

Port Performance Scorecard (PPS) Newsletter 2020

Headlines

Major improvements on data collection and analysis from partnership with MarineTraffic and new technical features in the PPS platform;

50 participating ports from Africa, Asia, Europe, and Latin America;

Cargo Dues remain the main source of port authorities revenue;

Labour costs settled around 20-22% of gross revenue with great variations across regions;

Women's participation in the port sector remains low, with higher rates in management and administration;

On average, container ships accounted for one third of arrivals, but with great variations across regions and ports.

Strengthening knowledge
and skills through innovative approaches
for sustainable economic development

UNCTAD and the Port Management Programme (PMP)

Within the framework of the Network of ports under the UNCTAD TrainForTrade (TFT) Port Management Programme (PMP), over 3'600 port managers have been trained in the last two decades in 60 countries in Africa, Asia, Europe, Latin America and the Caribbean.

The impact of the programme is regularly measured using two specific indicators from the TFT methodology: the performance rate (75% global average) and the satisfaction rate (88% global average) collected over time and for each activity conducted in the TFT Port Network.

The long-standing success of the PMP capitalizing on training and capacity building of port managers and also strengthening port institutions through the implementation of good governance mechanisms and best practices¹ has called for a deeper analysis of the long-term impact. Based on this assumption and with the support of port entities that are members of the PMP Network, the port partners (from France, Ireland, Portugal, Spain, and the United Kingdom of Great Britain and Northern Ireland), and Irish Aid, the search for metrics at operational level was initiated in 2012.

Background of the Port Performance Scorecard (PPS)

In this Port Performance Newsletter No. 4, we are very pleased to report the latest development under the Port Performance component of the TFT/PMP. The initiative started in 2012 with a series of international conferences held in cities from the TFT Port Network (Belfast, Manila, Ciawi, Valencia, and Geneva). Thereafter, the Port Performance Scorecard (PPS) has gone through tremendous changes and upgrades to respond to four main technical requests from port members. Indeed, the new pps.unctad.org website now features (1) a more user-friendly interface, (2) incorporated data consistency checks, (3) an automated past-entry function, and (4) advanced analysis tools by regions and categories with automated graphics and filters. The process captures data through annual surveys (starting with year 2010) sent to focal points in each port entity around April to report for the previous calendar year².

Adding value to the Network and beyond

One particular aspect of the PPS relates to the very active participation of the port partners of the PMP that are providing every year the full set of data and using it for their own strategic planning as per examples in this Newsletter for the Port of Drogheda (Ireland) and the Port of Valencia (Spain).

With the newest development of the PPS platform and the digital strengthening of the backbone IT architecture, we are confident we can increase the participation of port entities beyond the scope of the Network in order to provide more and more accurate and relevant data and analysis over time. Simultaneously, we will pursue our efforts to include more port entities and countries from the PMP Network that are not yet reporting in the PPS component.

1 They are reflected through the TrainForTrade Port Managements Series (volumes 1 to 7) featuring best case studies and actionable recommendations in line with Sustainable Development Goals which are available at the following link:

