INSTITUTO MEXICANO DEL TRANSPORTE

SCT
SECRETARÍA DE COMUNICACIONES Y TRANSPORTES

PORT INDICATORS SYSTEM: Methodology

Department of Transportation Integration
Mexican Institute of Transport
Secretariat of Communications and Transportation

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SECRETARIAT OF COMMUNICATIONS AND

TRANSPORTATION

MEXICAN INSTITUTE OF TRANSPORT

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Sanfandila, Quintana Roo, 2016

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Background

Mexico boasts a prime location, with 11,500 km of coastline and a total of 117 ports and authorized terminals. However, 67% of cargo movements are concentrated in just 16 commercial ports, the most important of which are Manzanillo, Lázaro Cárdenas, Altamira, and Veracruz, which operate 96% of containerized cargo.

Prior to the economic liberalization in 1993, Mexican ports were organizations operating under different sets of restrictions. This led to quality and productivity lagging behind international standards, in addition to insufficient public investment.

As a response to the challenges arising from opening the Mexican economy to global markets in 1993, Mexican ports have sought to boost their competitiveness, i.e. their capacity as organizations to systematically develop and maintain advantages to secure a dominant position in the markets in which they operate.

The Communications and Transportation Sector Program, in keeping with the National Development Plan, aims to enhance international competitiveness and improve port performance through various lines of action, including: improving domestic connectivity with ports; streamlining customs, tax, and port authority administration; promoting cabotage; among other activities.

The current-day efficient container operations of Mexico's ports allow them to compete with leading ports around the world. Despite the improvements made thus far to Mexican ports, they are still far from being recognized as benchmarks in terms of infrastructure for moving goods; an example of this is the Global Enabling Trade Report that ranks Mexican ports 57th out of 138 in terms of infrastructure. A series of efforts have been undertaken to improve ports and competitiveness in Mexico.

These efforts require data analysis and evaluation mechanisms to standardize information gathering in the sector, identify areas of greater opportunity, and establish factors that can be regularly measured to determine whether goals are being met.

1 Introduction

As part of developing instruments and mechanisms to reduce the lag in the port logistics sector, the Mexican Institute of Transport (IMT in Spanish) is developing a National Observatory for Transport and Logistics as a strategic tool to collect, analyze, and disseminate the country's logistical information and generate indicators and a quantitative model to facilitate efficient public policy decision-making, as well as prioritize public and private investments to improve Mexico's competitiveness.

Given the importance of the port sector and that need for specific indicators, the Observatory has created a **Port Indicators System**. The system enables identifying the areas of opportunity showing the greatest set-backs in comparison to other international benchmark ports. It will also allow for determining the impact of implemented improvements. These elements will enhance competitiveness and work to reduce the areas in which the National Port System (SPN in Spanish) is lagging.

The IMT seeks to contribute to and support authorities to improve SPN competitiveness by developing a series of methodology-based strategic performance indicators, such that the Secretariat of Communications and Transportation, the General Coordination for Ports and Merchant Shipping, and the Mexican Institute of Transport (known by its Spanish acronym SCT-CGPyMM-IMT) can identify areas of opportunity to boost SPN competitiveness. The IMT also contributes to elements necessary for:

- The evaluation of port plans and policies,
- The prioritization of actions and investments,
- A discussion with actors based on hard data,
- Trend analysis required for prospective planning,
- Valuable information for users, service providers, and investors, and
- Information quality and maintenance over time.

The Port Indicators System is organized based on an intermodal approach for the Maritime-Port Logistics Chain. The indicators are divided into three operational segments:

- Indicators for Ship-Port Interface
- Indicators for Port Operations Interface in Terminals
- Indicators for Port-Hinterland Interface

Based on these three proposed interfaces, 20 methodology-backed strategic performance indicators are proposed for the Port Indicators System, to ensure that the system functions as a strategic tool to collect, analyze, and disseminate the port-specific information impacting the country's logistics and which facilitate efficient public policy decision-making, as well as prioritize public and private investments to improve Mexico's competitiveness.

Twenty indicators were defined for the Port Indicators System; these were then divided into three interfaces throughout the maritime-port logistics chain.

Proposed Interfaces

1. Ship-Port	Identification and assessment of the use of dock infrastructure and productivity, as well as the liner shipping connectivity index, port dues, and time at berths.
2. Port Operations in Terminals	Identification and assessment of terminal efficiency, turnaround time, and inspections prior to customs, as well as the full-empty container ratio.
3. Port-Hinterland	Intensity of infrastructure use for truck and rail delivery/receipt, as well as the modal distribution of land transport systems (rail and truck) and the efficiency of port connectivity with the hinterland.

Source: Prepared by IMT

Indicators for Ship-Port Interface

The Ship-Port Interface is broken into eight indicators to identify and assess the use of dock infrastructure and productivity, as well as the liner shipping connectivity index, port dues, and berth times for container ships in the National Port System.

Proposed indicators for the Port Indicators System
Ship-Port Interface

No.	Name	Objective
1.	**Intensity of dock infrastructure use**	Determine the efficiency of cargo movements by length of docks built for specialized terminals, in order to determine the degree to which port infrastructure is leveraged.
2.	**Dock loading/unloading productivity**	Evaluate how loading/unloading performance goals are met with respect to real terminal operations.
3.	**Dock occupancy rate in terms of loading/unloading productivity**	Determine the dock occupancy and/or saturation rate in terms of loading/unloading productivity. This is useful for planning infrastructure and improving port operations.
4.	**Liner shipping connectivity index**	Determine how connected the country is to the rest of the world through maritime routes with ports of call in Mexico. Based on the UN-UNCTAD Liner Shipping Connectivity Index.
5.	**Time at berth**	Determine the time at berth for ships in terms of dock occupancy rate, by line of business. This is useful for planning infrastructure and improving port operations.
6.	**Ship operating time**	Determine the percentage of time a ship is operating while at port to order corrective actions and reduce inactive periods or delays (entrance, free practique, and exit of ships).
7.	**Port dues**	Total cost covered by the shipping company to call into port, including the rights to the use of infrastructure and port services. This is useful to update and streamline fees.
8.	**Capacity to accommodate ships, depending on their size**	Determine the maximum vessel dimensions the port can accommodate, depending on infrastructure and available services.

Source: Prepared by IMT

1. Intensity of dock infrastructure use

Indicator	1. Intensity of dock infrastructure use
Objective	Determine the efficiency of cargo movements by length of docks built for specialized terminals, in order to determine the degree to which port infrastructure is leveraged.
Description	This indicator measures cargo movements by linear meter of berth per specialized terminal. High efficiency in leveraging terminal infrastructure enables maximizing the performance of port investments and bolstering loading and unloading capacity, thus improving the competitiveness of the terminals, ports, and the country.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☑	NO ☐	PARTIAL ☐

Original source	Publishing source
API	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured by dividing the units moved (for both imports and exports) by linear meters of berth per terminal. For containerized cargo, the movements are expressed as TEUs; other types of lines of business are expressed in tons.

Containerized Cargo: $Mc_t = \frac{Uc_t}{L_t}$ $yt = 1,2,3 \dots n$

Other lines of business: $Ml_{l,t} = \frac{Ul_t}{L_t}$ $yt = 1,2,3 \dots n$

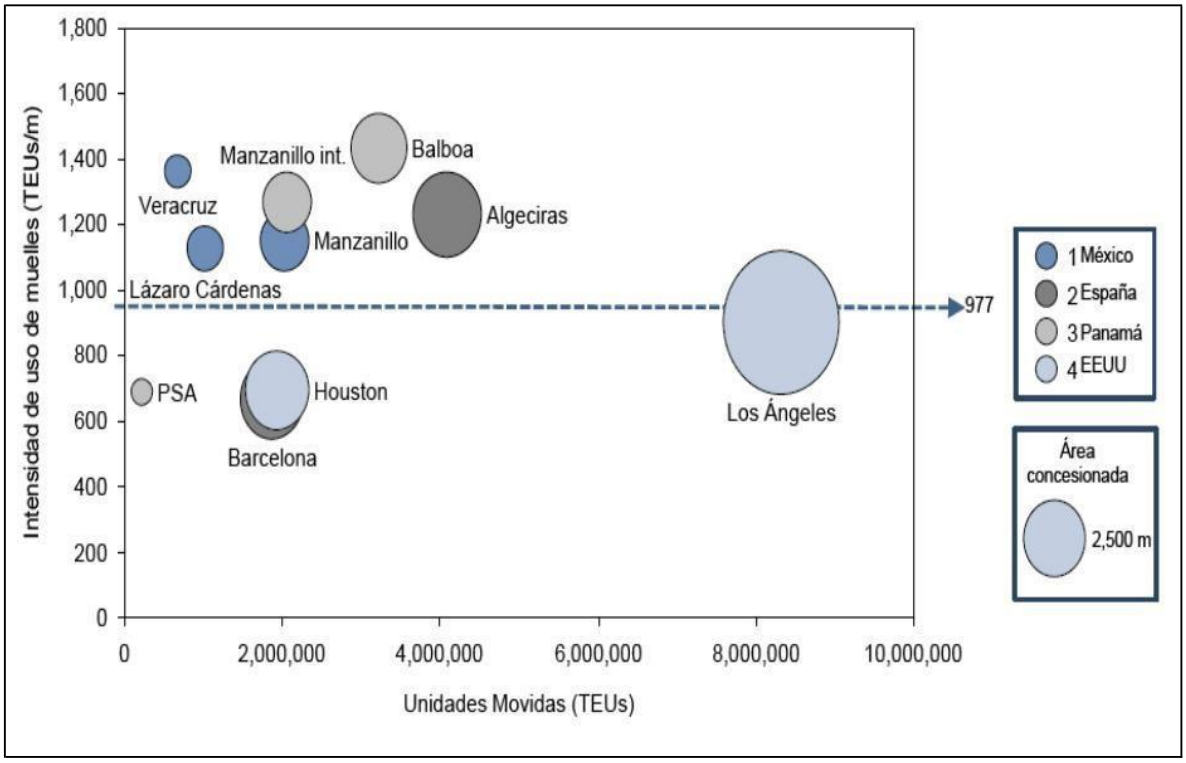
l = (vehicles, general cargo, agriculture bulk, liquids)

