Automation & Digitalisation in Ports: Hemispheric Trends

5th Hemispheric Conference on Competitiveness, Innovation and Logistics:
Port-Maritime Digitalization as a Key for Global Trade

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What is Port Automation?

The use of integrated technology to develop intelligent solutions for efficient control of traffic and trade flows on the port, thereby increasing port capacity and port efficiency

Context - The Case for Automation & Digitalisation

- Mitigate disruption due to human catastrophe – eg; Covid-19 pandemic and its effect on maritime and trade activities

- Better control movement of vessels eg; (Suez canal blockage, 2021 by the Ever Given)

- Align with the objectives of UNCTAD,WTO in protecting frontline maritime workers by facilitating remote working and electronic document transfer

- Facilitate real time transactions using solutions such as Blockchain technology

- Seamless data transfer in real-time among stakeholders

- Integrate equipment control systems

Ports worldwide are steadily adapting to new emerging trends to becoming SMART PORTS

These innovations consist of Robotic Process Automation (RPA) and Digitalization

The Port Authority
of Jamaica

Context – What the World Bank Recommends

- ☐ **Make the single window for data exchange mandatory for ports worldwide**

- ☐ **Establish a port community system (PCS)**

- ☐ **Upgrade to a Port Management System (PMS)**

- ☐ **Establish smart ports with processes that are automated and connected to the Internet of Things (IoT)**

- ☐ **Improve legislation and human capital in line with increased digitalization**

World Bank IAPH Report

Main Areas for Automation and Digitalization

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MAIN TECHNOLOGIES

- Robotics
- Artificial Intelligence
- Autonomous Vehicles
- Internet of Things (IoT)
- Blockchain
- Big Data
- Virtual Reality

LOGISTICS AND PORTS FOCUS

- Autonomous Vehicles
- Automated Terminals
- Robotics

- Port Community System
- Improved Forecasting
- Decision-Making

- Cargo Monitoring
- Asset Management
- Supply Chain Visibility
- Process Automation

- Inventory Optimization
- Cargo Bundling
- eBill of Lading
- Digitalization

Implications For Ports

Low buy in from ports

Large capital outlay

Data not standardized
Expensive to collect

Cost/benefits not clear

Cyber security risks

Benefits For Ports

Greater Supply Chain Efficiency

Cost savings

Data transparency across global port operations

Lower Emissions

Greater competitiveness

Emerging Global Port Trends - Environment

More Technological Solutions

➤ Increase in innovation, Increase investments in technology….

➤ Decrease cost

Environmental Drivers

❑ Efforts to reduce the carbon footprint and improve the environmental performance of the maritime sector remains paramount

❑ A global transition to a cleaner and greener maritime sector is underway

❑ IMO quires the reduction of c02 emissions

Smart Ports

Energy Transition

Open Innovation
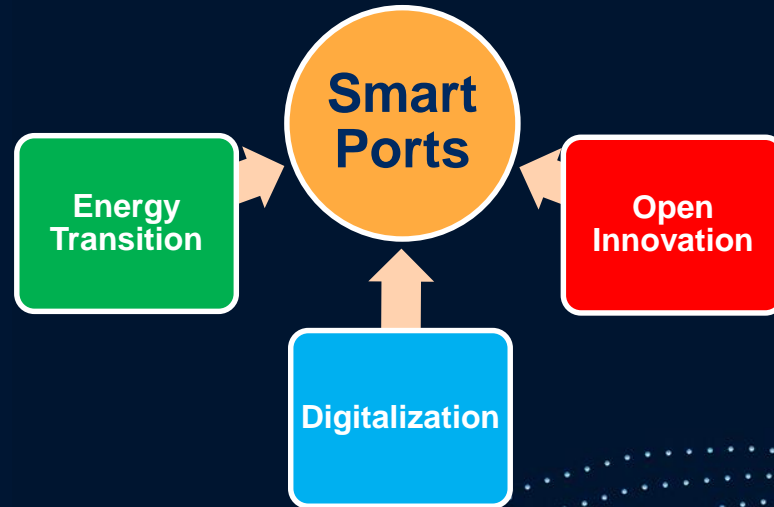
Digitalization

Innovation & Leadership

A Jamaican Electronic Single Window System

Recipient of the 2021 Maritime Award of the Americas for Digitalisation, Automation and Technological Transformation