https://tft.unctad.org/tft_documents/publications/port-management-series/

2 Previous PPS Newsletters are available at the following link:

https://tft.unctad.org/tft_documents/publications/port-performance-newsletter/

New technical features of the PPS platform

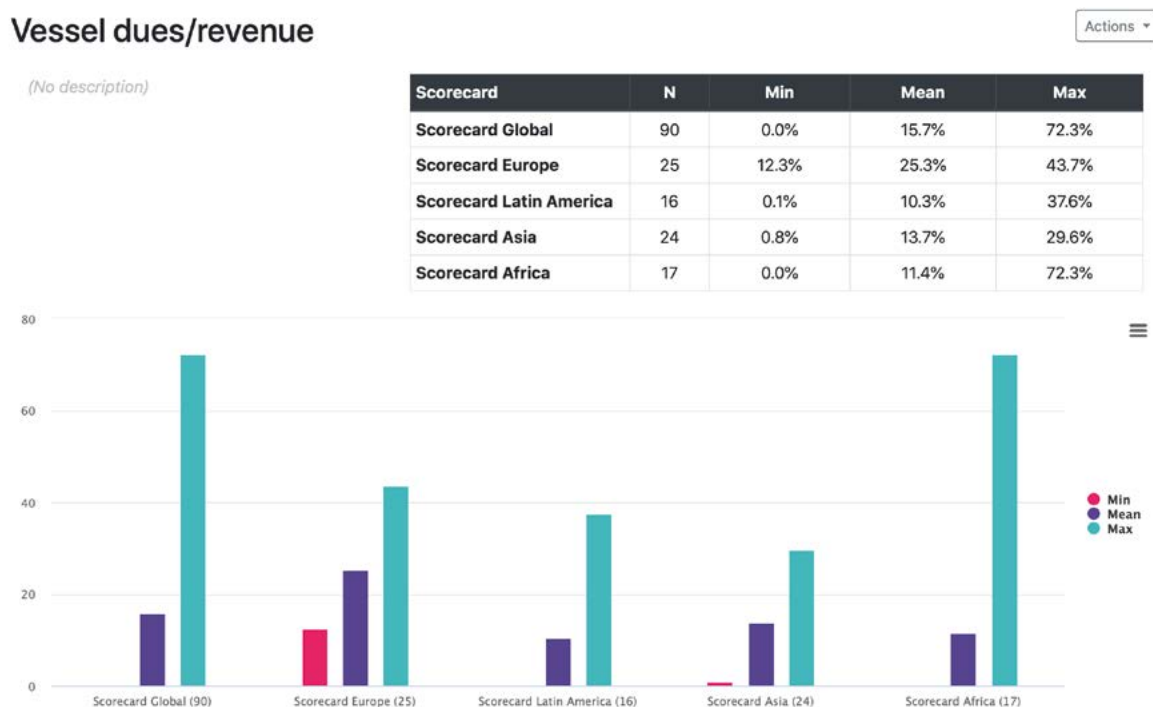
The new PPS platform is based on Symfony. This web application framework allows the needed flexibility to create surveys, to make consistency checks, and to analyse data to produce the scorecards.

The interface is user friendly with easy access to the main features: Surveys, Scorecards and Interactive Graphics.

The participating ports can easily see the status of completion of each survey. In addition, their answers from previous years are shown as a reference and can be reused by a single click if needed.

The scorecards are presented by region and globally. Interactive graphics comparing the different regions are also available for each indicator.

Table 1 - Example of an indicator compared by region with an interactive graphic as it appears in the platform



Data partnership

Major improvements have also been achieved in terms of data consistency checks performed by the TFT team with the support of data provided by MarineTraffic, an UNCTAD partner for maritime statistics. Gross tonnage and total time in port are two of the main sets of data utilised to operate checks in the PPS platform.



PPS Survey 2019 PPS Survey 2019

This year, 24 port entities members of the PMP Network (out of the 50 ports which reported data since the inception of the PPS – as shown by the green color on the horizontal line above) completed the 2019 Survey, reporting a total of 2,509 datapoints with an average of 72 datapoints for the 5-year rolling back average of the global results. The data was collected through a series of 82 questions from which the PPS derives 26 agreed indicators under the six following categories: Finance, Human Resources, Gender, Vessel Operations, Cargo Operations, and Environment (see Table 2 below). This approach has been used since the inception of the PPS to ensure consistency and comparability of measures over time.

Table 2 - Port Performance Scorecard Indicators (26), 2015 - 2019³

Region	Category				Average
	Small <5m	Medium <10m	Large <20m	Very large >20m	
Africa	4.4	8.7	14.2	22.7	11.9
Asia	3.3	7.2		61.5	11.1
Europe	1.5			47.1	41.4
Latin America	2.2	8.7	14.4	31.9	14.3
Average	3	8.5	14.3	43.4	19.2

Port data description

The number of participating ports across the regions has varied over the ten years of reporting now held in the dataset. There are a significant number of ports that report comprehensively every year (23-26). This provides a solid basis for comparative financial and operational benchmarks. These reports, on the PPS platform and in this Newsletter, can be applied by member ports in a range of planning and performance based analyses.

Table 3 below is a summary, for the 5-year period from 2015 to 2019 by region and size, of the average annual throughput volume of participating ports in each category using the traditional throughput performance measure. The categorisation by port size is based on the maximum reported throughput value for each port. The volume brackets ensure a reasonable number of values for each category of size and region.

Table 3 - Average annual throughput volume (million tonnes), 2015 - 2019

Region	Category				Average
	Small <5m	Medium <10m	Large <20m	Very large >20m	
Africa	4.4	8.7	14.2	22.7	11.9
Asia	3.3	7.2		61.5	11.1
Europe	1.5			47.7	41.1
Latin America	2.2	8.7	14.4	31.9	14.3
Average	3	8.5	14.3	43.4	19.2

³ Abbreviations: CAPEX, capital expenditure; EBITDA, earnings before interest, taxes, depreciation and amortization.

