Ministry of Foreign Affairs

Study Supplement - Digitalization in Ports (Ecuador)

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STUDY SUPPLEMENT - DIGITALIZATION IN PORTS ECUADOR

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1. Introduction and Background

With about 80% of world trade carried by sea, ports are an integral part of the global economy. In the past decades, both intra and inter port competition, coupled with increased global container traffic, has significantly influenced the port geography in several regions across the globe. For the case of Ecuador, the ports of Guayaquil and Bolivar have shown dynamism at regional/national level.

Today's maritime supply chains have become increasingly complex, especially due to the large number of processes and stakeholders that need to interact and sometimes communicate in short time spans, for instance during a ship's arrival. Having a high level of manual administrative processing and paperwork, combined with other unpredictable factors, imply that the risk of sub-optimal processes is still substantial, not only in the Latin American (LATAM) region, but across the globe.

The recently conducted study on port digitalization in the LATAM region, commissioned by the Regional Business Development (RBD) team of the Kingdom of the Netherlands Embassies in the region, presented the panorama of developments, challenges and opportunities in 7 countries (Argentina, Chile, Colombia, Costa Rica, Panama, Peru and Mexico). This report is a complement and aims to map the current initiatives, future plans for port digitalization and automation, and consequent opportunities for Dutch companies in Ecuador. In February 2021, extensive desk research and interviews with experts (see chapter 5) in Ecuador were conducted.

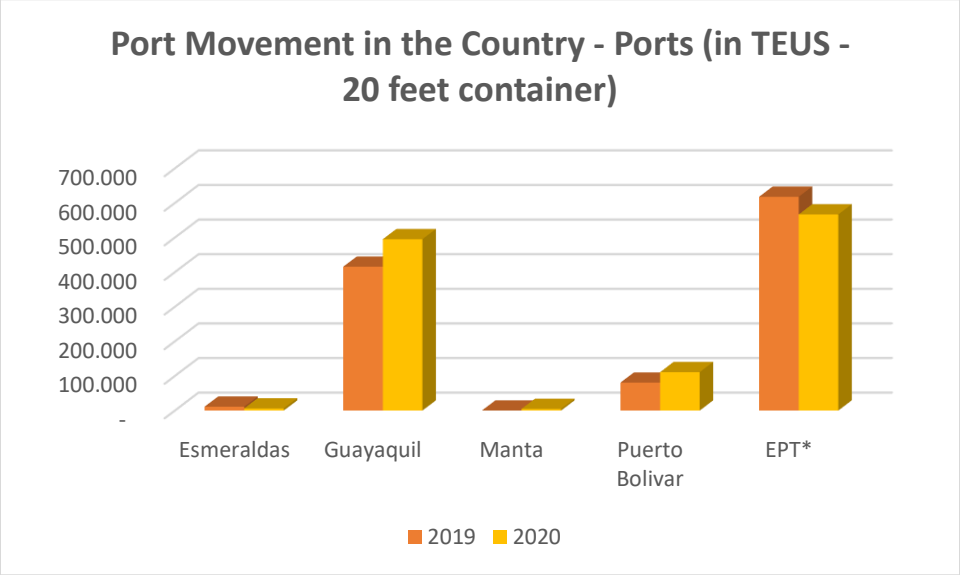
2. Port Sector in Ecuador

Ecuador is a Latin American country, located in the northwestern part of South America. The country is bordering the Pacific Ocean and the countries of Colombia and Peru. One of the predominant economic activities of Ecuador is the export of goods. Ecuador's main export commodities include petroleum, bananas, cut flowers and shrimp. For this reason, the importance of its seaports is highlighted. The ports are the gateways that allow the country to boost its commercial activities with the rest of the world. The most important ports in Ecuador are the port of Guayaquil, Bolivar and to a lesser extent Manta.

Ecuador has put forward ambitious and comprehensive plans to further boost international trade, resulting in the development of the Posorja port (inaugurated in 2019). With a

channel of 16,5 m and an annual capacity of 750,000 TEUs, this greenfield project is meant to become the largest deep-sea port in the country. DP World Posorja was awarded a 50-year public-private partnership (PPP) for the construction, operation and maintenance of the multi-purpose port terminal. According to DP, the USD 538 million initial investment (Phase 1, finished in 2019) included the purchase of land, dredging of a new access channel (awarded to Jan de Nul/Flanders Dredging Corporation), a 20-kilometer access road and a 400-meter berth equipped to handle containers and other cargo. Phase two of DP World's project will be the development of 'Posorja ZEDE'; a special economic zone (SEZ) for maritime, logistics and light industrial businesses.

Figure 1. Port Movement in the Country - Ports (in TEUS - 20 feet container) 2019-2020.