Digital & Automated Solutions Used at the Ports in Jamaica

JamaicaPCS

The Port Authority of Jamaica

SAVE TIME! DO BUSINESS ONLINE

The Port Community System (PCS) Integrates with:
- The Jamaica Single Window for Trade (**JSWIFT**)
- Jamaica Trade Information Portal (**JTIP**))
- Automated System for Customs Data (**ASYCUDA**)

GATES

Manned (semiautomatic) gates serve as a key checkpoint for identifying and recording every entity entering or leaving the port.
- ✓ Fully Integrated ICT Infrastructure
- ✓ Technologies 4.0
- ✓ OCR/LPR Technologies
- ✓ RFID Scanners

CRANES

Ship-to-Shore Cranes are used to deliver the containers from the ships to the port.
- ✓ Gantry Cranes

STACKS

Cargo handlers and stacking cranes are used to stack the containers as per the category specified. The inventory is often managed by the date of departure inland.
- ✓ Straddle Carriers
- ✓ NAVIS / N4 Expert Decking

ICT

Port Community System (PCS) is a neutral and open electronic collaborative platform enabling the intelligent and secure exchange of information between public and private stakeholders
- ✓ ASYCUDA World
- ✓ JamaicaPCS
- ✓ Jamaica Single Window for Trade (JSWIFT)

Jamaica PCS - Benefits

Paperless

Streamlined procedure

Track and Trace

Interoperability

Jamaica PCS- Steering Committee

JAMAICAP⚙S

- Gives direct oversight of the PCS Project

- Committee is chaired by the Port Authority of Jamaica with Jamaica Customs Agency as a partner and the Shipping Association of Jamaica as a key stakeholder as well as representatives from stakeholders along the supply chain

- Comprised of both public and private entities

- This committee guides the implementation activities of the project
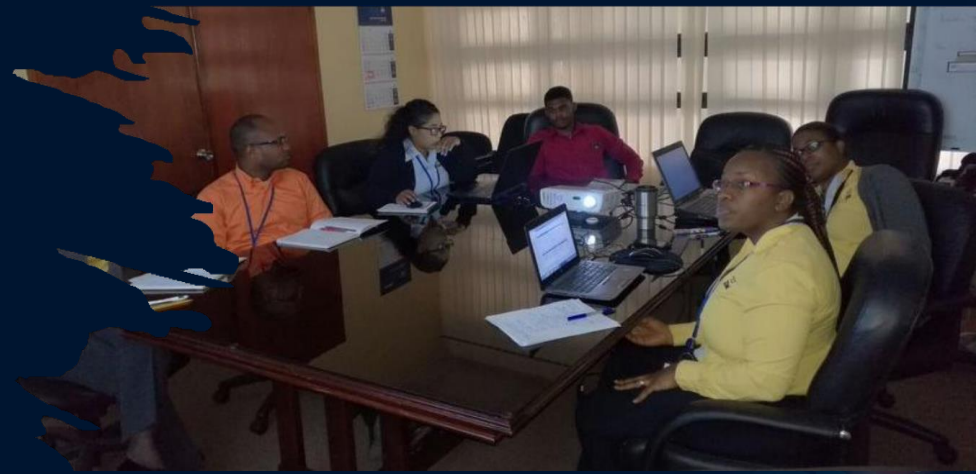
Leading a Community

- Jamaica is a first mover within the region to implement a PCS

- Jamaica is one of the first in the region to implement a PCS in the Cloud. This provides greater levels of availability and efficiency

- The Pandemic caused a need for reduction in physical contact and the PCS facilitated some paper based authorizations, eliminating the need for physical contact for approval

Knowledge Exchange

- **Many engagement sessions were convened**

- Breakfast meetings and consultations with all stakeholders

- Business Review sessions

- Training & Capacity building sessions

- Constant engagement and feedback from the Port Community
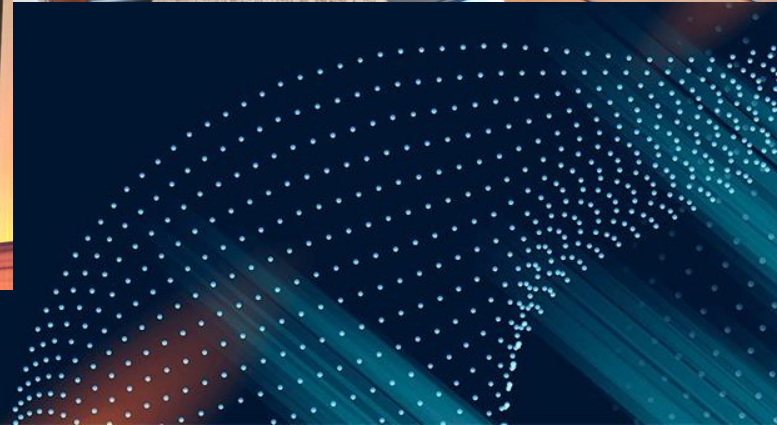
Enhancing the Port Ecosystem