Data	Unit	Source
Units Moved per Terminal [Ult]	Tons	APIs
Units Moved per Terminal [Uct]	TEUs	APIs
Linear meters of berth per terminal [Lt]	Meters	APIs

Observations

Does not include petroleum or its derivative products
Data is available on a monthly basis

Example of the intensity of dock infrastructure use, 2014



Intensity of dock infrastructure use, 2014

Source: IMT-IDOM. 2016, based on Port Authority data

2. Loading/unloading dock productivity

Indicator	2. Loading/unloading dock productivity
Objective	Determine the efficiency of cargo movements in container terminals to determine the degree to which port infrastructure is leveraged.
Description	This indicator measures the loading/unloading productivity of container terminals for both Containers/Hour/Ship/Operation and Containers/Hours/Ship/Dock. High efficiency in leveraging terminal operations enables maximizing performance and measuring port efficiency as compares to other ports and to the goals proposed in the Port Operations Programs, which monitor compliance with objectives, strategies, and Port Development Goals, as well as terminal concession titles.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☑	NO ☐	PARTIAL ☐

Original source	Publishing source
Port Authorities Terminals	General Coordination for Ports and Merchant Shipping

Frequency	Quarterly	Last period	2015

Calculation methodology

These indicators represent the division of units moved in loading/unloading the ship, both in terms of time the ship is in operation (from the initiation to conclusion of ship operations (Containers/Hour/Ship/Operation, or CHBO as per the Spanish acronym)) and total time the ship is docked (from berthing to unberthing (Containers/Hour/Ship/Dock, or CHBM as per the Spanish acronym)). For containerized cargo, the movements are expressed as containers/hour; other types of lines of business are expressed in tons or units/hour.

Containerized Cargo:

$$CHBp_{o,m} = \frac{\sum_{k=1}^{t} Xi}{t}$$

Port Operational Goals Program

$$P_{tp} = \frac{Rr_t}{Rr_p} \text{ X } 100\% \quad \forall t = 1,2,3 \ldots n \quad \forall P = 1,2,3,4$$

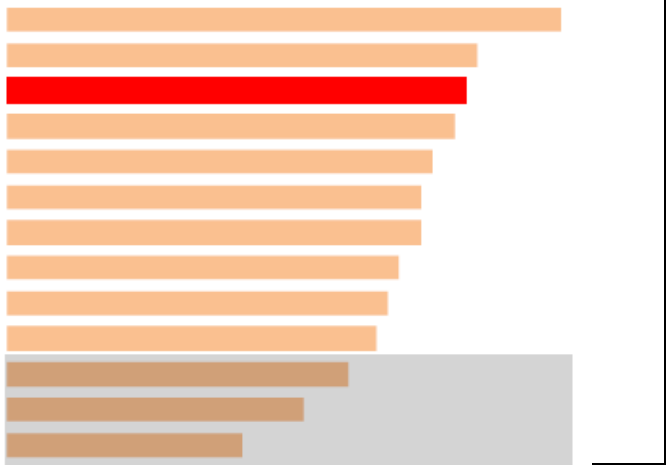
Data	Unit	Source
Units Moved per Terminal [Rr_t]	CHBO & CHBM	Terminal
Units Moved per Port [Ur_p]	CHBO & CHBM	Terminal
Port Operational Goals Program Performance [Rp_p]	CHBO & CHBM	APIs

Observations

Does not include petroleum or its derivative products
Data is available on a monthly basis

Example of loading/unloading dock productivity for the 10 major ports in the Americas, 2014 (CHSD, Containers/Hour/Ship/Dock)

Port	Country	CHSD 2014
1. Balboa	Panama	99
2.Baltimore	United States	84
3. Lázaro Cárdenas	**Mexico**	**82**
4. Pointe-à-Pitre	Guadalupe	80
5. Los Angeles	United States	76
6. Prince Rupert	Canada	74
7. Long Beach	United States	74
8. Mobile	United States	70
9. Charleston	United States	68
10. Savannah	United States	66
Veracruz	***Mexico***	***61***
Manzanillo	***Mexico***	***53***
Altamira	***Mexico***	***42***



Loading/unloading dock productivity

Source: Prepared with JOC 2015 data and Port Authority data

3. Dock occupancy rate in terms of loading/unloading productivity

Indicator	3. Dock occupancy rate in terms of loading/unloading productivity
Objective	Determine dock occupancy rate to plan infrastructure development, new concessions, and port operational improvements
Description	This indicator measures dock occupancy rates in a year, based on the potential capacity of the infrastructure, as well as a comparison to the throughput proposed in the port's Operational Goals Program and current capacity based on real throughput for each terminal. Evaluating the infrastructure and current operations allows for developing improvement strategies.

Disaggregation of data	Family
- Port - Terminal - Current/Potential	

Availability		
YES ☑	NO ☐	PARTIAL ☐

Original source	Publishing source
APIs SCT Terminal	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured by dividing the units moved per terminal per year by the product of number of berth positions per terminal, the distribution of 20" and 40" containers per port, the product of the operational hours per year and the percentage of time a ship is in operation, and throughput for each type of terminal.

For real throughput for each type of terminal:

$$Srt_t = \frac{U_t}{Rr_t * [(Ho_p - Hc_p) * P_t * A_t * [(2Cc_t) + Cv_t]} \times 100\% \quad \forall t = 1,2,3 \ldots n$$

For throughput proposed in the Goals Program:

$$Srp_t = \frac{U_t}{Rr_t * [(Ho_p - Hc_p) * P_t * A_t * [(2Cc_t) + Cv_t]} \times 100\% \quad \forall t = 1,2,3 \ldots n$$

Data	Unit	Source
Units Moved per Terminal [Ut]	TEUs	APIs
Current throughput per terminal [Rrt]	CHBO	APIs
AOP Throughput per port [RpP]	CHBO	APIs
Number of hours in operation per year [Hop]	Hours	APIs
Number of hours the port is closed [Hcp]	Hours	APIs
Ship operating time [Pt]	Percentage	APIs
Percentage of 20" containers per port [Cvt]	Percentage	APIs
Percentage of 40" containers per port [Cct]	Percentage	APIs
Number of berths per terminal [At]	Unit	APIs

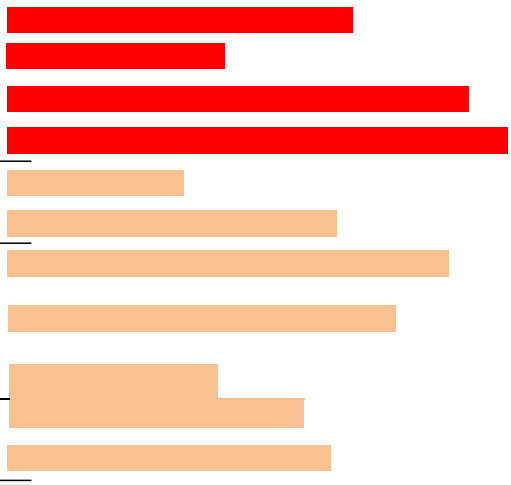
Observations

Does not include petroleum or its derivative products

Data is available on a monthly basis

Example of dock occupancy rate in terms of loading/unloading productivity, 2014

		TEUs	Berths	Real Throughput (CHSO)	Dock occupancy (%)
Mexico	Altamira	609,678	3	50	***57***
	Lázaro Cárdenas	1,044,687	3	111	***38***
	Manzanillo	2,037,279	6	62	***75***
	Veracruz	687,001	1.5	84	***81***
Spain	Barcelona	1,893,299	9	93	***32***
	Algeciras	4,556,465	11	112	***55***
Panama	Balboa	3,236,355	7	80	***72***
	Manzanillo International Terminal	2,071,342	5	90	***64***
	PSA	231,928	1	90	***37***
USA	Houston	1,951,088	7	83	***50***
	Los Angeles	8,340,065	21	96	***54***



Note: The semi-specialized ports in Manzanillo and Veracruz are not considered

CHSO: Containers/Hour/Ship/Operation

Dock occupancy rate in terms of loading/unloading productivity, 2014

Source: Prepared based on IMT-IDOM, 2016 and Port Authority data

4. Liner shipping connectivity index

Indicator	4. Liner shipping connectivity index
Objective	Determine how connected the country is to the rest of the world through maritime routes with ports of call in Mexico. Based on the UN-UNCTAD Liner Shipping Connectivity Index.
Description	This indicator is based on the UN-UNCTAD Liner Shipping Connectivity Index and captures the degree to which countries are connected to global shipping networks. High connectivity entails cost reductions, better access to shipping services, and positively impacts the competitiveness of the ports and the country.

