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Providing thought leadership on the role of ports in a connected world

Mind shift

Port authorities should move past landlord role to become supply chain partners, argues Mario Cordero, Port of Long Beach



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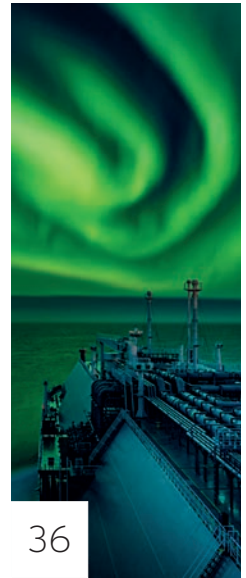
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EDITOR'S COMMENT



INES NASTALI
Editor

Thinking outside the box

CONTRIBUTORS



VLADISLAV VOROTNIKOV
Freelance journalist

Times of big political turmoil always open new opportunities for some. The Russian invasion of Ukraine has already deprived its seaports of millions of tons of cargoes, including transit supplies, but goods still need to be delivered. Bypassing one-sixth of the world's land surface is a tricky task. Seaports in the Caspian region have a chance to become more important international transit hubs, but it is yet to be seen whether they can really make it. ■

Ports and port cities have grown through curious humans setting out to explore the world and return with products from other continents, which led to the subsequent exchange of goods brought about by the triangular trade. With it being easier to build a ship than invent an airplane, towns situated near a coast and with access to open water became the trading hubs of countries.

That means geography pretty much is the deciding factor on where a port is built. This brings me to one of this edition's opinion pieces, which discusses the influence of topographical features such as mountain ranges on the dispersion of pollutants in port cities.

Those cities and their inhabitants suffer more from air pollution caused by ship exhausts than people in other locations where the exchange of air is aided by unhindered access — see page eight for more details on the affiliated research on this.

With emission reduction and decarbonization becoming more and more important to the maritime industry, this aspect again makes it clear how important the switch from high- to low-carbon fuels is to not turn the lives of people living in port areas into an unnecessary health hazard.

Given how advanced our knowledge and imagination of technological possibilities has become, compared to port operations before the industrial age, it might also

mean that “inventing the airplane” — aka thinking outside of the box(ship) — shouldn't be disregarded.

This diversification of the transport and logistics industry is already underway. I am not thinking of ideas such as Amazon's drone delivery, but more about the fact that we will have a selection of different fuels that propel ships depending on the route and distance that a ship travels.

For example, timetabled departures such as ferry services will run more and more on battery-powered vessels. Short-sea shipping services offer themselves to low-quantity green fuels such as hydrogen.

This again will bring in new players, including ports in developing states, to serve as new bunkering trading hubs.

Geography as well as geology, including natural resources, will continue to determine a country's trading system and economic outlook. With more advanced technology available to a broader range of economies, the deprivation of a poorer country caused by the exploitation of a richer country with better access to R&D might be easier to be leveled out.

Hopefully the same applies to balancing out geographical features without having to move mountains. ■

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CHARLIE BARTLETT
Freelance journalist

Geopolitics was “over” in the post-Cold War dreamland of my childhood. This was never true of course, but some of us were briefly afforded the privilege of ignoring it. How rudely it has crashed back into our lives. My piece this issue is on the fracturing of globalization, and if you want to do business, not politics – good luck! ■



TONY SLINN
Freelance journalist

It's always a pleasure to interview a person who is not only driven by an ideal, but has the experience, background, and, most importantly, the charisma and energy to make things happen. That's Professor Lynn Loo, founder and CEO of the Global Centre for Maritime Decarbonisation. And there could hardly be a more important cause. ■



The mind shift

IN CONVERSATION WITH MARIO CORDERO

Mario Cordero, the executive director of the Port of Long Beach, USA, talked to IAPH's Patrick Verhoeven about the shifting role of port authorities – from being landlords to becoming supply chain partners

INES NASTALI

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ometimes a little retrospective allows you to appreciate the achievements of your efforts. For Mario Cordero, the executive director of the Port of Long Beach, US, this rings true when looking back at the import surge of 2020 that

has led to some significant operational changes at the port.

“The situation now is very good. We’re back to some sense of normality in terms of the fluidity and the movement of cargo. But let’s go back to 2020 when the disruption of the supply chain started as a result of the pandemic. Toward the second half of the year, we quickly put together a business recovery task force here at the Port of Long Beach with the aim to have conversations with various customers and government agencies about the global disruption to the supply chain,” said Mario.

That business recovery task force then transitioned to deal with the surge of imports the US began to experience in the third and fourth quarters of 2020.

Consequently, the port offered a 24-hour, 7-day a week operation, which opened the door to an ongoing query — the potential of 24-hour, 7-day a week operation on the

West Coast, particularly at the Port of Long Beach. “Now admittedly, that’s a work in process,” Mario said.

Finally, the increased movement of cargo led to an operational change on the seaside. “A third thing that occurred was us putting forward a slow-steaming concept that addressed the issue of the backlog of vessels waiting to get into the port complex. It changed the dynamic of preferences. Previously, it was first come, first served. We were able to change that based on your time of departure from the port of origin,” said Mario.

The Port of Long Beach therefore took some of the temporary COVID-19 measures to alleviate the backlog — at some point, there were more than 100 vessels waiting to berth outside the ports of Long Beach and Los Angeles — and turned them into permanent concepts.

Making a permanent change

IAPH managing director Patrick Verhoeven has seen this elsewhere. “I think the proof of the pudding is in the eating for the solutions that were found during the crisis, whether they have a permanent legacy like the 24-hour, 7-day a week operations but also the behavior of the shipping lines and their ties into the whole port call optimization discussion, which actually shipowners have been asking for since pre-pandemic times,” he said.

While he appreciates the movement in the US, he said, “I’m not quite sure whether we can say that at the global level, there is a permanent mind shift happening within the industry. I think it happens in certain ports where the crisis most hit. What I do notice, and that could be a game changer, is that the ultimate cargo interest has understandably become much more vocal than before. Even if there is no direct commercial relationship with landlord



port authorities. On our level as an association, we got Ikea joining us as a member, which is something that I don't think would have ever happened in the past."