Key elements

- Ports range in size from 1.5 to 80.7 million tonnes in 2019;
- The average port handled 19.2 million tonnes per annum over the last five years;
- However, the median value for the same period is 8 million tonnes illustrating the skewed nature of the data with more than 50% of ports in the small to medium categories; and
- 25% of ports averaged less than 3.3 million tonnes over the 2015-2019 period.

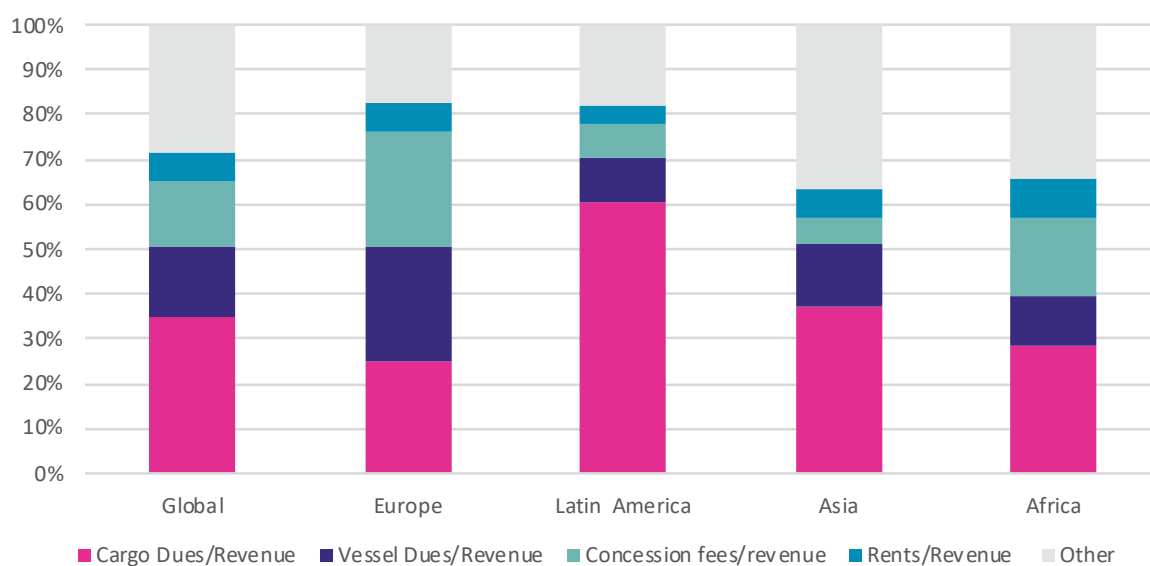
Table 4 - Port Performance Scorecard 2015-2019

Category	Indicator	Mean (2015 - 2019)	Number of values (2015 -2019)
Finance	1 EBITDA/revenue (operating margin)	38.8%	85
	2 Labour/revenue	22.3%	89
	3 Vessel dues/revenue	15.7%	90
	4 Cargo dues/revenue	34.9%	90
	5 Concession fees/revenue	14.7%	83
	6 Rents/Revenue	6.4%	84
Human resources	7 Tonnes/employee	62 649 t	94
	8 Revenue/employee	\$202 476	88
	9 EBITDA/employee	\$104 812	80
	10 Labour cost/employee	\$35 760	82
	11 Training cost/wages	1.6%	82
Gender	12 Female Participation Rate - Global	17.6%	96
	12.1 Female Participation Rate - Management	38.0%	95
	12.2 Female Participation Rate - Operations	13.2%	84
	12.3 Female Participation Rate - Cargo Handling	5.5%	60
	12.4 Female Participation Rate - Other employees	29.4%	27
Vessel operations	13 Average waiting time	13 h	83
	14 Average gross tonnage per vessel	18 185	94
	15.1 Average of Oil Tankers arrivals	10.4%	80
	15.2 Average of Bulk Carrier arrivals	10.9%	81
	15.3 Average of Container Ship arrivals	31.8%	79
	15.4 Average of Cruise Ship	1.4%	78
	15.5 Average of General Cargo Ship	23.6%	82
15.6 Average of Other Ship	24.2%	80	
Cargo operations	16 Average tonnage per arrival (all)	7 865 t	103
	17 Tonnes per working hour, dry or solid bulk	416 t	60
	18 Tonnes per hour, liquid bulk	428 t	40
	19 Box Per Ship Hour at Berth	27	44
	20 Twenty-foot equivalent unit dwell time in days	7	54
	21 Tonnes per hectare (all)	140 408 t	91
	22 Tonnes per berth meter (all)	10 091 t	102
	23 Total Passengers on Ferries	1 458 596	57
	24 Total Passengers on Cruise	126 976	61
Environment	25 Investment in Environmental Projects/Total CAPEX	7.2%	35
	26 Environmental expenditures/Revenue	2.3%	50