Disaggregation of data	Family
Port	

Availability

YES ☑ NO ☐ PARTIAL ☐

Original source	Publishing source
UNCTAD	UNCTAD

Frequency	Yearly	Last period	2015

Calculation methodology

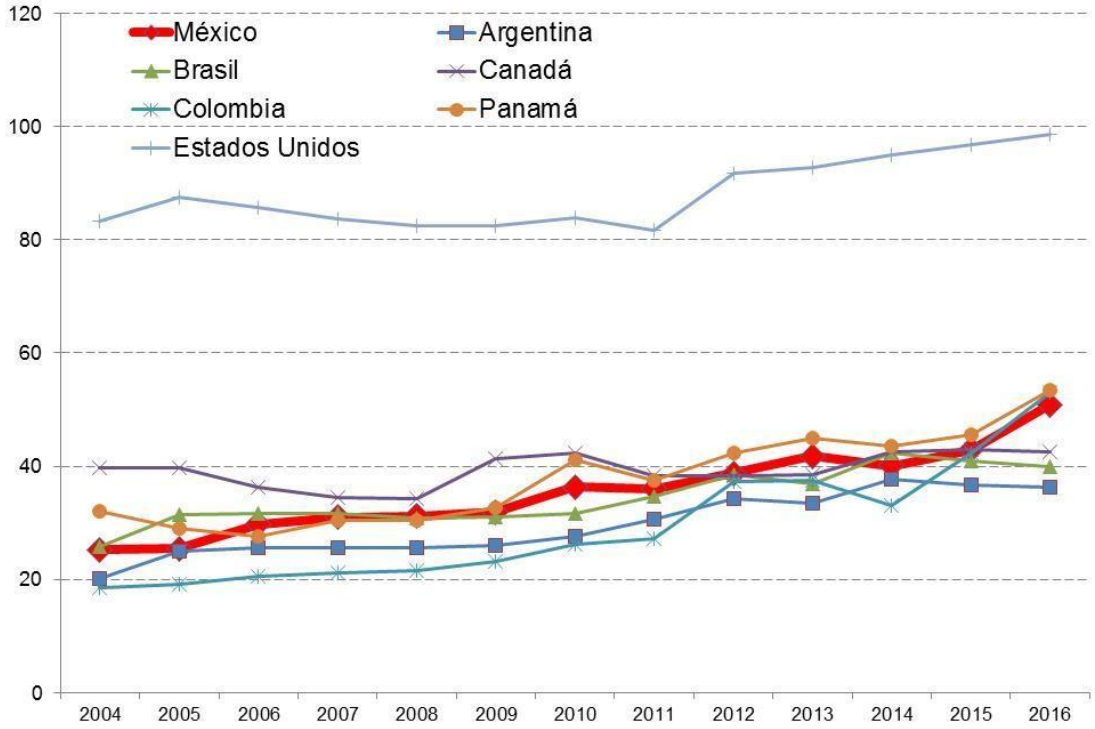
This indicator is calculated by the UNCTAD Conference based on five components of the maritime transport sector: number of ships, their container-carrying capacity, maximum vessel size, number of services, and number of companies that deploy container ships in a country's ports. For each component, a country's value is divided by the maximum value for 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.

Data	Unit	Source
Maximum container ship size	TEUs	Ports
Number of container ships	Unit	Ports
Number of companies that deploy container ships	Unit	Ports
Container-carrying capacity of container ships	TEUs	Shipping
Number of services	Unit	Shipping

Observations

Indicator based on the UN-UNCTAD Liner Shipping Connectivity Index.
The companies cannot be operated by domestic companies.

Example of Liner Shipping Connectivity Index, 2016



Liner Shipping Connectivity Index, 2016

Source: Prepared based on UNCTAD data. 2016

5. Time at berth

Indicator	5. Time at berth
Objective	Determine the time at berth based on dock occupancy rate for each line of business (type of cargo)
Description	This indicator measures the average time ships are berthed at port. Shortening time spent on activities that do not add value to the cargo reduces loss of capital and market and lowers delays in moving goods. Reducing bottlenecks drives economic growth in the port and the country.

Disaggregation of data	Family
- Port	

Availability

YES ☑ NO ☐ PARTIAL ☐

Original source	Publishing source
APIs	N/A
Frequency: Yearly	Last period: N/A

Calculation methodology

This indicator is measured by obtaining the annual average time vessels entering and exiting the port spend at berth by subtracting the time at which the ship crosses the breakwater to the time it enters the berth.

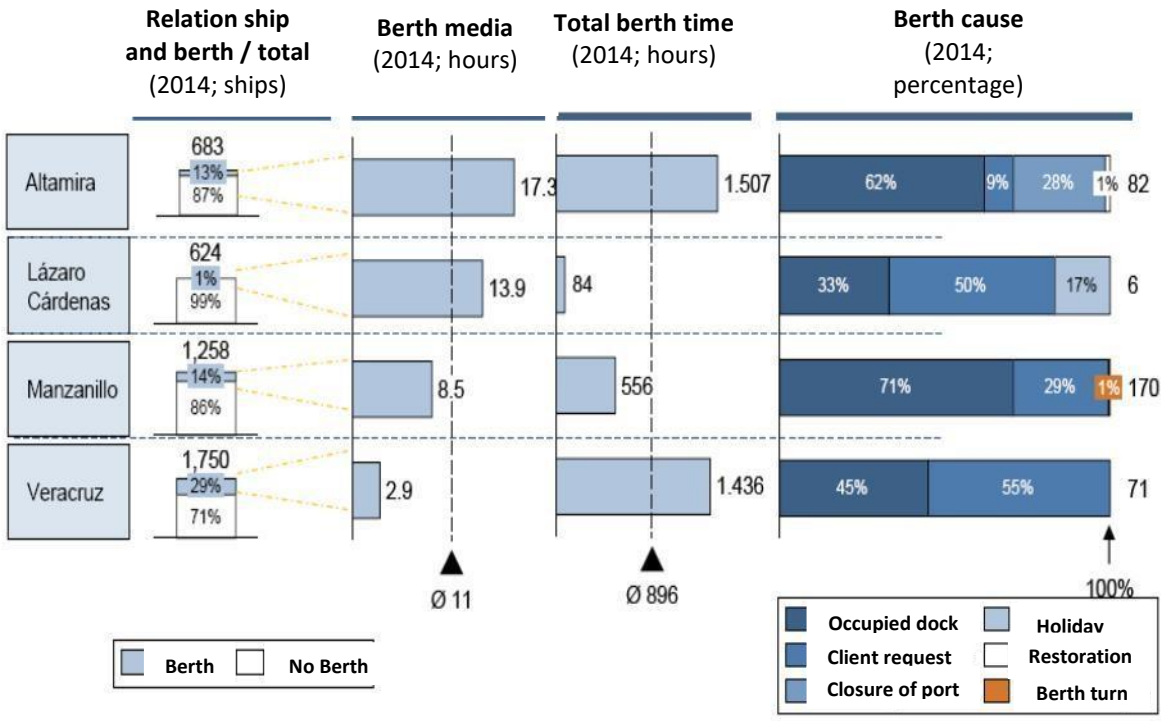
$$Tf_p = \frac{\sum_{b=1}^{b=n} (Hc_b - Hf_b)_p}{n}$$ n = buque por puerto yt = 1,2,3 ... n

Data	Unit	Source
Time the ship crosses the entrance breakwaters [Hcb]	Date and time	APIs
Time it enters the berth [Hfb]	Date and time	APIs

Observations

No comments

Example of ship time at berth, 2014



Ship time at berth–hours, 2014

Source: IMT-IDOM. 2015, based on Port Authority data.

6. Ship operational time

Indicator	6. Ship operational time
Objective	Determine the percentage of operational time per ship in port, not counting time at berth, to determine corrective actions to reduce non-productive time (entrance, free practique, and exit of ships)
Description	This indicator measures the percentage of a ship's operational time as compared to the entrance, exit, and free practique times. Shortening the time spent on activities that add no value to the cargo will prevent operational delays and reduce capital losses. Reducing bottlenecks drives economic growth in the port and the country.

Disaggregation of data	Family
Port	

Availability

YES ☑ NO ☐ PARTIAL ☐

Original source	Publishing source
APIs	SCT

Frequency	Yearly	Last period	N/A

Calculation methodology

This indicator is measured by dividing the average annual operational time by the sum of the total port stay time, not counting time at berth. This is multiplied by 100%, such that the indicator is expressed as a percentage. The total port stay time is calculated by adding the average time for ships to enter, conduct free practique and operations, and exit. Each port is scored.

$$To_p = \frac{\sum_{o=1}^{o=n} (Ha_b - Hcb)_p}{\sum_{n=1}^{n=j} [(Ha_b - Hcb) + (Hi_b - Ha_b) + (Hf_b - Hi_b) + (Hd_b - Hf_b) + (Hs_b - Hd_b)]_p}$$

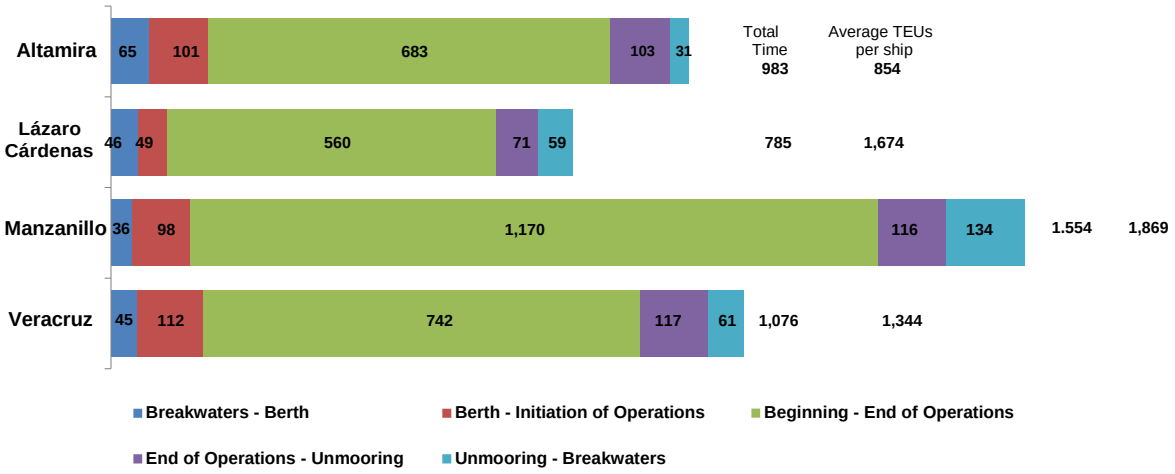
n: ships per port ~~y~~P = 1,2,3,4

Data	Unit	Source
Time ship crosses entrance breakwaters [Hcb]	Date and Time	APIs
Time first lines are moored [Hab]	Date and Time	APIs
Time operations are initiated [Hib]	Date and Time	APIs
Time operations are completed [Hfb]	Date and Time	APIs
Time last line is unmoored [Hdb]	Date and Time	APIs
Time ship crosses breakwaters upon exit [Hsb]	Date and Time	APIs

Observations

Includes times for containerized cargo movements Does not apply to other types of cargo

Example of ship operational time, 2014



Ship Operational Time, 2014 (minutes)

Source: IMT-IDOM. 2016, based on Port Authority data

Note: This does not include any rearrangement of vessels carried out by the shipping companies. No information is available.