Mario has noticed this, too. "That's a very good point, Patrick, and I think you're right. We have a history of coming together in crisis and then, everybody walks away. But in this case, you will see some fundamental transformation. It's not going to happen at every port."

The single window

One of these fundamental changes comes in the form of port community systems (PCS) and maritime single windows (MSW) to exchange trade data. "I think you mentioned a very important point in us talking to each other, which brings me to the concept of visibility and transparency," said Mario. "This industry has had a conversation for some years about the need for digital transformation. What the pandemic elevated is how do we increase visibility and transparency so that the shipper knows where their cargo is at."

The Port of Long Beach has therefore introduced the Supply Chain Information Highway, a data sharing concept. "We need to have greater cargo visibility by way of a single window and PCS. We're one year into this in phase two, which means all the terminals at the Port of Long Beach now are using the system," said Mario.

In the meantime, the Port of Long Beach had several ports agree to collaborate with it to further this concept, such as the ports of Oakland, Seattle, Tacoma, New York and New Jersey, Miami, as well as the South Carolina and Utah Inland Port Authority. "Stay tuned for what's to come, as we're very excited about this being a potential solution to again enhance cargo visibility," said Mario.

This collaboration is what Patrick wants to see from the world's ports. "That's something that will help now that there's a deadline of January 1, 2024, which the IMO has introduced to make MSWs mandatory. On the other hand, we know that IMO, as a regulator, doesn't have the teeth when it comes to enforcement that a national authority, or even supranational one, like the European Union has. That's one of the reasons why we, and BIMCO, agreed to work together with IMO in raising awareness among governments and industry stakeholders."

Patrick explained why this is a strategic focus for ports. "It's an issue of compliance, but it's much more than that.

"A single window is a window of multiple opportunities"

PATRICK VERHOEVEN,
IAPH

This is for your benefit to have a digital platform in place to make life easy for the shipping and for the port side. And that, in the end, will make your port more attractive, more competitive and it will make your trade flow. A single window is a window of multiple opportunities."

For IAPH, this messaging will be the core focus in the run-up to and during the World Ports Conference taking place in October in Abu Dhabi, UAE.

A change in regulations

Patrick has more news to share on the use of PCS. "That's one thing that we can do. The other thing is capacity building. We teamed up with the World Bank on a project on port community systems and the report for that will be published on June 15. This has been an in-depth study into how they are used and what have the early adopters who already had PCSs back in the 1980s done so far with it — have they moved forward and linked the cargo to a single window?"

According to Patrick, it is actually easier "if you haven't got any system yet, because then you can start with the textbook approach, otherwise you have a whole lot of connecting work to do."

Developing single windows is one regulation envisioned to make port operations more efficient. The other one, specifically seen in the US over the past year, is the change to detention and demurrage fees via the Ocean Shipping Reform Act 2022. While the Port of Long Beach acted swiftly to open pop-up yards during the pandemic, Mario reminds readers that "terminals are not meant to be warehouses", and the legislation aims to weed out a few bad players in the market.

"For American shippers, it's important that they're not subject to additional cost. If for whatever reason shipping lines are not able to deliver that cargo to you, then it's unfair to the shipper to inherit these costs, which of course are going to be passed down to the consumer eventually."

He said that it was right for the legislation to come at this point because "again, this is an issue that has been discussed for years and that has been elevated by the congested situation during the pandemic."

Patrick thinks that "federal initiatives, such as these, are quite a change in attitude. I find it a remarkable step that this was deemed necessary to intervene. I haven't seen too many examples in other countries where governments have actually stepped in on this area, but that doesn't mean it's not necessary."



Pictured: Mario Cordero from the Port of Long Beach, USA, and Patrick Verhoeven of IAPH, in conversation on the sidelines of the TPM 2023 conference in Long Beach.

Reforming port operations

For Patrick, this underlines a point he made before: shippers have become much more vocal — and also politically vocal to drive change in legislation.

“We as ports need to engage in that dialogue with cargo owners, which I think is changing. More port authorities are doing that now. Before, it was sort of we’re the landlord, the business is done by the terminal operator. They negotiate with the carrier and the carrier negotiates with the shipper. We provide the land and whatever else is necessary, but we don’t get into the discussion of our ultimate customers’ needs.”

This change in attitude has consequences. “I think the model of we collect the rent and the port dues, that’s about it, is completely outdated. You need to have a proactive engagement with your community, with your customers, and with those living around the port.”

Mario agreed. “You’re correct. Those days are passé. For the Port of Long Beach, we want to facilitate change and so you’re absolutely correct in terms of how that model has changed over the past years.”

The journey ahead

Mario shared another retrospective insight. “We’ve learned that the supply chain, at least in the US, is not as resilient as we or some people thought.”

This, however, had unseen, positive consequences for US ports. “For many of us who are in the industry, we knew all along changes had to happen in terms of transforming operations. But also in terms of the funding that

was needed. You know, the cliché that crisis brings opportunities — this crisis certainly brought the opportunity to have governments at the federal and state level enhance their funding to the major ports here in the US. With the Biden administration, we certainly have seen that and also in the state of California with the governor.”

As a result, for the next decade, the Port of Long Beach has allocated \$2.2 billion in capital improvement investment. “Much of this, in our opinion, will focus on rail and even inland port development.”

While this is good news for the US, Patrick is skeptical about the level of movement across the Atlantic. “Again,

I’m not sure whether we see the same sort of level in Europe of governments stepping up. Not just in talk, but in money. I don’t see a similar approach on the funding or regulatory side to say we need to do more because this industry is so vital to us.”