Financial sustainability

The financial analysis presented in the PPS platform dashboard, from which selected graphics are reproduced below, shows the range of values for the ports over the 5-year period to 2019. Over the period 2015-2019, the average of the annual total revenues of all participating ports was 1.97 billion USD on 417 million tonnes. The average revenue per tonne varies greatly depending on port financial profile, including port dues, port estate and other services/investment income. Figure 1 illustrates the range of income categories for the participating ports (indicators 3, 4, 5 and 6). The analysis of revenue for ports by region shows the expected dominance of cargo related income for port entities, especially when compared with vessel related income. Thus ports generate more return on working quays for cargo and relatively less against marine assets such as dredged berths and channels.

Figure 1 - Revenue Mix



The ports that show higher values in the Concessions category tend to be larger ports with container terminal(s). Europe is the region that has the largest proportion of revenue for this category of income.

One of the challenges identified during the PPS conferences attended by the PMP member ports was how best to collate data on financial capital inputs. In some cases the returns show large revenue transfers as subventions or as head office distributions for branch ports. This can impact the profit related ratios in particular where apparent losses are recorded in years with low transfers and exceptional profits when transfers are high. There are some differences in accounting treatment that still require Network members to agree a reporting methodology. An analysis of the data however shows that these anomalies do not materially impact the mean values for the indicators EBITDA/Revenue (indicator 1, Figure 2) or Labour/Revenue (indicator 2, Figure 3) due to low representation in the data. They do impact the range of values.

The average revenue per port is 88.9 million USD with 50% of ports below 49 million USD. The small group of ports in quartile 1 (25% of sample) averaged 13.3 million USD with the very large ports in quartile 3 (25% of sample) averaging above 80 million USD per annum. It is not possible to share the results per individual port but our analysis shows evidence of average rates being closely aligned when similar ports in the same regional group are compared. For example, publicly available data for Irish ports shows this when gross revenue per tonne is compared across the Island. However, it is a useful benchmark by region and by size when forecasting revenue for development projects.

Figure 2 - EBITDA/Revenue

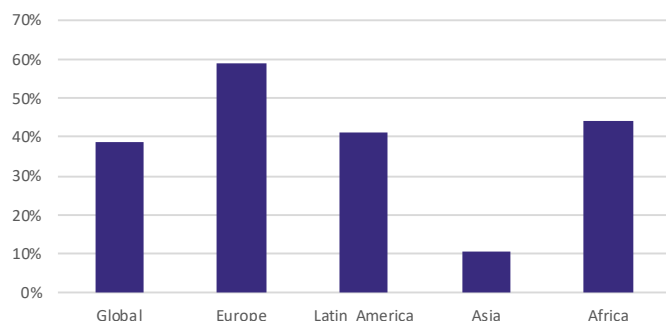
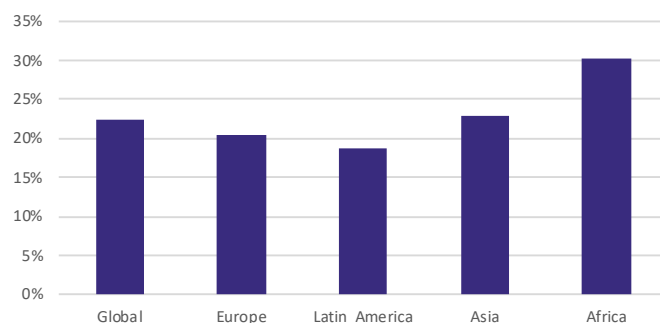