7. Port dues

Indicator	7. Port dues
Objective	Determine the total costs incurred by the shipping company to call a port, including the costs paid to the API (Integral Port Administration) and port services to update and streamline rates
Description	This indicator is obtained by adding the infrastructure rates or dues for entering port and additional services provided to the vessel. Lowering prices could significantly increase movement volumes and cargo transport and provide incentives for shipping companies to establish hubs. Thus, growing the port and the country.

Disaggregation of data	Family
- Port	

Availability		
YES ☐	NO ☐	PARTIAL ☑

Original source	Publishing source
APIs SCT	SCT

Frequency	Yearly	Last period	Variable

Calculation methodology

This indicator is measured by dividing the average annual operational time by the sum of the total port stay time, not counting time at berth. This is multiplied by 100%, such that the indicator is expressed as a percentage. The total port stay time is calculated by adding the average time for ships to enter, conduct free practique and operations, and exit. Each port is scored.

$$To_p = \frac{\left(Tq_p * \frac{\sum_{b=1}^{b=j} Meh_b}{j}\right) + Tp_p + \left(Tv_p * \frac{\sum_{b=1}^{b=j} Trb_b}{j}\right) + \frac{\sum_{c=1}^{c=j} TL_c}{j} + Ta_p + Tr_p + \left(Tr_p * \frac{\sum_{b=1}^{b=j} Mrb_b}{j}\right)}{\frac{\sum_{b=1}^{b=j} Ub_b}{j}}$$

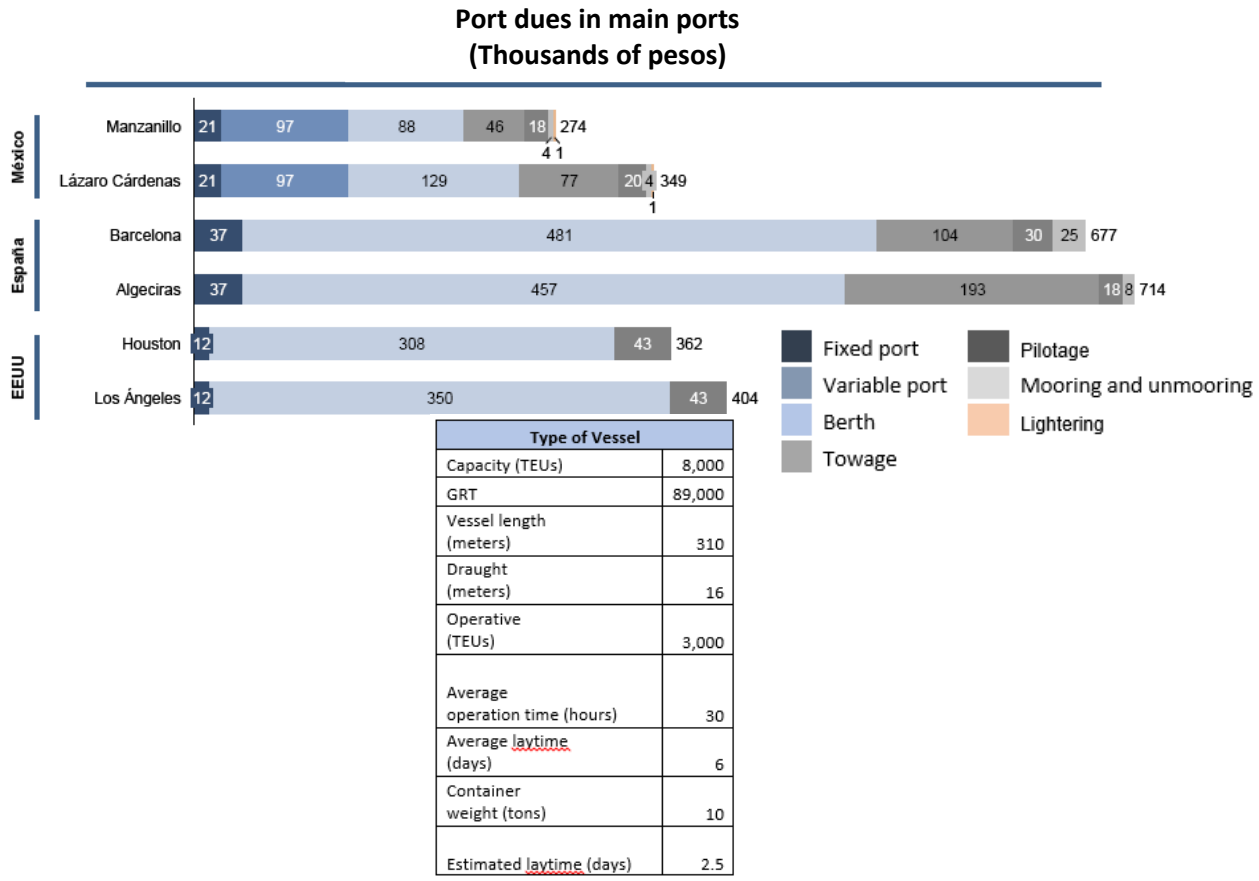
n : number of companies offering lightering services in each port
j : ships per port
ɣP = 1,2,3,4

Data	Unit	Source
Units moved per ship [Ubb]	TEUs	APIs
Lightering dues [TIC]	$/Hour	SCT
Mooring and unmooring rate [TaP]	$/Service	SCT
Pilotage dues [TIP]	$/GRT	SCT
GRT for container ships [Trbb]	GRT	APIs
Towage [TrP]	$/service-hr	SCT
Berthing dues [TqP]	$/MLT*	SCT
MLT for container ships [Mehb]	$	APIs
Variable port dues [TvP]	$/GRT	SCT
Fixed port dues [TpP]	Date & Time	SCT

Observations

Includes containerized cargo rates. Does not apply to other lines of business. *MLT = meter/length/time

Example of port dues, 2014



Type of Vessel	
Capacity (TEUs)	8,000
GRT	89,000
Vessel length (meters)	310
Draught (meters)	16
Operative (TEUs)	3,000
Average operation time (hours)	30
Average laytime (days)	6
Container weight (tons)	10
Estimated laytime (days)	2.5

Port dues, 2014 - (in thousands of MEX pesos)

Source: IMT-IDOM. 2016, based on Port Authority data

8. Capacity to accommodate ships, depending on their size

Indicator	8. Capacity to accommodate ships, depending on their size
Objective	Determine the maximum ship dimensions the port can accommodate, depending on infrastructure and available services.
Description	This indicator determines the depth and maximum length of vessels moving through each port. Companies operating at the highest capacities typically are in a position to offer cheaper services. This indicator is, thus, a measure of the maximum economies of scale that each port may attain.

Disaggregation of data	Family
- Port	

Availability

YES ☑ NO ☐ PARTIAL ☐

Original source	Publishing source
APIs SCT	SCT

Frequency	Yearly	Last period	2014

Calculation methodology

This indicator determines the depth and maximum length of vessels able to berth for each line of business at the port.

Containerized Cargo:

$Emax_p = max(Es_t)_p$ $\quad Cmax_p = max(ca_t)_p$

e: number of container terminals $\quad$ ~~y~~t = 1,2,3 ... n $\quad$ ~~y~~p = 1,2,3,4

Vehicles:

$Emax_p = max(Es_t)_p$ $\quad Cmax_p = max(ca_t)_p$

e: number of vehicle terminals $\quad$ ~~y~~t = 1,2,3 ... n $\quad$ ~~y~~p = 1,2,3,4

Other types of cargo:

$Emax_p = max(Es_t)_p$ $\quad Cmax_p = max(ca_t)_p$

e: number of other types of cargo terminals $\quad$ ~~y~~t = 1,2,3 ... n $\quad$ ~~y~~p = 1,2,3,4

Data	Unit	Source
Depth of berth per terminal [Cat]	Meters	APIs
Vessel length per berth per terminal [Est]	Meters	APIs

Observations

Does not include ships moving petroleum or its derivative products

3 Indicators for Port Operations Interface in Terminals

The Indicators for the Port Operations Interface in Terminals is broken down into seven indicators to identify and assess the use of terminal infrastructure, productivity, and efficiency, as well as turnaround time, and inspections prior to customs, and the full/empty container ratio in the National Port System.

Proposed indicators for the Port Indicators System
Port Operations Interface in Terminals

No.	Name	Objective
9.	**Intensity of port concessions use**	Determine the efficiency of the volume moved, based on the concession area licensed to each terminal, in order to evaluate the degree to which infrastructure is leveraged.
10.	**Availability of specialized terminals**	Measure the supply of specialized terminals for the various lines of business, in order to evaluate the number of competitors and the need for building new terminals.
11.	**Intensity of terminal and port occupancy**	Determine the occupancy rate of terminals and ports to plan and develop infrastructure and port operational improvements.
12.	**Stay time of goods at port**	Measure the time the goods are at port, identifying possible delays so as to increase the dynamic warehousing capacity and reduce saturation.
13.	**Inspections prior to customs**	Measure the percentage of goods inspected before reaching customs, thus incurring additional cargo inspection costs.
14.	**Distribution of refrigerated cargo**	Determine the amount of refrigerated cargo in each port in order to provide infrastructure and equipment necessary for this type of cargo.
15.	**Empty container movements and the full/empty ratio**	Determine the percentage of empty container movements, which result in increased shipping costs.

Source: Prepared by IMT

9. Intensity of port concessions use

Indicator	9. Intensity of port concessions use
Objective	Determine the efficiency of the volume moved, based on the concession area licensed to each terminal, in order to evaluate the degree to which infrastructure is leveraged.
Description	This indicator measures the cargo movements per hectare subject to concessions in each terminal. High efficiency in leveraging terminal infrastructure enables maximizing the performance of port investments and bolstering their dynamic capacity, thus improving the competitiveness of the terminals, ports, and the country.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☑	NO ☐	PARTIAL ☐

Original source	Publishing source
APIs	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured by dividing the units moved (for both import and export) by the concession area licensed to each terminal in a given year. For containerized cargo, the movements are expressed as TEUs; other types of lines of business are expressed in tons.