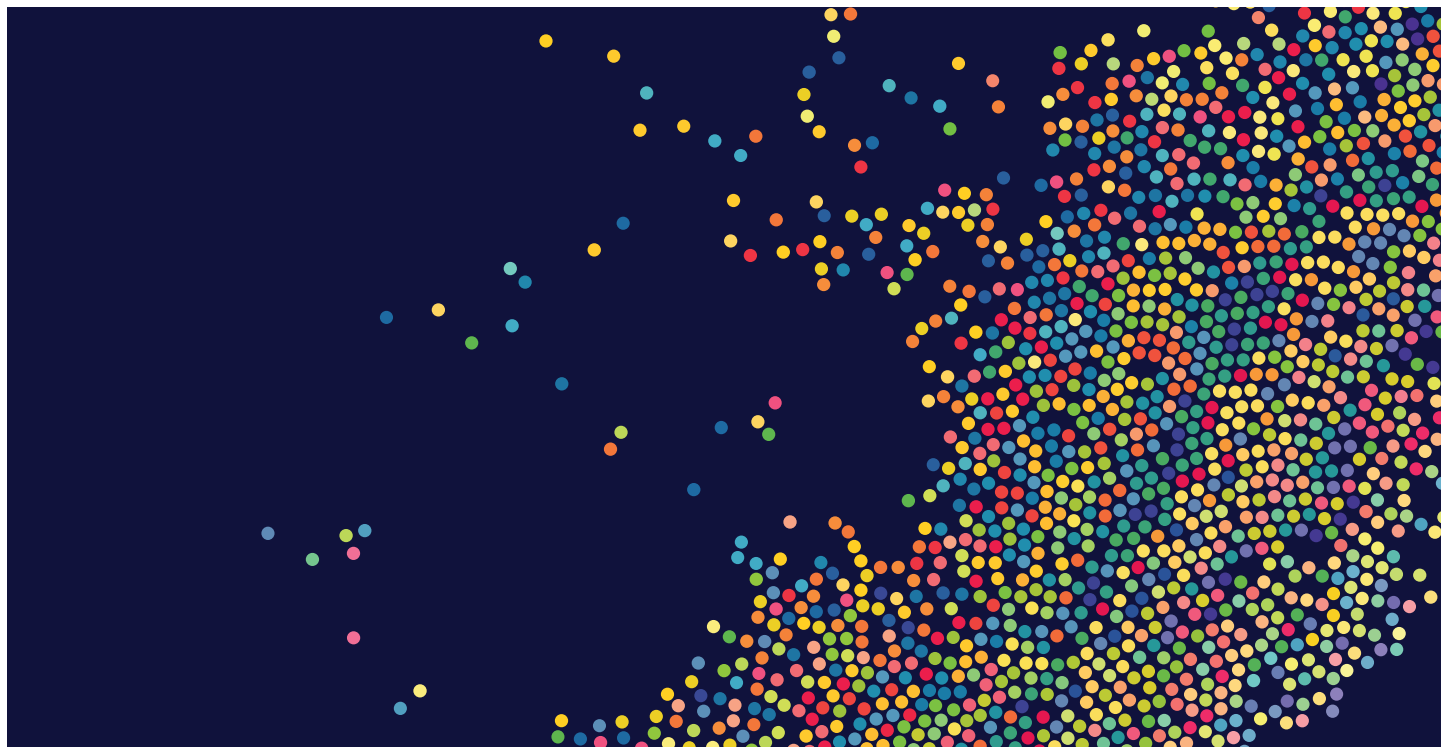
That said, Patrick agreed. “What is happening in the US is definitely a good sign that these projects get moving. I guess you have the same issue in the US as in Europe that planning permits and the whole regulatory process linked to new infrastructure is tremendously complex

and it takes a lot of time before you can build or expand anything. Hopefully that discussion will also focus on how we can simplify procedures.”

He is envisioning a more efficient planning process altogether. “Especially in the Western world where the pendulum may have gone a little bit too far in the other direction, where it gets too complicated,” he said, adding that “not excluding, of course, the legitimate interests of nature, people and neighbors. I’m not suggesting we go back to the 1950s when you could expand a port and nobody had anything to say about it. We need to bring it back to something more balanced,” he concluded. ■

“The supply chain is not as resilient as we thought”

MARIO CORDERO,
Port of Long Beach



PERSPECTIVE PARTICLE DISPERSION

Complex terrain dispersion: Implications for port cities

A complex terrain is a region of land that has unusual or irregular topographical features, such as mountains, valleys, coastlines, or some combination thereof. Compared with open plains, these features drive changes in local meteorological systems, impacting air flow dynamics. In the instance of heavily urbanized areas, land topography is an often-overlooked factor when considering air quality and pollution levels - especially in industrial areas such as ports.

At a simplified level, solar heating of the Earth's surface creates diurnal variations in air flow across the planet. Convection currents form as warmer, ground-level air rises, with cooler air at high altitudes sinking to the surface. Advection furthers this particle movement, creating a system of widespread vertical and horizontal mixing. This natural

