and Seaport Authority
Grenada, St. Georges	Mr. Ian Evans	Port Manager, Grenada Ports Authority
Guyana, Georgetown	Mr. Andrew Astwood	Managing Director, Guyana National Shipping Corporation
	Mr. Oudkerk	Project Manager, Guyana National Shipping Corporation
	Mr. Chris Fernandes	Chairman, John Fernandes
	Mr Philip Fernandes	CEO, John Fernandes
	Mr. Mark Archer	Warehouse Manager, John Fernandes
St. Kitts, Basseterre	Mr. Loui Hendrickson	Seaport Manager, St. Christopher Air and Seaports Authority
Saint Lucia, Castries	Mr. Keigan Cox	General Manager / CEO, Saint Lucia Air and Sea Ports Authority
	Mr. Adrian Hilaire	Director of Seaports, Saint Lucia Air and Sea Ports Authority
Mr. Carl James		Saint Vincent, Kingstown Chief Operating Officer, Saint Vincent and the Grenadines Port Authority
	Mr. Sudarmo Toby	Assistant Operations Officer, Saint Vincent and the Grenadines Port Authority
Suriname, Paramaribo	Mr. Marcel Mulier	Deputy Managing Director, Port Authority Suriname
	Mrs. Vanessa Aman	Manager Corporate Strategy & Commercial Services, Port Authority Suriname
	Mr. Faisal Abdul Sovan	Manager, Engineering Dept. Integra Port Services / DP World Paramaribo
Trinidad and Tobago, Port of Spain	Mrs. Trudy Gill	CEO, Port of Port of Spain
	Mr. Ricardo Gonzales	Divisional Manager Operations
	Mr. Wendell Yearwood	Logistics Manager

REFERENCES

Arawak Port Development Ltd, 2015: "Annual Report, 2015"

Association of Caribbean States, 2014: "Study on Port and Maritime Strategies for the Greater Caribbean"

Inter-American Development Bank, 2013: "Assessment of Port Performance and Port Connectivity Study in Belize, Central America and the Dominican Republic"

Inter-American Development Bank, 2013: "Benchmarking Container Port Technical Efficiency in Latin America and the Caribbean"

International Monetary Fund, 2015: World Economic Outlook Online Database

Nathan Associates, 2014: "Port Rationalization Study for Trinidad and Tobago"

World Bank, 2015: "OECS Ports, An Efficiency and Performance Assessment"

World Bank, 2012: "Logistics Connectivity in the Caribbean: Current Challenges and Future Prospects"

World Bank 2015: "Connectivity for Caribbean Countries"

World Bank, 2016: Online Databank, Doing Business Indicators

World Bank, 2007: "Port Reform Toolkit"

CARIBBEAN DEVELOPMENT BANK
P.O. BOX 408, WILDEY, ST. MICHAEL
BARBADOS BB11000
T: (246) 431-1600
F: (246) 426-7269

www.caribank.org