Containerized Cargo:

$$Sc_t = \frac{Uc_t}{A_t} \qquad yt = 1,2,3 \ldots n$$

Other lines of business:

$$Sl_{l,t} = \frac{Ul_t}{A_t} \qquad yt = 1,2,3 \ldots n$$

l = (vehicles, general cargo, agriculture bulk, liquids)

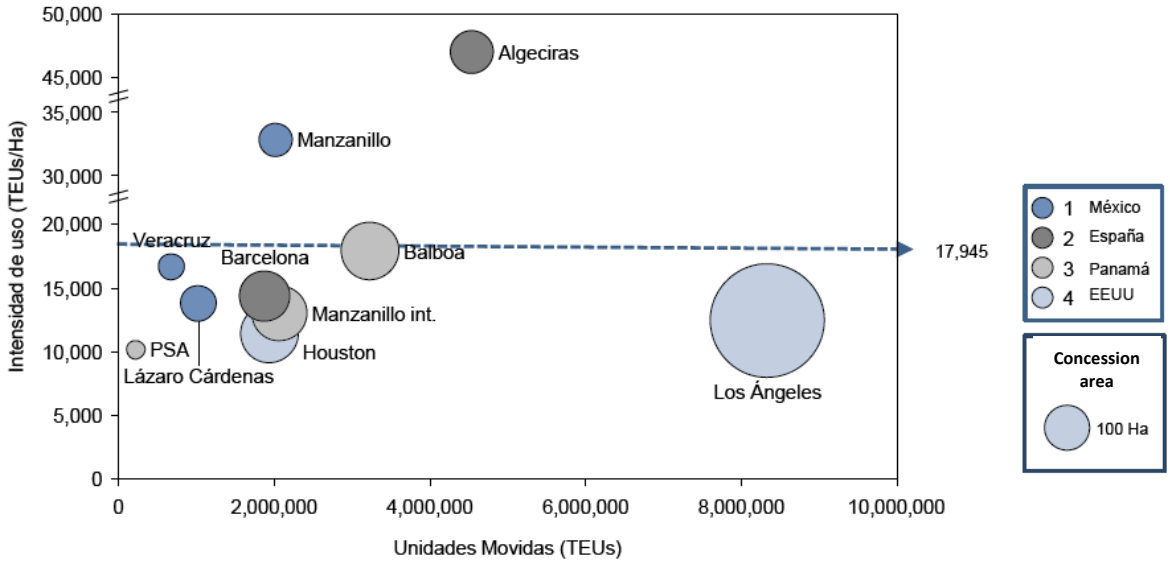
Data	Unit	Source
Units Moved per Terminal [Ult]	Tons	APIs
Units Moved per Terminal [Uct]	TEUs	APIs
Area subject to concessions per terminal [At]	Hectares	APIs

Observations

Does not include petroleum or its derivative products

Data is available on a monthly basis

Intensity of port concessions use, 2014



Intensity of port concessions use

Source: IMT-IDOM. 2016, based on Port Authority data

10. Availability of specialized terminals.

Indicator	10. Availability of specialized terminals.
Objective	Measure the supply of specialized terminals for the different lines of business to assess the number of competitors and the need for developing new terminals.
Description	This indicator is measured by identifying the number of specialized terminals and non-specialized terminals at each port. A broad offering of specialized terminals enables improving service quality and lowering rates for freight movements. It also allows for identifying the need for developing markets for specific goods and freight.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☑	NO ☐	PARTIAL ☐

Original source	Publishing source
APIs	SCT / API (Master Programs for Port Development)

Frequency	Every 5 yrs	Last period	Variable

Calculation methodology

This indicator is measured by identifying the number of specialized terminals and non-specialized terminals at each port. Such that:

$Te_{l,p}$ = "Specialized Terminals" in P_n ~~y~~P = 1,2,3,4

$Tm_{l,p}$ = "Non-specialized Terminals" in P_n ~~y~~P = 1,2,3,4

l = (containers, vehicles, general cargo, agriculture bulk, liquids)

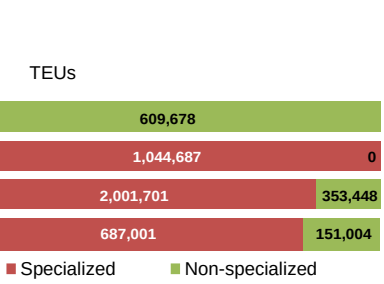
Data	Unit	Source
Number of specialized terminals, by type of cargo [TeP]	Unit	APIs
Number of non-specialized terminals, by type of cargo [TnP]	Unit	APIs

Observations

Does not include petroleum or its derivative products
Data is available on a monthly basis

Example of the availability of specialized terminals, 2014

Port	Specialized		Non-specialized		TEUs	Total
	Ports	Berths	Ports	Berths		
Altamira	0	0	2	3	0 / 609,678	**609,678**
Lázaro Cárdenas	1	3	0	0	1,044,687 / 0	**1,044,687**
Manzanillo	2	6	2	2 - 4	2,001,701 / 353,448	**2,355,149**
Veracruz	1	1.5	1	2	687,001 / 151,004	**838,005**



Availability of specialized terminals, 2014

Source: Prepared based on Port Authority data. 2015

Note: Up to 4 berths can be used at the non-specialized terminals at the Manzanillo port, depending on the freight movements and vessel size.

11. Intensity of terminal and port occupancy rate.

Indicator	11. Intensity of terminal and port occupancy rate.
Objective	Determine the intensity of terminal occupancy rate at the port to plan infrastructure development and port operations improvements.
Description	This indicator compares the units moved per terminal with the terminal's dynamic capacity. Lowering the warehouse saturation allows for occasional terminal productivity boosts, lower prices, and improved leveraging of available space. Reducing bottlenecks drives economic growth in the port and the country.

Disaggregation of data	Family
- Port - Terminal	

Availability

YES ☐ NO ☐ PARTIAL ☑

Original source	Publishing source
APIs TERMINAL	SCT
Frequency: Monthly	Last period: 2015

Calculation methodology

This indicator is measured by dividing the units moved per terminal each year by the dynamic capacity. Dynamic capacity is obtained from the product of dividing the static capacity of each terminal and the stay time of the goods by the number of days in a year (365) and multiplying this by 100%, such that the indicator is expressed as a percentage.

$$Sa_t = \frac{U_t}{\left(\left(\frac{Ce_t}{Te_p}\right) * 365\right)} \times 100\% \qquad \forall t = 1,2,3 \ldots n \qquad \forall p = 1,2,3,4$$

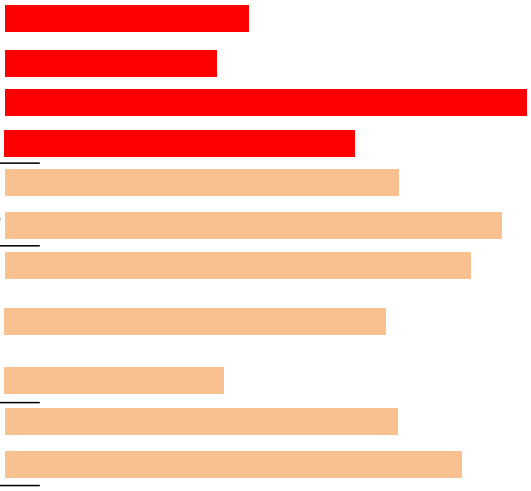
Data	Unit	Source
Static capacity per terminal [Cet]	TEUs	APIs
Stay time of goods at port. [TeP]	Days	APIs
Units moved per terminal [Ut]	TEUs	APIs

Observations

Indicator is calculated for container terminals
Stay time of goods is measured in calendar days

Example of intensity of terminal and port occupancy rate, 2014 - Comparison of Mexican ports vs. ports in the USA, Panama, and Spain

		TEUs	Static Capacity (TEUs)	Stay times (days)	Occupancy rate in the port (%)
Mexico	Altamira	609,678	37,000	8.5	***38***
	Lázaro Cárdenas	1,044,687	59,280	6.9	***33***
	Manzanillo	2,001,701	39,144	7.1	***81***
	Veracruz	687,001	20.592	6.1	***54***
Spain	Barcelona	1,893,299	42.466	5.0	***61***
	Algeciras	4,100,000	109.263	7.5	***77***
Panama	Balboa	3,236,355	78.000	7.0	***72***
	Manzanillo International Terminal	2,071,342	66.100	7.0	***59***
	PSA	231,928	6,465	3.5	***34***
USA	Houston	1,951,088	48,000	5.0	***61***
	Los Angeles	8,340,065	134,781	4.0	***71***



Source: Prepared based on IMT-IDOM data. 2015, based on Port Authority data

Note: For the ports in Manzanillo and Veracruz, semi-specialized ports are not taken into consideration.