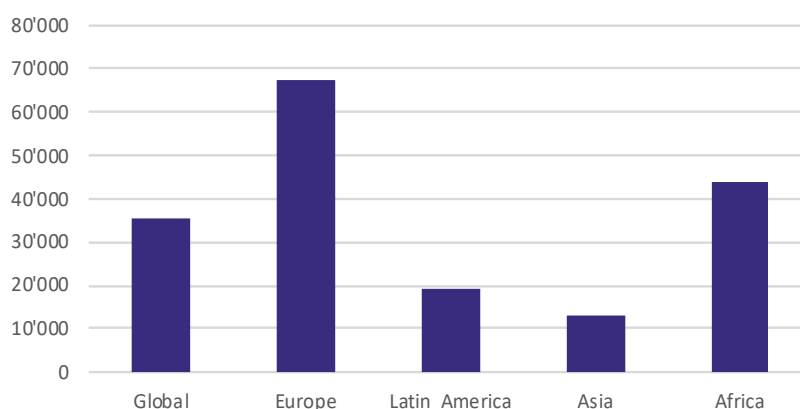
Figure 3 - Labour costs/Revenue



Labour costs

Labour costs have recorded a stable average over the life of the PPS. Values have settled around 20-22% as a proportion of gross revenue (indicator 2). When analysed by region (Figure 3), there is a significant range across mean values. For Africa, the value is relatively high and Latin America is low. It is not clear at this level of data abstraction if this is because of rates of pay or employee numbers that in turn may reflect levels of private supply to port entities as contractors. In the case of Latin America, the average rate (indicator 10, Figure 4) is lower than the global mean suggesting that ports have relatively high staffing levels. However, the analysis is less clear for Africa where labour rates are at the higher end of the range. Europe shows the highest rate per employee of 67,705 USD per annum.

Figure 4 - Average wages per employee (USD)



Environmental investments

The proportion of total capital spending (CAPEX) on average per annum on investment in environmental projects (indicator 25) averages 7.2%, with 2.3% of operating expenditures reported as dedicated to environmental requirements (indicator 26). This is a difficult number to isolate and therefore the reported benchmarks come with a note of caution. However, throughout the data collection period the recorded numbers have been consistent. It suggests a relatively low proportion of total capital spending and it will be useful to note any upward trend should new regulatory requirements be implemented as climate change effects increase.

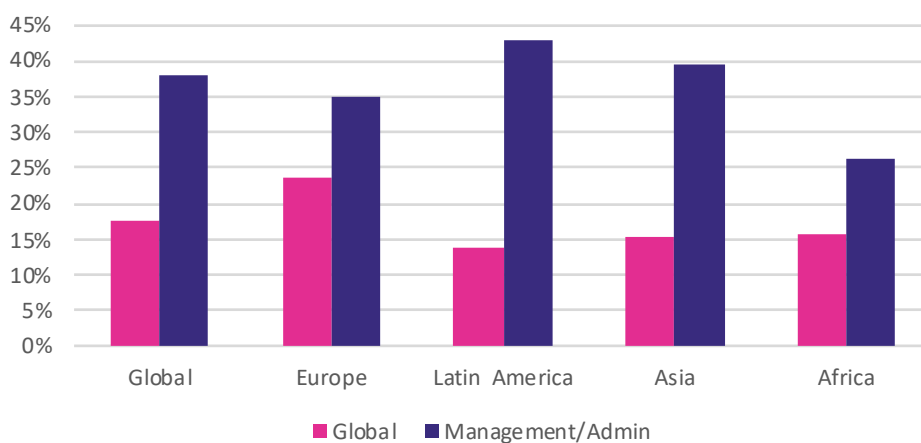
Human resources and gender participation

The gender profile remains low in terms of female participation (indicator 12, Figure 5). The category that is not very far from a gender-balanced distribution is Management and administration. However there is much to be done across the Network in order to achieve greater female participation.

The relative investment in training is also quite low (indicator 11). However, this may be partially explained by differing data capture methods across the Network.

There is definite scope for a debate on human resource strategies in modern ports. We would welcome feedback on this topic of interest to researchers for the reasons identified here and given the changes in work practices driven by digitization and security impacts from the COVID-19 pandemic.

Figure 5 - Female Participation Rate

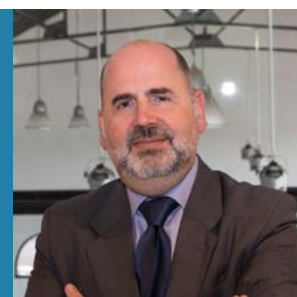


Valencia Port

The Port Authority of Valencia, operating under the commercial name of Valenciaport, manages three ports in the Spanish Mediterranean coast: Valencia, Sagunto and Gandía. The Port of Valencia stands among the five major container ports in Europe and is the leading port in the Western Mediterranean basin.