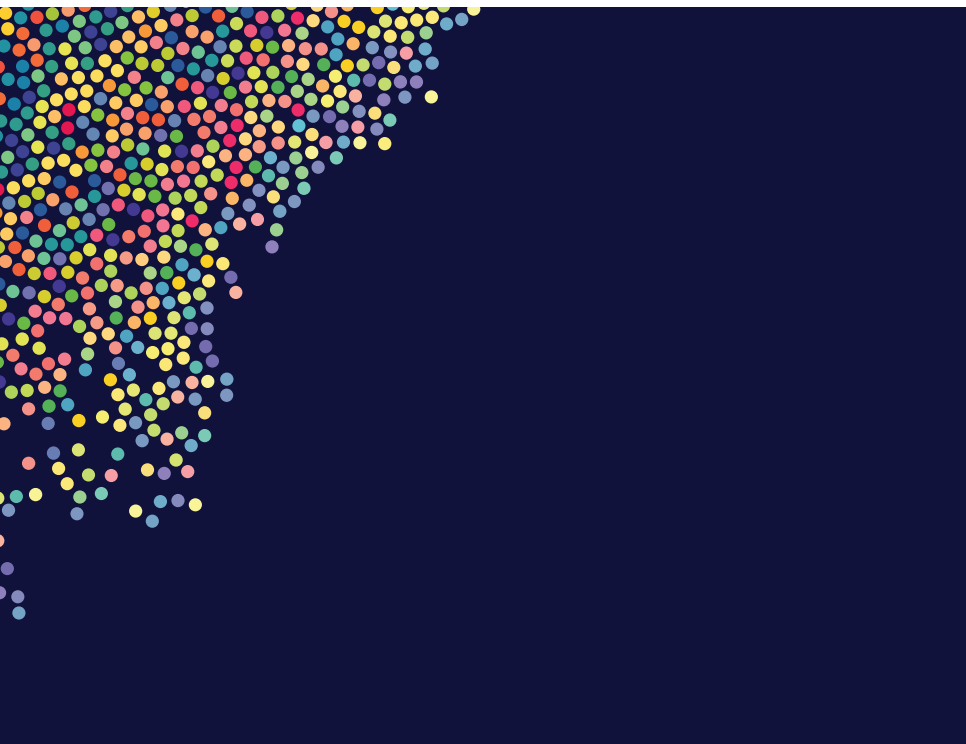
circulation acts as a ventilation system for human activities, dispersing toxic particulates away from population centers. However, geographical features interact with this process and alter typical air circulation dynamics.

Impact on port emissions

For coastlines in particular, discrepancies in the properties of water and land have an interesting effect on such air flow systems. Water, having a higher heat capacity than land, heats up slower and retains heat for longer than its counterpart. The proximity to vast bodies of water such as oceans, seas, and large lakes gives rise to phenomena known as onshore and offshore breezes. Here, the heating fluctuations can drive air inland or out to sea. Unfortunately, shipping emissions contain a noxious mix of unhealthy particles, and onshore breezes carry

coastal emissions further inland. These breezes can travel for dozens of kilometers without interference, typically weakening further inland. Where onshore breezes meet high elevation terrain such as mountains, a stagnation of air mixing can occur, creating a health hazard for local population centers.

Shipping lanes in particular are an emission hotspot, releasing plumes of sulfur and nitrogen oxides, as well as particulate matter. For cities located near busy ports, inland breezes carry these shipping plumes into the population, further worsening air quality. Wind interactions with these emissions have been well-documented, illustrating the pollution problem for port cities. However, populations further separated from the coast may also be adversely affected. In Cape Gris-Nez, a rural site 20 km inland from Calais, France, PM10 levels rose in line



ABOUT THE AUTHOR

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with those at Calais harbor. Ship emissions were found to be responsible for a 390% and 1,200% increase in PM10 and PM1 levels respectively, compared with background. As 70% of ship emissions occur within 400 km of the coastline, this inland movement is a worrying observation. At Tangshan, mainland China, one of the busiest ports in the world, nitrogen oxide emissions during sea breezes were found to penetrate as far as 100 km inland, although this tailed off as the wind weakened with distance. In other studies, similar observations have been made, with onshore breezes advancing pollution up to 60 km inland.

Counteracting the impact

Numerous solutions have been proposed to overcome these challenges. Wind monitoring systems can indicate periods of heavy sea breeze, directing shipping traffic where possible and reducing the levels of pollution heading inland. Limiting ship maneuvering in the harbor during these conditions can also impact air quality significantly, as maneuvering accounts for 37% of a ship's PM10 emissions in a port. The cessation of port traffic during local pollution events is also a consideration, with similarities to the traffic interventions implemented in Beijing and Delhi during heavy smog periods. Such adaptations are already being assessed for plane travel, with tweaks in flight trajectory

lessening the formation of climate-damaging contrails. While drastic measures are not sustainable in the long term, short-term interventions during adverse air quality events can alleviate the problem.

However, without systematic shoreline policy changes, small-scale adaptations offer few benefits. For instance, the widespread electrification of ports generates opportunities for renovation of old systems. Upgrading these to use shoreline electricity can reduce emissions by up to 70%. Compositional changes to marine fuel sources that reduce the amount of heavy metals and sulfur present is another option, while alternative fuels such as LNG offer similar advantages. International campaigns to reduce lead pollution from automotive vehicles have previously been met with success, underlining the potential for change.

Increasing renewable energy close to shorelines further facilitates this transition to electric power for ports. For wind energy, there is a two-pronged positive effect; lower emission levels reduce air pollution near cities, while wind turbines benefit from shoreline breezes.

In locations such as Japan and the US west coast, where the continental shelf drops off rapidly, floating offshore wind farms can be introduced. Inland, freshwater wind farms are an underutilized asset,

benefiting from reduced corrosion compared with sea locations. This advantage has previously been highlighted for large inland bodies such as the Great Lakes in northern US, where shoreline effects can be pronounced, making it an ideal candidate for wind energy.

More options for cities

For large cities that suffer when shipping emissions are brought inland, there are additional adaptations. Studies that have assessed the role of vegetation as a method on particle dispersion and deposition, found that certain plant types are useful pollution barriers.

Particular tree species can substantially improve air quality when placed between emission sources and population centers, by disrupting and dispersing airflow.

Air flow dynamics are often an overlooked factor when assessing the impacts of shipping pollution. Areas found between complex terrain and emission sources suffer from accumulation within the geography, with shipping emissions also carried over land by sea breezes, dispersing toxic particles along the way.