12. Stay time of goods at port.

Indicator	12. Stay time of goods at port
Objective	Measure the time the goods are at port, identifying possible delays so as to increase the dynamic warehousing capacity and reduce saturation.
Description	This indicator measures the average stay time of goods at port. Shortening the stay time enables maximizing the use of port infrastructure, reducing saturation at ports, and preventing delayed operations. This indicator assesses the impact of port initiatives to increase the port's dynamic capacity and reduce saturation in the National Port System.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☐	NO ☑	PARTIAL ☐

Original source	Publishing source
APIs Terminal	N/A

Frequency	Yearly	Last period	N/A

Calculation methodology

This indicator is measured by adding the stay times for containers moved for each terminal. Such that:

$$Te_p = \frac{\sum_{i=0}^{i=n} \sum_{c=1}^{c=i} (Te_c)}{C_p} \qquad \forall P = 1,2,3,4$$

c: containers moved by terminals

i: port terminals

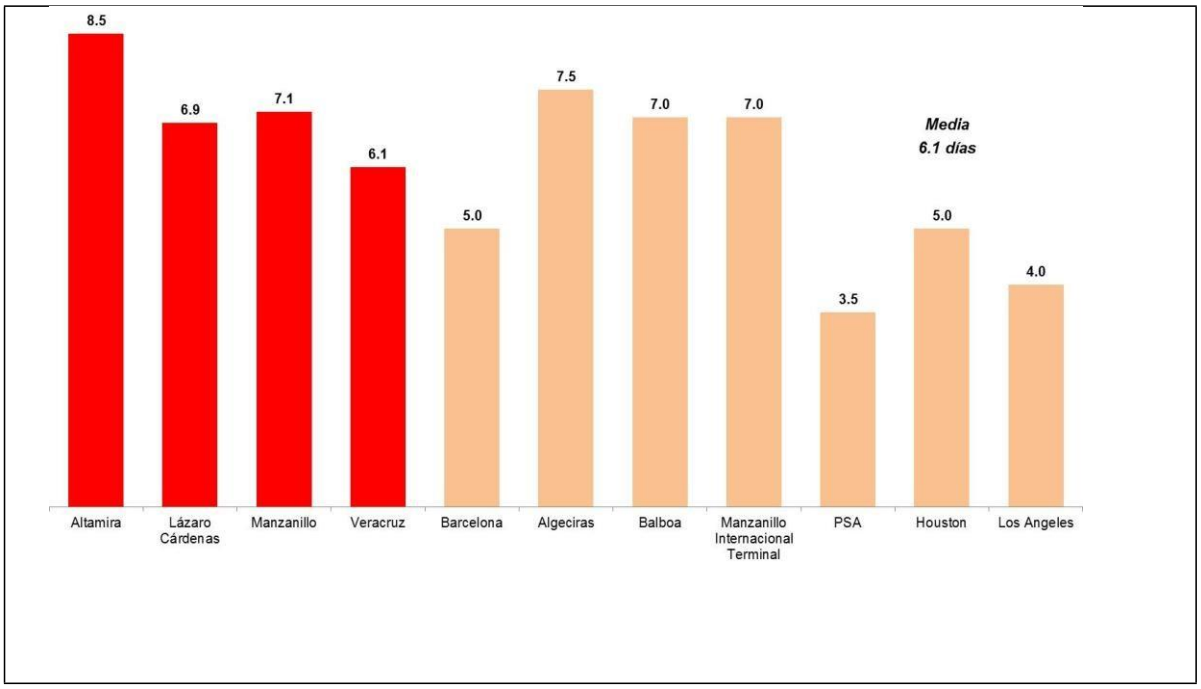
Data	Unit	Source
Stay time of containers [Tc]	Hours	APIs
Total containers moved per terminal [Ct]	Containers	APIs
Total containers moved per port [CP]	Containers	APIs

Observations

Only the stay time of containerized cargo is analyzed.

The calculation is based on containers, not TEUs.

Example of stay time of containers at port (days), 2014 - Comparison of Mexican ports vs. ports in the USA, Panama, and Spain



Source: Prepared based on IMT-IDOM data. 2016, based on Port Authority data

Note: For the ports in Manzanillo and Veracruz, semi-specialized ports are not taken into consideration.

13. Inspections prior to customs.

Indicator	13. Inspections prior to customs.
Objective	Measure the percentage of goods inspected before reaching customs, which are subject to additional cargo inspection costs.
Description	This indicator measures the percentage of (prior) inspections performed by customs agents and by customs, as compared to the total number of container movements in the port. Reducing the percentage of inspections reduces additional costs and delays in moving freight. This will, thus, improve port operations and drive port growth. It only applies to countries in which inspections are carried out prior to reaching customs.

Disaggregation of data	Family
- Port - Terminal - Type of inspection	

Availability		
YES ☐	NO ☐	PARTIAL ☑

Original source	Publishing source
APIs Terminal	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured by dividing the total number of annual containers inspected at port terminals by the number of total containers moved in port every year, then multiplying by 100%, such that the indicator is expressed as a percentage.

Inspections prior to customs.

$$Ip_p = \frac{\sum_{t=1}^{t=n} Npt}{C_p} \qquad \forall P = 1,2,3,4$$

n: number of container terminals per port

Customs inspections:

$$Ia_p = \frac{\sum_{t=1}^{t=n} Nat}{C_p} \qquad \forall P = 1,2,3,4$$

n: number of container terminals per port

Data	Unit	Source
Number of containers inspected (prior) [Npt]	TEUs	Terminal
Number of containers inspected by customs [Nat]	TEUs	Terminal
Containers moved per port [CP]	TEUs	APIs

Observations

Due to the lack of information on container inspections performed by customs, the first phase will only consider prior inspections performed by customs agents.

Example of inspections prior to customs, 2014

Port	Import	Inspection (prior)	% of prior
	Containers		
Altamira	99,895	31,669	32%
Lázaro Cárdenas	226,959	59,223	26%
Manzanillo *	75,221	29,072	39%
Veracruz	N/A	N/A	N/A

Inspections prior to customs, 2014

Source: Prepared based on IMT-IDOM, 2015 and Port Operator data. Note: *The information corresponds exclusively to a Port Operator

It bears noting that many of the region's countries do not perform inspections prior to reaching customs; this indicator will not apply to them.

14. Distribution of refrigerated cargo

Indicator	14. Distribution of refrigerated cargo
Objective	Determine the amount of refrigerated cargo in each port in order to provide the infrastructure and equipment necessary for this type of cargo.
Description	This indicator measures the percentage of refrigerated cargo passing through a port, as compared to the total number of containers moved. Identifying an increase in the transport of perishable products allows for providing services, technology, and facilities to effectively accommodate refrigerated cargo. This will enhance the port's, and in turn, the country's competitiveness.

Disaggregation of data	Family
- Port - Terminal	

Availability

YES ☐ NO ☐ PARTIAL ☑

Original source	Publishing source
APIs	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured for each port by dividing the annual number or refrigerated containers by the total number of containers moved in a year, multiplied by 100%, excluding petroleum and its derivative products. Units moved are expressed in TEUs, such that the share is expressed as a percentage for each type of product.

$$Rr_p = \frac{R_p}{C_p} \times 100\% \qquad \forall P = 1,2,3,4$$

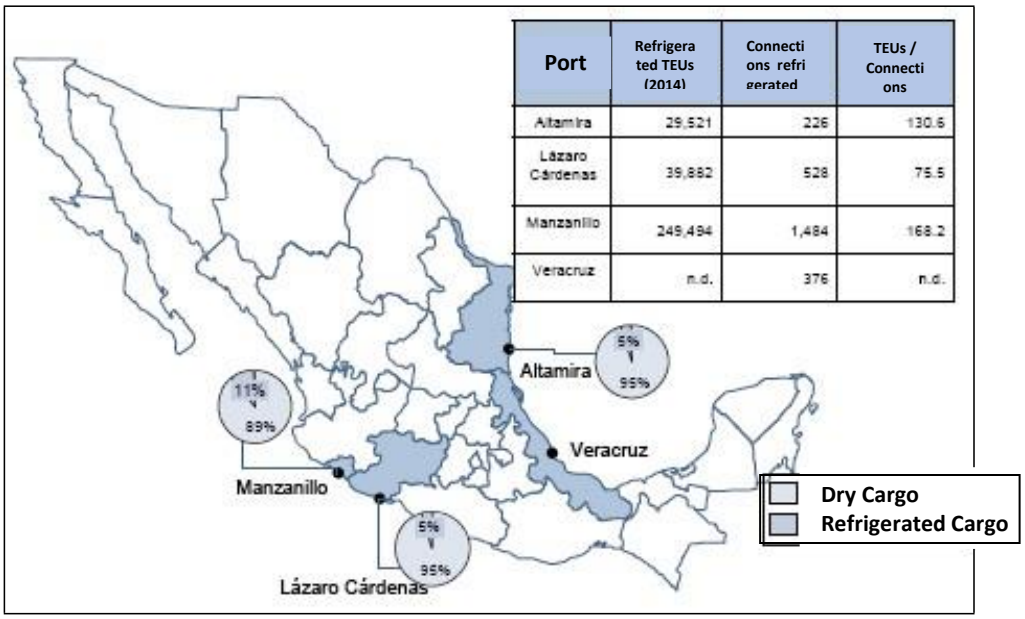
Data	Unit	Source
Refrigerated containers moved per port [RP]	TEUs	APIs
Total containers moved per terminal [CP]	TEUs	APIs

Observations

Does not include petroleum or its derivative products. Only includes containerized cargo.

Data is available on a monthly basis

Example of distribution of refrigerated container cargo, 2014



Distribution of refrigerated container cargo, 2014

Source: IMT-IDOM. 2015, based on Port Authority data

15. Empty container movements and the full/empty ratio.

Indicator	15. Empty container movements and the full/empty ratio
Objective	Determine the percentage of empty container movements, which result in increased shipping costs.
Description	This indicator measures the movement of empty containers in relation to the total yearly movements of containers in a port. A high percentage of empty containers involves repositioning costs, increases warehousing costs, and, in general, increases freight costs. The percentage of empty containers is a measure of a port's imbalance between imports and exports.