Jamaica's PCS is integrated with Jamaica Customs Agency, the Terminal and Warehouse Operators

Has details on manifest and cargo movement activities

The PCS supports business decisions, using data by tracking certain metrics and KPIs such as:

➢ Cargo Release times

➢ Processing times

➢ Cargo movements

➢ Entity data/process accuracy

The Transportation Module

Digitization of Transshipment Bills (TSBs)

    Ease of creating electronic TSBs

    Online Payment of TSBs

Reduce the need for printing TSBs

Online Approvals available to relevant parties

Reduction in the processing time for TSBs

The Import JAMAICAP⚛S Export Module

- Reduces the need for printed manifests

- Electronic sharing of manifests

- Tracking & Tracing of Containers

- Designation of authorized trucker

- Implementation of Electronic Delivery Order

- Gate-Out Authorization for all containers leaving the Ports

- Booking confirmation

- Transformation of physical Customs Approval (Dock Receipt) to electronic approval in the PCS

- Tracking & Tracing of Container

- Identification of trucker

- Gate-In Authorization containers entering the Ports

The Truck Appointment System

- Allows the terminal operators to manage the appointments requested by stakeholders

- Reduces truck turnaround times

- Improves cargo transport planning logistics

- Matches capacity of the terminals to appointment schedules

- Improves transparency along the Logistics chain

Financing and Next Steps

- Project Financed wholly by the Port Authority of Jamaica

- PCS Tariff Fee Model Implemented February 2022

- Implementation and Operational investments have exceeded US $12M to date.

- Air Exports module

- FAL Forms Implementation

- Warehouse Module Implementation

- Removal of Physical Bill of Laden

- Collaboration with Customs re Contactless Clearance

Digital & Automated Solutions Used at the Kingston Freeport Terminal Ltd. (KFTL)

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LATAM Ports - Automation and Digistalisation

The Port Authority
PA
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AUTOMATION   ARTIFICIAL INTELLIGENCE   BIG DATA   BLOCKCHAIN   INTERNET OF THINGS

The Port **PA** Authority of Jamaica

Technology	Argentina		Chile		Colombia		Costa Rica		México		Peru		Panama	
	[AR1]	[AR2]	[CL1]	[CL2]	[CO1]	[CO2]	[CR1]	[CR2]	[MX1]	[MX2]	[PE1]	[PE2]	[PN1]	[PN2]
Open Platforms	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Automation & robotics	IP	X	Y	IP	IP	Y	X	X	Y	Y	Y	X	X	IP
Internet of Things	X	X	Y	X	Y	X	X	X	Y	X	Y	IP	Y	Y
Artificial Intelligence (AI)	X	X	X	X	X	X	X	X	Y	Y	IP	X	Y	Y
Virtual/Augmented/Mixed Reality	X	X	X	X	Y	X	X	X	Y	X	X	X	IP	Y
Blockchain	X	X	IP	X	IP	IP	Y	X	X	X	IP	IP	X	X
Big Data	X	X	X	X	X	X	X	X	X	X	IP	X	IP	IP
Cloud Computing	X	X	Y	Y	X	X	X	X	X	X	IP	X	IP	IP
5G	X	X	IP	IP	X	X	IP	X	X	X	X	X	X	X
Drones	X	X	X	X	X	X	X	X	IP	IP	X	X	X	X
Presence of Start-up port accelerators	X	X	X	X	Y	X	X	X	X	X	X	X	X	X

[AR1]: Port of Buenos Aires
[AR2]: Port of Rosario

[CL1]: Port of San Antonio
[CL2]: Port of Valparaiso

[CO1]: Port of Cartagena
[CO2]: Port of Buenaventura

[CR1]: Port of Limon-Moín
[CR2]: Port of Caldera

[MX1]: Port of Manzanillo
[MX2]: Port Lázaro

[PE1]: Port of Callao
[PE2]: Port of Paita

[PA]: Puerto Balboa
[PA2]: Rodman Port

Y= Found deployed solutions making use of particular technology in port sector
X= No Data found on deployed solutions making use of particular technology in port sector
IP= Found solutions currently In Progress