Measuring performance is a key element when following up the port strategy and, at Valenciaport, we developed a Balanced Scorecard (BSC) approach to evaluate and redefine our annual objectives. For this purpose, the need to define appropriate targets for the indicators in our BSC, based on relevant international benchmarks, is a must and, most of the time, complicated to obtain. The PPS scheme helps us to define these targets, having access to an industry reference that we can analyse from different perspectives (e.g. regional) and that covers many of our own indicators.

In our view, the Port Performance Scorecard (PPS) has the ability to become an industry standard and, thus, a globally accepted benchmark, helping the port sector to continuously improve its efficiency. In fact, as a founding member of the MEDports Association, and as member of its Executive Committee, we are promoting the UNCTAD PPS scheme as a reference for port performance data gathering and exploitation. It is already a mature and consistently reported data hub providing added value to the different language-based UNCTAD port networks.



Juan Manuel Diez Orejas
 Strategic Planning and
 Innovation Director

Vessel and cargo operations

Figures 6 and 7 illustrate the profile of participating ports in terms of vessel type (indicators 15.1-15.6) and cargo lot size (indicator 14). The graphics show once again that there are no two ports in the world with the same vessel and cargo mix. Both Europe and Africa have the largest average cargo tonnes per arrival or departure but arguably for different reasons given their different vessel mix.

Figure 6 - Vessel arrivals

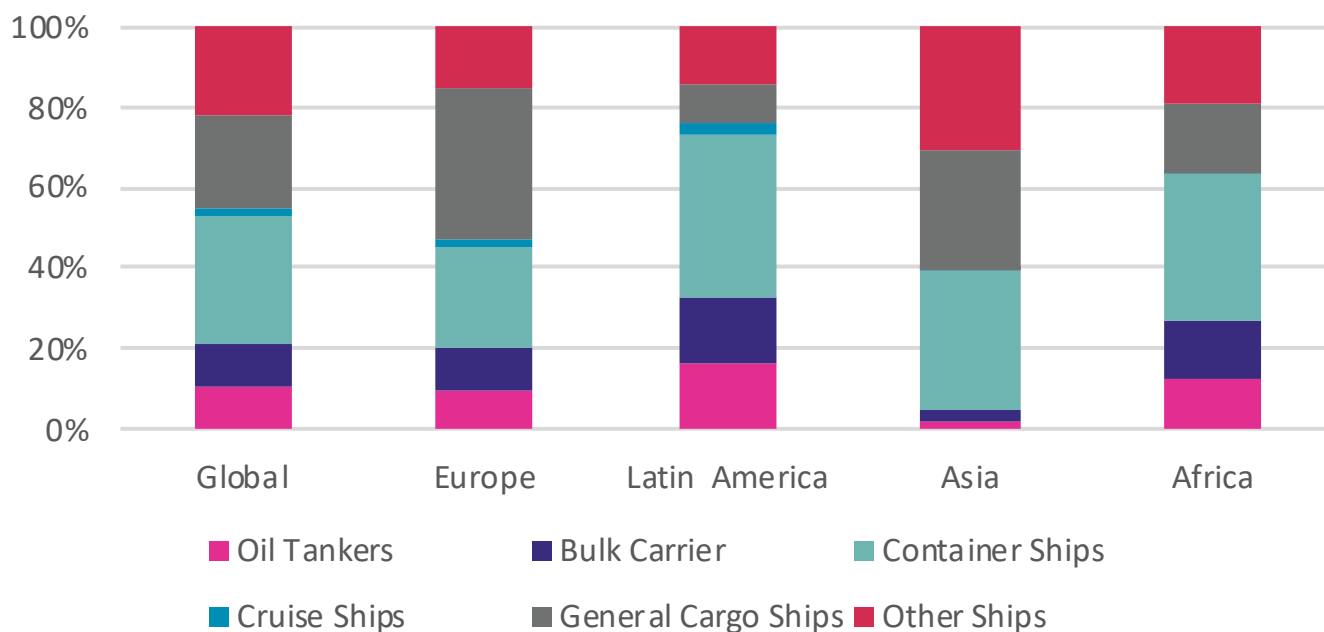
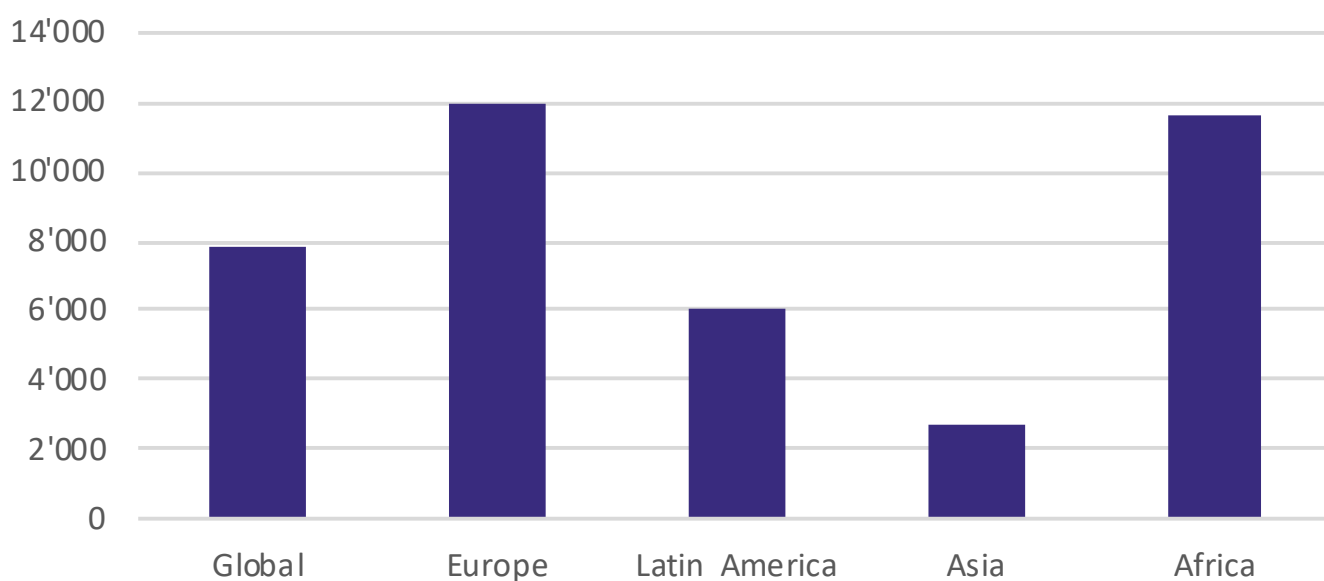