Disaggregation of data	Family
- Port - Terminal	

Availability

YES ☑ NO ☐ PARTIAL ☐

Original source	Publishing source
APIs	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured by dividing the total number of empty containers moved per year by the total number of containers moved per year, excluding petroleum and its derivative products. Units moved are expressed in tons, such that movements are expressed as a percentage. For each port:

$$Rv_p = \frac{V_p}{C_p} \times 100\% \qquad yP = 1,2,3,4$$

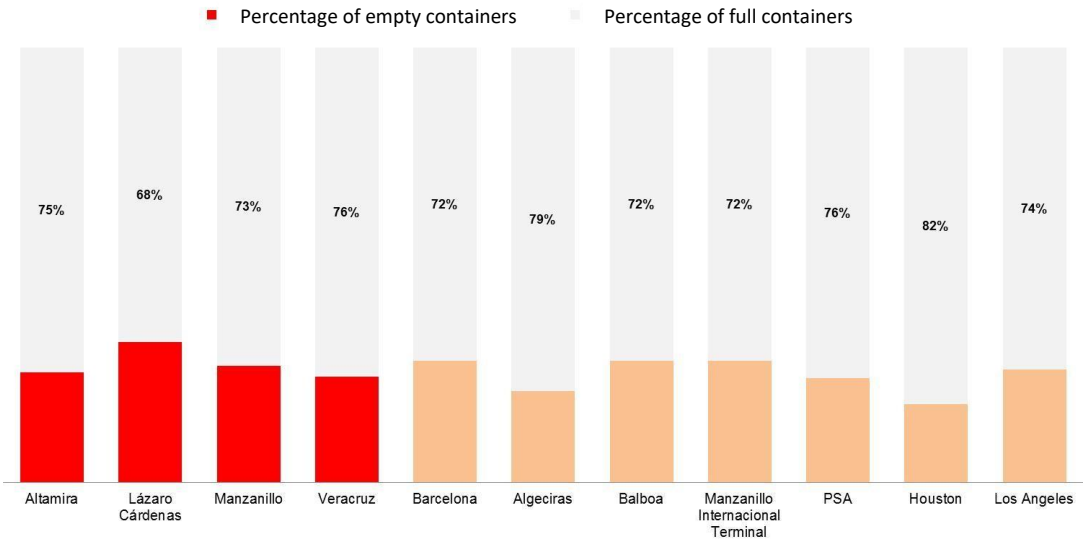
Data	Unit	Source
Empty containers moved per port [VP]	TEUs	APIs
Total containers moved per port [CP]	TEUs	APIs

Observations

Does not include petroleum or its derivative products

Data is available on a monthly basis

Example of the full/empty container ratio, 2014 (%) - Comparison of Mexican ports vs. ports in the USA, Panama, and Spain



Source: Prepared based on IMT-IDOM data. 2015, based on Port Authority data
Note: This does not include any rearrangement of vessels carried out by the shipping companies. No information is available.

4 Indicators for Port-Hinterland Interface

The Port-Hinterland Interface defines five indicators to identify and assess the use of infrastructure, productivity, and efficiency of the port's land connectivity, based on the intensity of infrastructure use for truck and rail delivery/receipt, as well as the modal distribution of land transport systems (rail and truck) and the efficiency of the port-hinterland connectivity.

Proposed indicators for the Port Indicators System
Port-Hinterland Interface

No.	Name	Objective
16.	**Truck-Turn Time**	Determine the time from when a truck enters the port until it leaves, in order to enhance the efficiency of truck delivery/receipt in ports.
17.	**Intensity of infrastructure use for rail delivery/receipt**	Measure the supply of specialized terminals for the various lines of business, in order to evaluate the number of competitors and the need for building new terminals.
18.	**Intensity of infrastructure use for truck delivery/receipt**	Determine the occupancy rate of terminals and ports to plan and develop infrastructure and port operational improvements.
19.	**Efficiency of the port-hinterland connectivity**	Measure the time the goods are at port, identifying possible delays so as to increase the dynamic warehousing capacity and reduce saturation.
20.	**Modal distribution of land transport systems**	Measure the percentage of goods inspected before reaching customs, which are subject to additional cargo inspection costs.

Source: Prepared by IMT

16. Truck-Turn Time

Indicator	16. Truck-Turn Time
Objective	Determine the time from when a truck enters the port until it leaves, in order to enhance the efficiency of truck delivery/receipt in ports.
Description	This indicator measures the stay time of a truck at port, from the time it enters until it leaves the port. The less time a truck spends at port, the better the efficiency in leveraging infrastructure, thus allowing for increased trucking capacity; this, in turn, improves the competitiveness of the terminals, ports, and the country.

Disaggregation of data	Family
- Port - Terminal	

Availability

YES ☐ NO ☐ PARTIAL ☑

Original source	Publishing source
APIS	N/A

Frequency	Monthly	Last period	N/A

Calculation methodology

This indicator is measured by dividing the time a container truck is at port by the number of container trucks entering the port. This indicator may also be used to measure the efficiency of truck delivery/receipt for other types of freight.

Containerized Cargo:

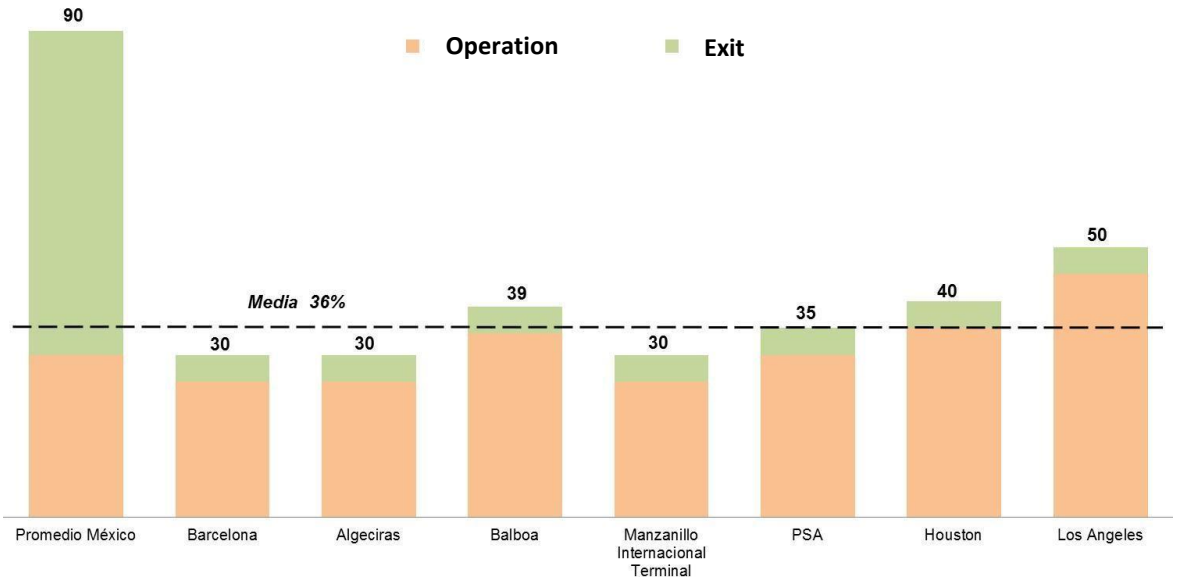
$$Pc_t = \frac{\sum_{t=0}^{t=n} Pc_t}{C_n} \qquad yP = 1,2,3,4 \qquad yt = 1,2,3 \ldots n$$

Data	Unit	Source
Container truck stay time at port [Pct]	Hours	APIs
Units entering and transporting containers [Uct]	Unit	APIs

Observations

Does not include petroleum or its derivative products
Data is available on a monthly basis

Example of stay time of trucks at port (truck-turn time), 2014 - Comparison of Mexican ports vs. ports in the USA, Panama, and Spain



Truck-Turn Time, 2014

Source: IMT-IDOM. 2016, based on Port Authority data

17. Intensity of infrastructure use for rail delivery/receipt.

Indicator	17. Intensity of infrastructure use for rail delivery/receipt
Objective	Determine the intensity of infrastructure use for offloading freight onto rail to plan infrastructure development and port operations improvements.
Description	This indicator compares current rail freight movement to rail delivery/receipt capacity. The efficient use of rail infrastructure reduces operational delays in freight shipping, lowers prices, and better leverages rail infrastructure.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☐	NO ☐	PARTIAL ☑

Original source	Publishing source
APIs Terminal Railway Companies	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured by dividing rail movement by the rail delivery/receipt capacity. Rail movements are obtained by multiplying the modal share by the number of containers moved per terminal each year. Capacity is obtained from the product of the number of tracks, number of platforms per track, number of TEUs per platform, number of positions, ratio of platform re-use, and rail operating days. Such that:

$$Sf_t = \frac{Rf_t * Uc_t}{Nv_t * Pv_t * Tp_t * Np_t * Ru_t * Df_t} \times 100\% \qquad yt = 1,2,3 \ldots n$$

Data	Unit	Source
Number of tracks [Nvt]	Tracks	APIs
Number of platforms / track [Pvt]	Platforms/track	APIs
Number of TEUs per platform [Tpt]	TEUs/Platform	Terminal
Number of positions [Npt]	Positions/day	Terminal
Platform use ratio [Rut]	% used	Rail
Rail operating days [Dft]	Days	Terminal
Rail modal share [Rft]	% per railway	APIs
Units Moved per Terminal [Uct]	TEUs	APIs

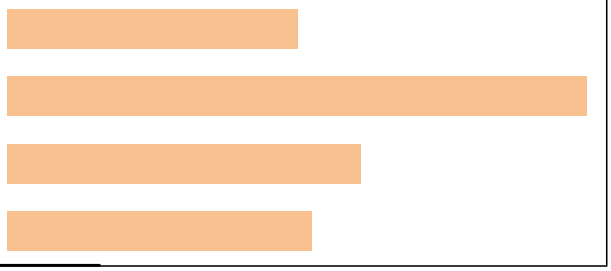
Observations

Given the lack of information on the platform use ratios (as they are not currently measured), a value of 1.5 is assigned.

Rail operations are defined as 6 days a week, as freight movements are occasionally limited due to customs scheduling

Example of the intensity of infrastructure use for rail delivery/receipt, 2014.

Port	TEUs by rail	Railway equipment on tracks	Intensity of infrastructure use (%)
Altamira	21,644	44	***41%***
Lázaro Cárdenas	352,051	120	***82%***
Manzanillo	271.078	252	***50%***
Veracruz	86,821	181	***43%***



Intensity of infrastructure use for rail delivery/receipt, 2014

Source: Prepared based on IMT-IDOM, 2015 and Port Operator data.

Note: A positioning ratio of 1.5 is assumed.