*(*Enabled Port Terminals = operational capacity, excluding expansions currently underway)*
Source: Sub Secretariat of Ports - Ecuador

Ecuador prioritizes the development and digitalization of its ports in order to streamline the paperwork and facilitate the logistics processes for the arrival and departure of goods. One of the most important advantages of this process is the systematization of information and the increase in competitiveness in terms of logistics chain towards the international market.

In addition, the government has assured through direct or through public-private partnerships an investment of USD 700 million for the goal of improving the maritime port system. "The purpose of automating ports and terminals is to introduce a new level of consistency in handling the merchandise, and to reduce labor costs and carbon emissions compared to manually operated terminals." (Maritime Chamber of Ecuador, 2018).

In this context, it is important to highlight the investment in software that has allowed the automation of processes in Ecuadorian ports. For instance, Guayaquil Port uses the Terminal Management System and Radar to carry out a detailed control of yard inventory

and planning of warehouses. The software was designed to "get to know in real time the vehicles that have entered the Terminal and automatically define the dispatch sequence in which the containers must be delivered." (Maritime Chamber of Ecuador, 2019).

Table 1. Overview of characteristics of the commercial maritime ports of Ecuador.

Characteristics of the commercial maritime ports of Ecuador				
Port	**Size**	**Entry Restrictions**	**Canal**	**Annual capacity of ships**
Port of Guayaquil	Medium	Tide and lashing	9.4 – 10 m	405,000 TEUS
Port of Manta	Small	Lashing	9.4 - 10 m	270 fishing boats, 60 cruises and 48 TEUS
Port of Esmeralda	Small	Tide and lashing	11 – 12.2 m	850 TEUS
Port of Posorja*	Large	Tide	16.5 m	750,000 TEUS

* Capacity will become 1.5 million TEUs once all works are completed in phase 2. Phase 1 was completed in August 2019. Although current capacity is equivalent to 750,000 TEUs, in 2019 78,000 TEUs were moved.

3. Port Digitalization Trends in Ecuador

The Sub Secretary of Ports of the Ministry of Public Works has indicated that the Ecuadorian Government "seeks to strengthen operations in the country's ports improving and optimizing the loading, unloading and warehousing processes to benefit all those involved in the logistic chain of foreign trade through digitalization" (El Comercio, 2020). As in the case of other Latin American countries, Ecuador's port sector has begun to adapt its processes and operations with digital solutions, but so far there are few examples of cases pointing at an advanced level of digitalization.

Since 2013, the Single Window for Foreign Trade (Ventanilla Única Ecuatoriana, VUE, https://ecuapass.aduana.gob.ec/) has been progressively implemented, which has allowed foreign trade actors to electronically deliver standardized documents and data at the local and regional level. The implementation resulted in better interoperability (e.g., communication capacity between different systems with different data in different formats) for Ecuadorian foreign trade.

Table 2. Ecuador: Technological interoperability in existing VUCE and PCS.

Country	Platform	Start year	Local / National Interoperability	Regional Interoperability
Ecuador	VUCE*	2013	Working under the name of 'Ventanilla Única Ecuatoriana (VUE)'. Its use is mandatory for the 20 public entities that compose it.	Projected interoperability with countries of the Andean Community.

**Single Window*

Source: Economic Commission for Latin America and the Caribbean (CEPAL)

Approximately 200 requests are received daily and are attended within an average of 2.13 days (Servicio Ecuatoriano de Normalización, 2018).

Some of the main entities that compose the Ecuadorian Single Window are the following:

- Ministry of Coordination of Production, Employment and Competitiveness (MCPEC)
- Ministry of Industries and Productivity (MIPRO)
- Ecuadorian Accreditation Body (OAE) and Ecuadorian Institute for Standardization (INEN)
- Central Bank of Ecuador (BCE)
- Associated entities such as the Ecuadorian Agency for Quality Assurance of the Agricultural Sector (Agrocalidad) and the National Fisheries Institute (INP)

The entity responsible for the VUE is the National Customs Service of Ecuador SENAE (Servicio Nacional de Aduana del Ecuador). One of its most relevant initiatives is the improvement of the system, which should allow Foreign Trade Operators to further facilitate operations and reduce times associated with the fulfillment of customs formalities. Particularly, SENAE aims to implement improvements in: registration forms; greater efficiency in the system´s processes; the graphic systematization of the information; and the maintenance of the traceability of product changes.

Current situation of digitalization in Ecuadorian Ports

Although no specific project or pilot is indicated, the Ecuadorian Chamber of Shipping recognizes that "the maritime and port sector in Ecuador had already systematized many processes even before the pandemic caused by Covid-19". This systematization included the automation of customer service processes (VUE), information management and documentation (Blockchain[1], IoT, among others).

Table 3. State of play of port digitalization found in selected ports of Ecuador.