A multitude of reduction methods have been suggested to tackle the problem, but fundamental changes in maritime behaviors and practices are required to drive meaningful change. ■



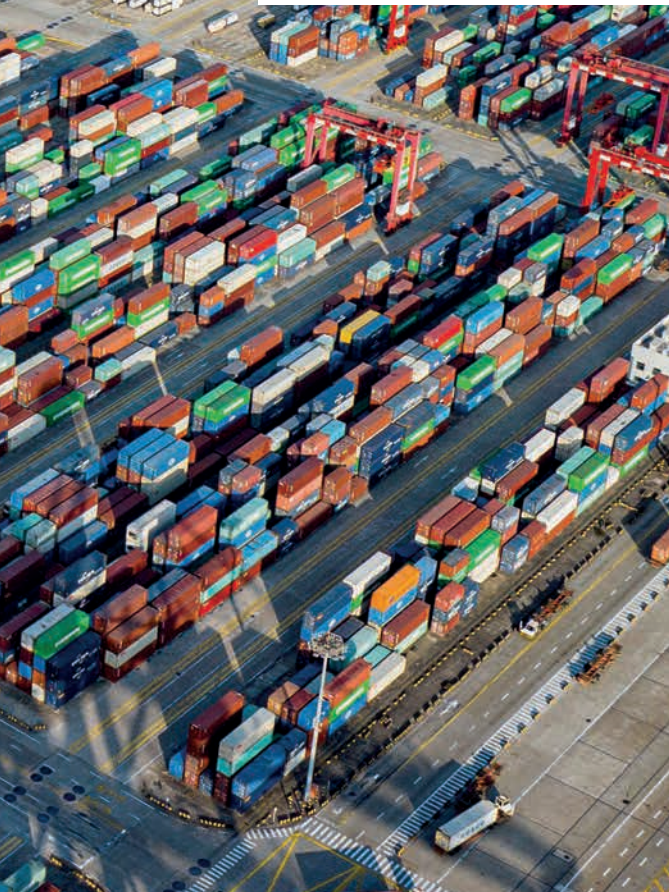


FEATURE TRADE RELATIONS

Deglobalizing the supply chain

One of the repercussions of the COVID-19 pandemic is the realization of changing trade behaviors between mainland China and the rest of the world. This includes how the maritime industry interacts with the powerhouse

CHARLIE BARTLETT



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ast year, as Germany shipped crate-loads of weapons and ammunition to Ukraine, the faltering of Russia's advance became clear.

However, another ideological clash was occurring, unnoticed, much closer to home. It transpired that at the Port of Hamburg, Container Terminal Tollerort (CTT) had been in talks — which are rarely public for their sensitive nature — about selling a third of the terminal to mainland China's COSCO.

For shipping, especially since the 1990s, globalization has been a fait accompli. Maritime's extra-national focus has led to low labor costs, lower freight rates, and the smooth doing of business. Sheltered from the general public, and often tax, ports have been regarded not as domestic; but rather as embassies of a global ocean concord, on land.

It must have seemed impertinent, then, when Germany's Economy and Climate Minister Robert Habeck of Die Grünen (The Greens) intervened. Nominally left-leaning, Die Grünen has not shied away from tough decisions — arming Ukraine and keeping the last of Germany's nuclear power plants open despite their unpopularity.

Habeck, unapologetic in his opposition to COSCO's endeavor, was “disinclined” to allow the acquisition to take place at all.

Pictured: Shanghai Port, mainland China.

Photo: Sipa US/Alamy Stock Photo

However, for the Port of Hamburg's CEO of Marketing Axel Mattern, it was Habeck's point of view that was naive and an unwelcome intrusion of parochial thinking. "We want to do business, not politics," he said. "Strategic planning and port shares are totally different things. We need and have so far had good relations with the Chinese side in trade — transportation and logistics — which helps both sides understand and learn from each other better."

Ultimately, following intervention from Chancellor Olaf Scholz, Hamburg struck a compromise, leaving COSCO with 24.9% of the terminal, instead of the 35% it had sought.

Such incidents, indicative of a souring sentiment toward globalization, are becoming louder, more frequent in number, and harder to ignore.

People speak

But if businesses are exiting mainland China, it may have to do with economic but also labor issues.

Initially, low wages, and the inherent efficiencies of a command economy, were attractive to investors. This approach might have run its course, as it seems that some Chinese workers in the technology industry might be at their breaking point. In November, workers at Foxconn's iPhone City chanted "give us our pay" and "defend our rights" as they clashed with riot police. The incident itself was associated with delayed bonus payments, however following the easing of COVID-19 restrictions in mainland China, some in the population have been publicly speaking their minds about the lockdown.

It seems that the COVID-19 policy of the Chinese government has changed the economy of the country. Recently, Transport Intelligence (TI) and Agility surveyed C-suite logistics industry personnel for the 2023 Emerging Markets Logistics Index. Around 39% of respondents said they were either reducing investments in mainland China, or actively moving elsewhere. Mainland China's COVID-19 policies were the main reason given. Around half that number admitted that rising labor costs in the country are also a contribution.

Many respondents said they would be nearshoring, reshoring, or otherwise-shoring closer to their markets. Southeast Asia (13.6%) and India (13.4%) were popular destinations for moving production/sourcing activities in the coming years, but Europe and North America, at 13.1% and 12.9%, respectively, were surprisingly close behind.

"A number of manufacturers have started moving at least some manufacturing out of mainland China," the report noted. "Apple, for instance, has accelerated its shift out of mainland China, advising suppliers to assemble products in markets, including India and Vietnam, to diversify their supply chains, according to the *Wall Street Journal*. Apple has been moving assembly of certain products, such as the iPad, out of mainland China for a couple of years.

"Other companies, such as South Korean manufacturing giants Samsung Display and LG Electronics, have also closed some factories in mainland China, pressured by uncertainty caused by its ongoing lockdowns and cheaper local rivals."



Last year's EU Chamber Business Confidence Survey for Foreign Companies in mainland China surveyed 620 European companies, of which 315 agreed that business in mainland China was becoming more political, with 83 of them saying much more.

Some 60% said that doing business in mainland China became more difficult in 2022. Of these, 49% said COVID-19 was the main challenge, and 24% said the Chinese economic slowdown was to blame. Around 16% credited the rise in mainland China's labor costs. "The only thing predictable about mainland China today is its unpredictability, and that is poisonous for the business environment," said Bettina Schoen-Behanzin, vice president of the European Union Chamber of Commerce in mainland China, when the results were released in June 2022.