18. Intensity of infrastructure use for truck delivery/receipt.

Indicator	18. Intensity of infrastructure use for truck delivery/receipt
Objective	Determine the intensity of infrastructure use for offloading freight onto trucks to plan infrastructure development and port operations improvements.
Description	This indicator compares current freight movement by road transport to the terminal's truck delivery/receipt capacity. An efficient use of rail infrastructure would reduce congestion at the trucking exit from the port, lower wait times, and cut costs along the logistics chain, as well as reduce port-city problems.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☐	NO ☐	PARTIAL ☑

Original source	Publishing source
APIs Terminal	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is obtained by dividing truck movement by the sum of the truck delivery/receipt capacity and the entry/exit capacity of trucks. Truck movements are measured by multiplying the modal share and units moved per terminal each year. Port capacity is either the terminal's capacity to accommodate trucks or the port's restricted route, (*ruta fiscal),* whichever is lower. The annual delivery/receipt capacity for trucks in terminals is obtained from the product of the truck cargo capacity per hour, the average TEUs per truck, and the hours of operations per year. The annual entry/exit capacity for trucks in terminals is obtained from the capacity of customs to accommodate trucks, the average TEUs per truck, and the hours of operations per year.

$$St_t = \frac{Rc_t * Uc_t}{Tc_t * Ho_p * Cc_t} \times 100\% \qquad yt = 1,2,3 \ldots n$$

Data	Unit	Source
Average TEUs per truck [Tct]	Tons	APIs
Number of hours per year in operation [Hop]	Hours	Terminal
Capacity of restricted routes to accommodate trucks/hr [CrP]	TEUs/truck	Terminal
Truck modal share [Rct]	% truck	APIs
Units moved per terminal [Uct]	TEUs	APIs
Truck cargo capacity per hour [Cct]	Trucks/hour	Terminal

Observations

The capacity of restricted routes to accommodate trucks has not been established or recorded.

Example of intensity of infrastructure use for truck delivery/receipt, 2014.

Port	TEUs by truck	Port cargo/hour[2] (trucks)	Intensity of infrastructure use (%)
Altamira	588,034	120	***60%***
Lázaro Cárdenas	235,910	60	***55%***
Manzanillo	1,087,292	146	***88%***
Veracruz	760,392	110	***97%***

Intensity of infrastructure use for truck delivery/receipt, 2014.

Source: Prepared based on IMT-IDOM, 2015 and Port Operator data.

Note: 1) Based on an assumed 2.5 TEUs/truck and 285 operating days per year

2. Terminal cargo/hour estimates the optimal terminal capacity.

19. Efficiency of the port-hinterland connectivity

Indicator	19. Efficiency of the port-hinterland connectivity
Objective	Determine the port's zone of influence (hinterland)
Description	This indicator enables identifying the main points of origin for exports and destination for imports in the port. Identifying the port's hinterland enables developing markets to leverage geographic advantages, as well as meet shipping and distribution demands for the primary land markets. This will enhance the competitiveness of the port and the country.

Disaggregation of data	Family
- Port - Type of product	

Availability

YES ☐ NO ☐ PARTIAL ☑

Original source	Publishing source
APIs	SCT

Frequency	Monthly	Last period	2015

Calculation methodology

This indicator is measured by identifying the annual containerized cargo movements of the five main exporting entities in Mexico, as well as the five main importing destination entities, excluding petroleum and its derivatives. Such that, for each hinterland:

$C_{o,d}$ = *Containers moved, by main origins and destinations {Entity,* $C_{o,d}$ *}*

$\forall t = 1,2,3 \ldots n$

Data	Unit	Source
Containers moved, by origin/destination [Co,d]	TEUs	APIs

Observations

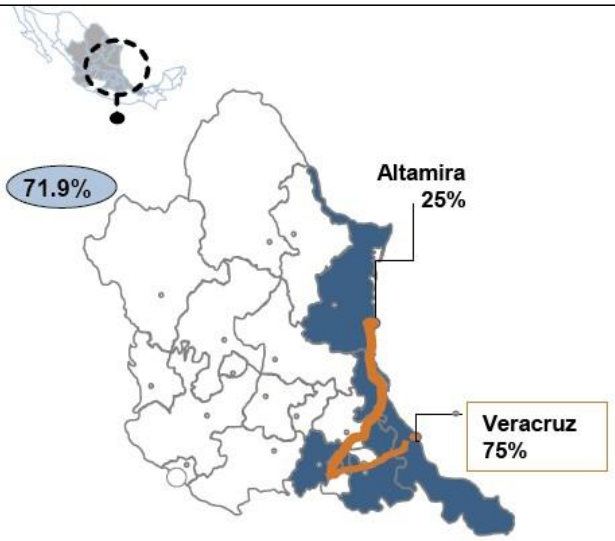
Does not include petroleum or its derivative products.

Information is available on a monthly basis.

According to available information, the origin/destination of freight is defined as the domicile of the importer/exporter, which reduces the reliability of the information currently available.

Example of efficiency of port connectivity with the hinterland, 2014

Destination	Veracruz	Altamira	Total	% Ton
Distrito Federal	2,712	66	2778	42.8
Veracruz	680	49	729	11.2
Estado de México	598	33	631	9.7
Tamaulipas	-	527	527	8.1
Puebla	336	-	336	5.2
San Luis Potosí	-	247	247	3.8
Guanajuato	127	66	193	3.0
Coahuila	-	181	181	2.8
Jalisco	97	33	130	2.0
Nuevo León	45	82	127	2.0
Querétaro	60	-	60	0.9
Michoacán	15	-	15	0.2
Resto	171	-	534	8.2
Total	4,834	1,648	6,488	100



Stay time of goods at port, 2014 (days)

Source: IMT-IDOM. 2015, based on Port Authority data

20. Modal distribution of land transport systems.

Indicator	20. Modal distribution of land transport systems.
Objective	Determine the efficiency of intermodal land transport to establish the degree to which the economies of scale and land infrastructure are leveraged.
Description	This indicator measures the modal distribution of land transport systems. High efficiency in leveraging land infrastructure enables maximizing sea-land connectivity and leveraging of economies of scale, thus improving the competitiveness of the ports and the country.

Disaggregation of data	Family
- Port - Terminal	

Availability		
YES ☐	NO ☐	PARTIAL ☑

Original source	Publishing source
APIs	SCT

Frequency	Yearly	Last period	2015

Calculation methodology

This indicator is measured by dividing the number of units moved by both rail and truck by the total number of units moved in a terminal or port.

$$Dm_p = \frac{Co_{a,f}}{Co_t} \times 100\% \qquad yt = 1,2,3 \ldots n$$

Data	Unit	Source
Units Moved by Truck [Ca]	TEUs	APIs
Units Moved by Rail [Cf]	TEUs	APIs
Total Units in the Port [Co]	TEUs	APIs

Observations

Does not include petroleum or its derivative products
Information is available on a monthly basis

Example of modal distribution of land transport systems, 2014

Port	TEUs by rail	% share of rail
Altamira	21,644	4%
Lázaro Cárdenas	352,051	60%
Manzanillo	271,078	20%
Veracruz	86,821	10%

Modal distribution of land transport systems, 2014

Source: Prepared based on operator and Port Authority data. 2015.

5 Conclusions

Defining sources of information and the availability of required data were key to the process for creating the Port Indicators System. The process also included identifying the main actors with whom agreements would be made to supply regular data to conduct the follow-up to the Port Performance Indicators in subsequent years.

The Integral Port Authorities (APIs) were among the main actors providing information to establish the Mexican Port Indicators System. The APIs oversee the management and administration of each of the nation's primary ports. They collect regular information on operations, infrastructure, and equipment for terminals under private concession for each port area.

The General Coordination for Ports and Merchant Shipping (CGPMM, in Spanish), under the Secretariat of Communications and Transportation (SCT), is the governing body responsible for the development of Mexican ports. Its primary function is to promote the modernization and consolidation of the National Port System (SPN), by designing and implementing policies, strategies, and initiatives that enhance the use of infrastructure, improve services, and bolster port competitiveness, while simultaneously overseeing the corporate rights of the Integral Port Administrators (APIs), as applied to the federal government.

As such, it is recommended that the CGPMM serve as a liaison for the entities generating seaport data and statistics, such as the APIs, port authorities, customs, maritime agencies, among others; as well as for the civil associations representing these actors. The Mexican Institute of Transport (IMT)—as a decentralized body of the SCT and the main research and development center in the Mexican transport and logistics sector—may assign scientific staff to gather, update, and analyze the yearly performance indicators for the port system. Based on this information, it will prepare reports containing key information enabling the government and private decision makers to access substantial, sufficient tools to support the implementation of policies, strategies, and initiatives that enhance the use of infrastructure, improve services, and bolster port competitiveness.

Currently, Mexican and Latin American ports are subject to global scrutiny based on analysis of a series of indexes and indicators implemented by international organizations, like the World Bank and the World Economic Forum, among others; however, all these instruments are based on qualitative analyses centered on the perception of the various actors along the logistics chain relating to the shipping and distribution of goods. This proposed methodology is substantially different from

other international indexes, given that is based on developing a corpus of inter-related quantitative indicators, which include the various links along the seaport and intermodal logistics chain; it allows for objective—not just perceptive—monitoring of how services, operations, and infrastructure change at Mexican ports, thus distinguishing the links that are making progress on compliance with international standards from those showing signs of deficiencies, stagnation, or opportunities for improvements. This enables decision makers to implement policies, plans, and/or programs to foster greater productivity, efficiency, and competitiveness in this sector.

Lastly, it bears noting that a key element required for the port indicators system to be effective is ensuring an uninterrupted flow of the necessary data and information each year to populate this tool. Therefore, an institutional mechanism should be created to collect and provide data to guarantee the long-term viability of the project, without relying on the good intentions of whoever may be in charge at the time. Indeed, continuity over time makes it possible to study progress made on meeting efficiency, productivity, and competitiveness standards throughout the seaport and intermodal logistics chain.

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