Technology	Ecuador		
	Port of Bolivar	Port of Guayaquil	Port of Manta
Trade Facilitation Platforms (SW, PCS, Terminal Management Systems)	Y	Y	IP
Automation & robotics	Y	X	IP
Internet of Things	Y	Y	Y
Artificial Intelligence (AI)	Y	X	X
Virtual/Augmented/Mixed Reality	X	Y	X
Blockchain	X	Y	X
Big Data	X	X	X
Cloud Computing	Y	Y	Y

[1] The Guayaquil Port Terminal (TPG) became the first port operator to join the Maersk-IBM blockchain network TradeLens (Portal Portuario, 2020)

5G	X	X	X
Drones	X	X	X
Presence of Start-up port accelerators	X	X	X

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

From desk research and consultation with stakeholders, it could be concluded that the Ecuadorian ports with the most notable advances in digitalization and automation are:

- Bolívar port, given the plans to acquire new gantry cranes with the latest generation devices.
- Guayaquil port, which has reached technological parameters that have allowed it to position itself as one of the most competitive ports in the region. Guayaquil port has had its biggest investment in digitalization processes in the ports that have Multinational Concessions. TPG and Contecon are leading the way.
  Terminal Portuario Guayaquil (TPG), part of the SAAM Group, concluded its USD 10.75 million expansion plan in October 2020. The expansion works of its infrastructure allowed TPG to extend its dock by 180 meters to a total extension of 720 meters.
  Likewise, the Contecon Guayaquil S.A Port Terminal signed an investment contract to enhance the infrastructure of the port terminal for an amount that exceeds USD 18.3 million.
- DPworld Posorja S.A. signed a credit agreement with the Inter-American Development Bank (IDB), two investment banks from France and Germany, and the China Fund for the Co-financing of the Americas. Approximately USD 539 million were destined for the execution of the first phase of the deep-water port. (Portal Portuario, 2019)
- Modernization process of the Manta port. The port has gone from receiving only cruise ships to work with other types of vessels, such as tuna containers. For that, the local authorities have had to carry out some infrastructural development to adapt the port.

Taking into account the above, the progress that ports have been able to make depends heavily on the management model (see annex 1) they follow. If they are landlord-based (operated by private port terminals), most of these technologies will particularly be implemented at, e.g., financed by the private operators, which tend to be ahead in terms of digitalization when compared to the Port Authorities themselves.

4. Needs and Opportunities

Some opportunities, based on the identified needs, have been identified for Dutch companies, some of which are external and others are related to the unique selling points of the Dutch stakeholders. These are summarized below:

- **The momentum created by COVID-19**

Due to the global pandemic, attention for port digitalization among management bodies and governmental entities in the port sector has grown. This was confirmed in consultations with Ecuadorian stakeholders.

- **The call for sustainable ports**

As already mentioned, ports are key enablers of global trade, and therefore of economic growth. However, many of the port activities can be harmful for the environment and surrounding livable areas. Major sources can be vessel emissions, effluent discharge, excessive noise or light.

In this sense, ports have for some time been under pressure to comply with tightening regulatory and societal requirements for sustainability of port-related activities. The smarter use of the current infrastructure via digital solutions can indeed reduce impactful elements such as congestion or sub-optimal use of fuel consumption.

- **Knowledge gap**

A knowledge gap has been identified between the port sectors of Ecuador and the Netherlands.

The role of research and knowledge infrastructure can be one of the basic elements supporting innovation, and therefore digital development. This approach can be seen in clusters such as Rotterdam, which involves not only the port community, but also a larger ecosystem of companies, education centers, research institutions, start-up accelerators, and other stakeholders, which can in one way or another increase the technical capabilities of the human capital in a port as a whole. The success case of Rotterdam is a good example of how strong knowledge can yield results over time.

In this sense, Dutch businesses, mainly coming from the maritime cluster, could play a key advisory role enhancing and strengthening the capabilities of the different port communities in the field of port digitalization in Ecuador.

4.1 Potential opportunities for port sector in Ecuador

In the following Table 4, potential opportunities have been identified:

Table 4. Potential opportunities for Port Sector in Ecuador.