"Increasing numbers of European businesses are putting mainland China investments on hold and reevaluating their positions in the market as they wait to see how



long this uncertainty will continue, and many are looking towards other destinations for future projects.”

The next survey is now under way, and the results will not be known until June 2023. However, speaking with *Ports & Harbors*, Schoen-Behanzin indicated that some positivity was already being felt. “Business sentiment has partly improved following mainland China’s COVID-19 policy ending, with businesses now able to see some light at the end of the tunnel,” she said.

However, “other economic headwinds remain — including an increasingly politicized business environment, supply chain complications, and long-standing market access and regulatory challenges,” she added.

Emissions by omission

Upheaval is due, then, for shipping. Following a decades-long adaptation process, today’s maritime industry

is a focused mainland China-to-everywhere-else machine. At the time of writing, a deluge of newbuild container giants are crashing onto a market that is collapsing under its own weight.

Ports, meanwhile, are experiencing a pendulum-swing. In the last two years, the Port of Shanghai, and its counterpart in Los Angeles, have barely kept up with demand. Now they are more than enough. Los Angeles experienced a 13% drop in volumes in January, compared with the same period in 2022.

In March, CMA CGM CEO Rodolphe Saade said to the *Financial Times*, “We have clients telling us they do not want to put all their eggs in one basket in mainland China, so they are looking for other solutions.

“The movement has begun, but not yet at large volumes,” he said. “It will take time. Maybe in 5 or 10 years, if India and Southeast Asia build port terminals that can accommodate large ships, then they will play a different, bigger role.”

Soren Toft, head of MSC, told audiences at the Trans-Pacific Maritime Conference in Long Beach, California, in February that shippers would “spread their sourcing around 5, 8, or 10 locations” instead of bringing back production to developed countries. He also argued that the existing port network would not be enough to handle this change. “It would be naive to say the ports haven’t learned from the experience,” explained Toft. “But the fundamentals haven’t changed and there is not enough infrastructure in the US and Europe.”

However, there is a caveat. In the absence of a corresponding overhaul of the world’s energy systems, reshoring and nearshoring are likely to yield nasty surprises for the environment.

Mainland China is the world’s biggest carbon emitter, for which it faces no small amount of criticism. Nevertheless, this disguises the fact that grid energy in mainland China is comparatively clean, running with a much higher proportion of renewable energy than many countries not troubling themselves with making almost all humankind’s steel, ships, batteries, solar panels, phones, and computers.

These include the US, Australia, Japan, and Belgium, as well as favored reshoring destinations India, Mexico, and Vietnam. The same country that built your correspondent’s Dell laptop obligingly takes credit for all the emissions involved in doing so.

It is likely, then, that as well as their ports and logistical infrastructure, firms will need to have a hand in financing improvements to their host countries’ energy systems in line with their investments in staff and assets. It may indeed be possible for industry to flee geopolitics for a few fiscal quarters at a time; but now more than ever, the latter seems to have a way of catching

up to the former. We may want to do business and not politics; but events suggest we will have to learn to do both. ■

“An increasingly politicized business environment remains”

BETTINA SCHOEN-BEHANZIN,
EU Chamber of Commerce in China

Since around the global financial crisis that started in 2008, the use of protectionist economic measures has been on the rise amid a backlash against globalization. Globalization, especially increased international trade, has been undeniably positive economically. In rich countries, it has raised productivity and lowered prices, thereby raising living standards, especially for lower income families. It has also lifted hundreds of millions of people from former centrally planned and emerging market economies out of poverty and into the global economy.

However, it has led to some groups losing out, for instance certain blue collar workers in rich countries. In several such countries, governments did not do much for people who had lost out from globalization in terms of retraining and finding different jobs. Instead, several governments have turned to more protectionist economic and trade policies. Industrial policy — favoring domestic production via regulation, subsidies or import restrictions — has become much more common and acceptable recently, including in countries, such as the US, where it was frowned upon for a long time.

Moving back home

In addition, in recent years, governments have increasingly intervened in the economy to pursue political, security or other non-economic objectives. One high-profile example is the sanctions and restrictions by western governments on Russia and Russian people. Another is the measures by the US and some allies to contain mainland China's technological development and partly decouple from its economy. Relatedly, several governments are now actively promoting on-shoring and friend-shoring, persuading and encouraging companies to move production from unfriendly countries back home or, at least, to more friendly countries.

Encouraged by such steps by leading economies, other countries have stepped up banning certain foreign firms and their investments and restricting certain imports

and exports, often in the name of national, food or other security considerations.

Given the strong evidence about the overall economic benefits of globalization, it is obvious that more protectionism and the usage of economic policy for political purposes will hurt economic growth and living standards. While the negative impact will be the largest in emerging markets, it will also hurt productivity and living standards in the richer countries at the forefront of the push toward more activist economic policies, especially among the less well off.

Green hindrance

This development will hinder the green transition as well. Under broadly free trade, countries can make progress with decarbonization in part by importing technology and products. Banning or restricting imports of clean energy products, or favoring their domestic production, will slow down the transition and increase its cost.

To what extent will the trend toward increasingly activist economic policy continue or even accelerate? Given the acceptability of ideas such as friend-shoring and the explicit contravention of World Trade Organization rules in the case of some industrial policies, the risk of major damage to the rules-based multilateral trading system is real. For decades that system survived and solidified in large part because politicians, convinced about the overall benefits of globalization, resisted calls for protectionism. The problem is that, once the genie is out of the bottle, it will be hard to stop. Vested interests will try to persuade governments to take more discretionary measures, and the more

such measures are taken, the more other governments will be inspired to do the same.

It is important for policymakers in key countries to at least acknowledge the negative economic impact of the recent trend to activist economic policy. Transparent discussion of this impact should limit the introduction of further discretionary measures. ■



LOUIS KUIJS
Chief economist, Asia-Pacific,
S&P Global Ratings

Wake-up call

The recent trend toward more protectionist policies and the usage of economic and trade policies to pursue political objectives will weigh on economic growth and living standards and set back the green transition



Closing the gaps

Making better use of the port area to accommodate low-carbon energy production is one quest ports have set out to close infrastructure gaps

Q&A

Q: Please give us a brief introduction of your role and how you interact with ports.