Figure 7 - Average cargo per arrival or departure (tonnes)



Relating the average time in port to the varied cargo size per vessel is of interest. There is a tight range of 1.5 to 2 days in port. Therefore, the larger cargo lots are logically handled by higher output labour and

equipment. With container vessels taking on average less time in port (1.2 days), there are higher averages in dry and wet bulks. Dry bulks stay on average 3.5 days, however, liquefied natural and petroleum gas (LNG/LPG) measures do distort the global average because of a small level of data points and some very high outliers. Therefore, the data reflects the observable reality for port managers.

Waiting times in the online scorecard show little change. Figures 8 and 9 provide some insights into the efficiency of container handling operations. There is a wide range of values across the standard performance metrics of dwell time and crane lifting rates. Europe has particularly higher lifting rates that perhaps reflect equipment capacity rather than labour efficiency (indicator 19, figure 9). Figure 8 shows the highest dwell time in days for each region (indicator 20). This topic requires quite sophisticated analysis to isolate the reasons for slow processing, for example: customs procedures; storage agreements; on port container stripping; multi-user facilities; and congestion in road networks at or near the port.

Figure 8 - Max TEU Dwell time (days)

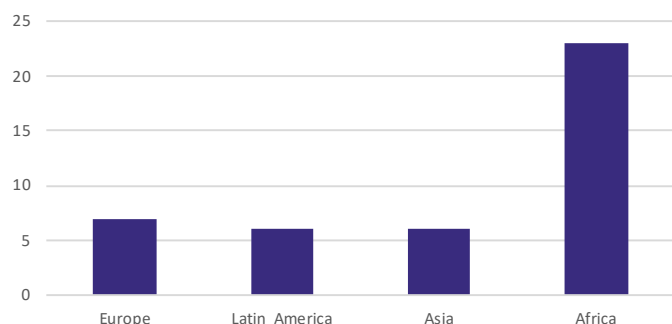
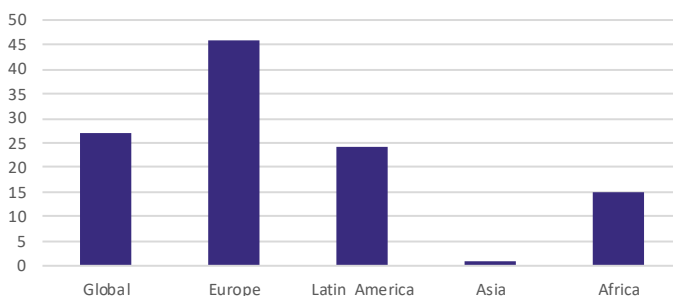