Possible opportunity[2]	Possible Client	Type of Dutch organizations that could benefit
Centralized platforms that integrate the services of both public and private actors, in the different logistics processes at the national level. (Single Window, Port Community System, Terminal Management System).	- SENAE -Ministry of Transport and Public Works of Ecuador -Port of Guayaquil: Port Authority of Guayaquil, Contecon, TPG -Port of Posorja	Companies that offer solutions in the development of applications related to Smart Ports.
Consulting services on technological tools that can be incorporated into logistical and operational processes, taking advantage of the existing digitalization projects in the ports of Ecuador.	-Port of Bolivar: Yilport -Port of Guayaquil: Contecon & TPG - Port of Posorja: DP World	Organizations with technical experience in digitalizing port operations.
Advisory and training services to both public and private entities, aiming to support the innovation processes that ports are implementing (communication systems for the logistic chain).	-Ministry of Transport and Public Works of Ecuador -Port of Guayaquil: Port Authority of Guayaquil, TPG -Port of Posorja	Organizations and Knowledge centers coming from the Dutch maritime-port cluster.
Technological solutions for port / terminal capacity management. New alternatives for the optimization of times and spaces at port docks.	- Port of Guayaquil: Andipuerto	Software solutions that allow optimizing dock operation planning.
Port infrastructure projects (expansion of docks,	-Port of Guayaquil: Contecon, Andipuerto	Companies structuring and developing port infrastructure

[2] Proposed opportunities are based on the desk and field research; where the interviewees presented the main needs which later were linked with the Dutch offering.

rehabilitation of terminals) and equipment for port operations (RTG and STS cranes)	- Port of Manta -Port of Bolivar - Port of Esmeraldas - Port of Posorja	projects. Port equipment suppliers.

5. Useful Steps and Contacts

Conclusion of this study, congruent with the regional study on port digitalization LATAM, is that doing business in port digitalization in Ecuador is more than a matchmaking, "plug-and-play" process between a Dutch company and the main stakeholders in Ecuador. Opening and creating business opportunities need a complex, multidisciplinary approach.

Dutch companies and knowledge institutes are advised to consider the following steps:

- Promotion of dialogues between Dutch and Ecuadorian stakeholders through initiatives such as webinars, round tables, trade missions, among others.
- Advice on the establishment of local offices or identification of local agents.
- Informal networking.
- Promote knowledge building in the country by offering services and technological solutions that generate an interest in learning more about new port development tools.
- Digital Showcase of Dutch offering.
- Taking advantage of the regional network through RBD LATAM and the Consulate.

Relevant contacts

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Andrés Padilla	MarGlobal	General Manager	apadilla@marglobal.com

6. Sources and Suggestions for further reading

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Annexes

Annex 1. Characteristics of the main port terminals in Ecuador.

Ports of Ecuador	Port terminals	Characteristics	Imports percentage	Exports percentage	Contracting Framework
Port of Bolivar	Autoridad Portuaria de Puerto Bolívar	Multipurpose terminal with access to the open sea. It has a pier with 3 berths and a depth of 10.5 m.	7%	7%	**Landlord:** Managed by Yilport with supervision of contracts by Port Authority of Puerto Bolivar.
Port of Guayaquil	Contecon Guayaquil S.A.	Multipurpose and container terminal with a natural maritime channel and depth of 9.75 m.	91.81%	91.96%	**Toolport:** The Guayaquil port authority manages, finances, develops and maintains the ownership of the infrastructure, superstructure and port equipment.
	Terminal Portuario de Guayaquil (TPG)	Cargo terminal with access to the Santa Ana channel and a depth of 9.75 m.			
	Andipuerto Guayaquil S.A.	Multipurpose terminal with a natural maritime channel and a depth of 9.75 m.			
	Fertisa	Multipurpose terminal with access to El Muerto channel with a depth of 9.75 m.			
	Bananapuerto	Multipurpose terminal with access to the Santa Ana channel and a depth of 9.75 m.			
	Puerto Trinitaria (Trinipuerto S.A.)	With access to the Santa Ana canal and a depth of 9.75 m.			
	Industrial Molinera	With access to the Guayas River and a depth of 6.5 m.			
	QC Terminales Ecuador	Chemical handling terminal with access to the Jambeli channel. Depth of 6.80 m.			
	Ecuagran S.A.	Cargo terminal with access to the Jambeli canal, with a depth of 6.8 m.			
	Ecuabulk S.A.	With access to the Santa Ana canal, and a depth of 6.8 m.			
	Terminal Portuario Internacional Puerto Hondo S.A. (TPI)	With a depth of 7.5 m.			

Port of Manta	Autoridad Portuaria de Manta	Multipurpose terminal with access to the open sea, it has a wharf with 4 berths for bulk cargo and 2 more wharfs for wagon ships. It has a depth of 12 m.	0.29%	0.27%	**Toolport:** Basic services and port concessions are managed by the port authority.
Port of Esmeraldas	Autoridad Portuaria de Esmeraldas	Multipurpose terminal with access to the open sea and a depth of 11.5 m.	0.90%	0.77%	**Toolport:** Basic services and port concessions are managed by the port authority.
Port of Posorja	DP World Posorja	First deep-water port in Ecuador, with a channel of 16.5 m in depth and 21 nautical miles in length.			**Landlord:** Managed by DP World with supervision of contracts by Port Authority of Guayaquil

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