STC International, Nov 2022

Top 10 Smart Ports

1. Port of Shanghai; i.e., the WORLD'S BUSIEST & LARGEST CONTAINER PORT
2. Port of Singapore; i.e., BUSIEST TRANSSHIPMENT PORT IN THE WORLD
3. Port of Rotterdam; i.e., LARGEST EUROPEAN PORT
4. Port of Hamburg
5. Port of Antwerp
6. Port Le Havre Haropa
7. Port of Los Angeles; i.e., LARGEST CONTAINER PORT IN NORTH AMERICA
8. Copenhagen Malmo Port
9. Port of Valencia
10. Port of Barcelona

Smart Ports

The Port **PA** Authority
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- ❑ Leading region in automation trend - Asia Pacific

- ❑ Countries like Australia, China, Japan, and India

- ❑ Revolutionizing their port operations and transforming them into SMART PORTS.

The Port of Shanghai

Dubbed the "**SMART GIANT SEAPORT**" or **"THE MAGIC TERMINAL"**

Why?
- There are no people working in the container terminal area

- Everything is automated

- Cranes are no longer driven by operators; they are controlled remotely

- Trucks are replaced with Automated Guided Vehicles (AGVs)

Port of Rotterdam (The Netherlands) Leaders in Automation and Digitalization

- One of the safest ports in the world
- Largest port in Europe
- Monitors port activities via a Digital Twin – A totally digital version of their port
- Port fitted with sensors to ensure environmental standards are maintained
- Can receive autonomous ships like the Yara Birkeland (First Zero Emissions Container ship)

Interesting Maritime Innovation

First Zero Emission Autonomous Cargo Ship

Has AI systems on board to identify and react to obstacles

Currently operating in Norway

Fully electric

Current capacity 103 Containers

Conclusion

- ✓ Achieving Smart Port status will improve the port and the country's competitiveness

- 🐖 Investment in improving port IT infrastructure will yield returns in the long run

- ✓ Training and development in line with technological advancements are key to success

- 🗄 Ports in the region are behind in automation and digitalisation

THANKS!

Questions?

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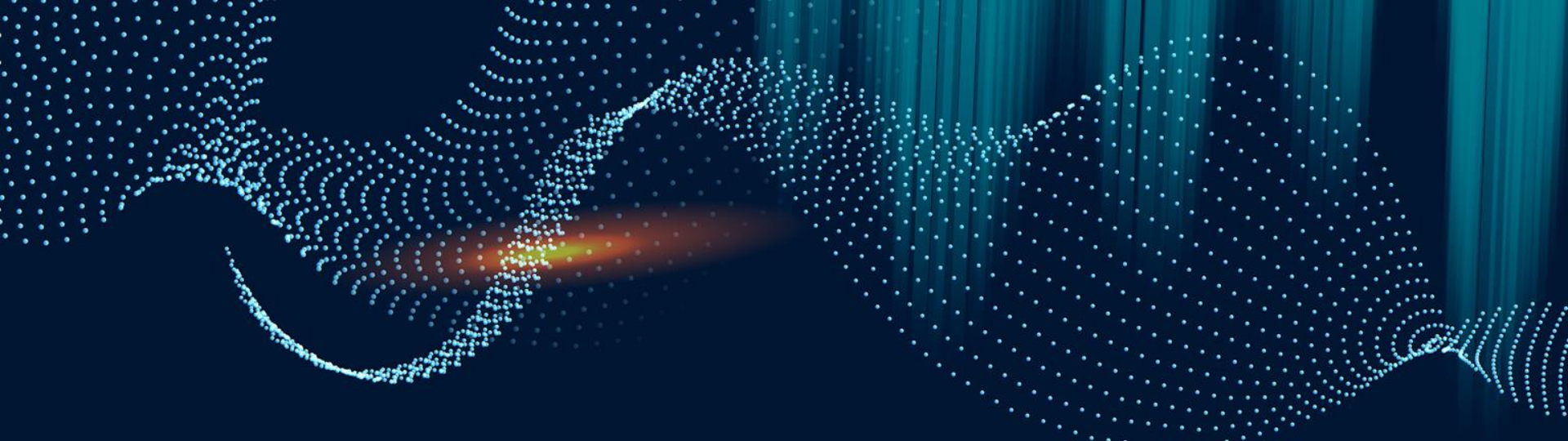
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