Figure 9 - Average Box Handling (Box per ship-hour)

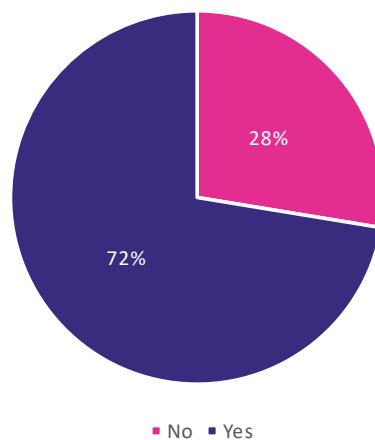


Governance

The structure of port entities in ownership and activity types remains stable across member ports. Figure 10 illustrates the extent to which port entities are constructed in corporate vehicles. All but two ports report that their entity, corporate or otherwise, are subject to central government control. The two outliers are in Ireland and they are a regional government port and a trust port (quasi-state controlled). For participating ports that are central government controlled, the detail suggests varied levels of private participation up to full service provision. At the core of this is perhaps the simple strategy of “public ownership, private operation” that can be observed in a range of public infrastructure settings. Three ports record private participation in the port entity but they equally record that they are subject to central government control. There is no observable pattern on which to base an explanation other than to argue that local history and context have a strong effect on government policy for ports.

The major trend in port management for containerisation over recent decades was to exit direct stevedoring and to get concession terminal operators to manage cargo operations. The data collected support that proposition for larger ports. However, there remains a significant number of ports that are active in providing port stevedoring services. With eight ports fitting this description, there is insufficient data to develop an explanation. In fact, these ports are spread evenly by region and size.

Figure 10 - Corporization



Drogheda Port

Drogheda is the leading port in the Ireland’s Regional port governance framework. Our critical strategic challenge is to plan and develop significant additional capacity for the region. In preparing the initial strategic submission to Government we made use of the Port Performance Scorecard (PPS) values as baseline metrics in the ‘proof of concept’ financial appraisal.

For example, when forecasting profit levels, wage profiles, employment numbers and revenue profiles, the PPS is a valuable resource. Structuring the financial model around a performance based Balanced Scorecard provides an alternative dynamic to designing a Greenfield port model. This drives an agenda of high performance rather than a traditional budget line forecast with a margin for profit. As an example, we constructed performance ranges for EBITDA as a proportion of Revenue and in turn tested the sensitivity of the project return rate (IRR) against EBITDA values. A second example of a useful benchmark is the proportion of costs applied to payroll for different port operating models.

With the majority of ports in the PPS handling less than 8m tonnes per annum, the metrics can be related to a port like Drogheda. Like all statistics they provide guidance only. Nonetheless, they are a valuable resource in building strategic planning financial models.



Joseph Hiney
 Chairman Drogheda
 Port Company

UNCTAD's Liner shipping connectivity index (LSCI)

UNCTAD's liner shipping connectivity index (LSCI) indicates a country's integration level into global liner shipping networks. The LSCI covers a total of 178 countries and 1,283 ports. The maximum value of a country's connectivity is set at 100, which was attributed to China in 2006 at the inception year of the index. In 2020, China, with its Port of Shanghai, was still the country best connected to others by sea with an increase of 51% from 2006 to 2019.

This connectivity index is an important indicator of the trade costs and competitiveness faced by a port and a country. Counting on a direct regular shipping connection has empirically been shown to help reduce trade costs and increase trade volumes. By augmenting trade volumes, the bargaining power and potential leverage to negotiate better transport rates increase.

The LSCI is calculated from data on the world's container ship deployment and is released annually.

The six components of the annual index are:

- 1) the number of companies that provide shipping services;
- 2) the number of services;
- 3) the number of ships that call per month;
- 4) the total deployed container-carrying capacity;
- 5) the size of the largest vessel; and
- 6) the number of countries that can be reached without transshipment (since 2019).⁴

Figure 11 below presents the LSCI for a selection of ports that are members of the TFT PMP and for which the LSCI was calculated in 2006 (inception date) and in 2020 (latest year available). The data refer to the ports connectivity within container networks only; other modes are not included.

⁴ More information on UNCTAD's LSCI is available at the following link: <https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=92>.

Figure 11 - Selected PMP ports: LSCI ranking 2006 vs 2020