A: I am the global director of Ports & Terminal Development at Moffatt & Nichol. Over the years, I had the privilege and challenge to develop my technical skills in terminal optimization and automation on site, in the terminal as an operator and manager. Improving terminals is still my passion!

Q: How do you see the current state of the port infrastructure market?

A: We have been seeing a shift from more infrastructure to a better use of the infrastructure for some time. Partly driven by disruptions in supply chains, by ROI-maximization goals, or by a potential overcapacity issue on the horizon, starting with the shipping lines and cascading into terminal or asset underutilization.

The environmental imperative is another trend resulting in interesting dynamics that affect the value chains that ports, as vital nodes, are trying to accommodate. For instance, in northern Europe, physical conditions are ideal for investments in offshore wind farms. While this trend already existed off the coast of economies such as the United Kingdom or the Netherlands, other countries such as Denmark or Spain are also stepping in heavily.

Port managers across those regions have come to us asking if their ports have the capacity to accommodate and retrofit their areas into marshalling. We therefore developed a digital twin to simulate marshalling operations of wind components at their port under different scenarios with the purpose of maximizing their operations.

On the digitalization side, I would say the market sees a mix between pull and push trends. Regulations such as the FAL



CHRISTIAN BLAUERT
Global director, Ports & Terminal Development, Moffatt & Nichol

amendment by IMO are making single windows for data exchange mandatory in ports around the world, which will enter into force in 2024. On the other hand, ports are seeking solutions to increase efficiency, sustainability, safety and resiliency of their operations. In this regard, the market is still trying to digest the wave of emerging technologies. It feels like the sector is heavily focusing on solutions, rather than on understanding the problems, with player having a siloed IT system to manage processes and of course business goals.

Q: What do ports need to do now to prepare for a changing infrastructure landscape?

A: Well, the decarbonization of the supply chain, both on the maritime and the land side, is a huge issue. This has two relevant impacts for ports. On one hand, the new value chain markets, which they will or will not be able to accommodate. Some cargoes such as offshore wind components are mature enough, whereas others like green hydrogen, while driven by high expectations, still need to undergo a sound assessment of its economic

and technical feasibility. On the other hand, the decarbonization of port-related activities themselves. What was seen not long ago as ESG-compliant practice by reporting emissions yearly, is now becoming a source of competitive advantage in a field where clients will progressively demand new green value-added services, such as bunkering of clean energies or onshore power for moored vessels. I think we should all be ready for changing dynamics over the next decade.

Q: What advice can you give ports to close the gaps?

A: My answer is simple: Ask the right questions that fit their context. In the end, port managers understand their own business and clients better than anyone else, so translating overall economic, political, environmental or legal trends affecting their business is a critical and ongoing process. The best and first advice that we give is to urge our clients to continue to invest in their people. New competences on energy transition or digitalization need to be developed if terminals and ports hope to stay relevant.

Q: In what kind of cooperation would you like to engage with ports?

A: Moffatt & Nichol has been assisting ports for over 75 years, advising our clients on all aspects of their business. From the advent of containerization to today's complex goods movement trends, environmental regulations and sophisticated technologies, Moffatt & Nichol has built a reputation for providing innovative solutions to support virtually any port assignment. We look forward to continually assisting ports in their development whether it involves infrastructure needs or integrating automation. To achieve a sustainable future, we must work together. ■



Professor Lynn Loo

In founding the Singapore-based Global Center for Maritime Decarbonization, Professor Lynn Loo wanted to set up “an action-oriented organization to complement and leverage the important work of think tanks in the sector.” It’s not without its challenges

TONY SLINN

Born in Malaysia, chemical engineering professor Lynn Loo’s background as a teacher and researcher at Princeton University in the US, and as an industrialist — she’s a co-founder of Andluca Technologies, which develops wireless smart window retrofits to increase building energy efficiency — gave little hint that she would gravitate to the maritime world.

Her first foray into shipping and its decarbonization opportunities and challenges came during a 2020 sabbatical in Singapore, where she became a member of the International Advisory Panel for Maritime Decarbonization and, in August 2021, she founded the Global Center for Maritime Decarbonization (GCMD) as a non-profit organization to meet or exceed the IMO’s goals for 2030 and 2050.

“GCMD’s mission is to convene stakeholders and conduct pilots and trials of low-carbon solutions to lower the barrier for adoption — and accelerate the sector’s decarbonization. And that needs to start now,” Professor Loo explained. “We aim to help the maritime industry eliminate greenhouse gas (GHG) emissions by shaping standards for future fuels, financing first-of-a-kind projects, piloting low-carbon solutions under real-world operational conditions, and fostering collaborations across sectors.” She added, “Our partners are able to co-create and participate in managing real-world complexities that they wouldn’t necessarily be able to encounter in one-off pilots.”

The focus areas

To get an overview of the status quo in ports, a study to define the safety and operational envelopes for a pilot to bunker ammonia with GCMD’s backing is under

way. “DNV, Surbana Jurong, and the Singapore Maritime Academy at the Singapore Polytechnic conducted this study in consultation with 22 GCMD-curated industry partners, a regulatory working group, and an industry consultative and alignment panel comprising 130 players,” Professor Loo stated. “The study was completed in April 2023, and the report was given on 27 April 2023, at the Singapore Maritime Week. Its findings will form the basis for a regulatory sandbox for subsequent trials and scoping for an ammonia bunkering

pilot — proxy assets in Singapore waters are under way.”

Additionally, a project involving 13 fuel purchasers across the container, tanker, and bulker segments bunkering biofuels at the ports of Rotterdam and Singapore is currently taking place. “The objective is to develop

an assurance framework for supply chain integrity of current and future green fuels that we hope will help increase transparency of transaction and quantification of emissions abated on a well-to-wake basis.”

Finally, partnering with energy and shipping companies, “GCMD has initiated a project to demonstrate shipboard carbon capture aboard a medium-range tanker to address the technical and operational hurdles, including onboard capture and storage, plus offloading and off-taking, of the captured CO₂,” Professor Loo told *P&H*. She added, “We recently awarded our concept study offloading liquefied CO₂ captured aboard ships to Lloyd’s Register, supported by their partner Arup. Findings will inform the next phase of our shipboard trial.”

Professor Loo and the GCMD “view commitment to decarbonization as a first step; this needs to be followed by concrete action. GCMD’s pilots and trials are one

form of that, allowing us not only to fail fast but to learn faster by doing. And it is these learnings that we aim to share publicly to help build confidence and spur investment to decarbonize the sector.”

A port’s work

Turning specifically to ports, *P&H* asked if GCMD recommends incentives for/by ports for decarbonization? Does it see a need for ports to present emissions data, given that future governmental regulations might make this mandatory?

“We think accurately measuring, tracking, and reporting emissions data is really important, not only aboard vessels but also at ports,” Professor Loo answered. “It’s through accurate accounting of emissions that we can determine whether we are measuring up against our ambition. With regulations including the Carbon Intensity Indicator, Energy Efficiency Existing Ship Index, EU Emissions Trading System, and others coming into force, the ability to accurately track fuel consumption and GHG emissions will have a commercial impact.”

Regarding what kind of collaboration she would like to see with IAPH, Professor Loo said, “In ports’ ship-shore interface, decarbonization is increasingly an emerging topic and an important piece of the puzzle to enable the energy transition. As a neutral convenor, we hope to also tap IAPH’s expertise to understand the considerations that need to be addressed from a port’s perspective to enable scoping of our future pilots.”

Furthermore, “we are supporters of the Clean Energy Marine Hubs initiative that was announced at the Clean Energy Ministerial in Pittsburgh in September 2022 because we believe ports and land infrastructure are critical to enabling shipping decarbonization — and in turn, as transporter of future fuels, shipping can facilitate the greater energy transition across other sectors. We look forward to working with IAPH on this initiative in more concrete ways in the near future.”

In the longer run, “once the outcomes and data from our pilots and trials are ready, shared, and become validated,” Professor Loo concluded, “we believe ports, more shipping companies, their customers, and other players will have greater confidence to make the necessary investments to move their organizations forward in their respective decarbonization journeys.” ■

“Our partners are able to manage complexities that they wouldn’t necessarily be able to encounter in one-off pilots”

Catching^{up}

Vessel calls stay strong and so does the growth of vessel sizes calling at global ports, with a low stress on staff availability and warehousing

THEO NOTTEBOOM AND THANOS PALLIS

The IAPH World Ports Tracker provides ports with a timely understanding of the challenges that emerge regionally and globally. The tracker has two sources: survey-based results on cargo and passenger markets in ports from IAPH members, and container port performance data from S&P Global.

The IAPH World Ports Tracker survey analysis used data collected in early March 2023. The survey includes questions revealing the trends in the container market, breakbulk and bulk markets, and the passengers/cruise business. Some of the questions are about the status of the ports, while other questions reflect the short-term expectations of port managers for the next quarter or the next 12 months.

Vessel calls and port moves

Four regions, Africa, Middle East and India, Southeast Asia, and Oceania, showed double-digit growth in the number of containership arrivals in the fourth quarter of 2022, compared with the vessel calls in the fourth quarter of 2021. Container vessel calls declined only in Northern Europe at 6.3%. Taking a longer-term perspective, vessel calls are down compared to the first quarter of 2019 in all regions except for Africa, and Middle East and India, where there was no change.

Northern Europe, North America, and Southeast Asia recorded the steepest declines in container vessel arrivals compared with the pre-COVID-19 period at 24.5%, 21.6%, and 19.5%, respectively.

Middle East and India was the only region to record a double-digit decline in port productivity at 11% year over year. On the other hand, Southeast Asia, North America, and Africa recorded the highest rise in average port moves per hour in the past 12 months at 10.3%, 8.6%, and 6.2%, respectively. When considering the trends in the past four years, it becomes clear that North America and Oceania, where port moves declined 33.4% and 31.2%, witnessed significant changes in port moves per hour, partly caused by port congestion and reduced schedule reliability.

Vessel and call sizes

Between the fourth quarter of 2021 and the fourth quarter of 2022, the share of container ships above 8,501 TEU capacity calling in Africa increased by 20.6%. A strong increase

was also recorded in Northern Europe (12.6%), Oceania (11.1%), and Middle East and India (10.2%). Only one region recorded a noticeable decline in the share of above 8,501 TEU vessels – Southeast Asia at 5.6%. All regions recorded a drop in average call sizes year over year, with the strongest declines recorded in North America (19%) and Northeast Asia (16.9%). The drop was the smallest in Northern Europe (2.9%) since the fourth quarter of 2021.

The picture looks very different when focusing on medium-term changes compared to the first quarter of 2019. Despite significantly smaller call sizes observed in the fourth quarter of 2022 compared with the previous quarter, most of the nine regions still showed major increases in average call sizes compared with the pre-pandemic year of 2019 – North America (18.1%), Latin America (17.1%), Northeast Asia (21.2%), Southeast Asia (16.9%), Oceania (19.3%), and Northern Europe (15.1%).

Survey analysis

Compared to the November 2022 survey, there are slightly more cargo ports reporting year-over-year growth in the number of vessel calls across all vessel types, except for other cargo vessels. The increase is the highest for container vessels (from 41% in the third quarter of 2022 to 53% in the last quarter of 2022) and bulk carriers (from 43% to 50%).

In general terms, the Americas recorded the lowest share of ports with growth of more than 2% in vessel calls on a year-over-year basis. Sub-Saharan Africa, Southeast Asia, and Oceania presented the highest shares.

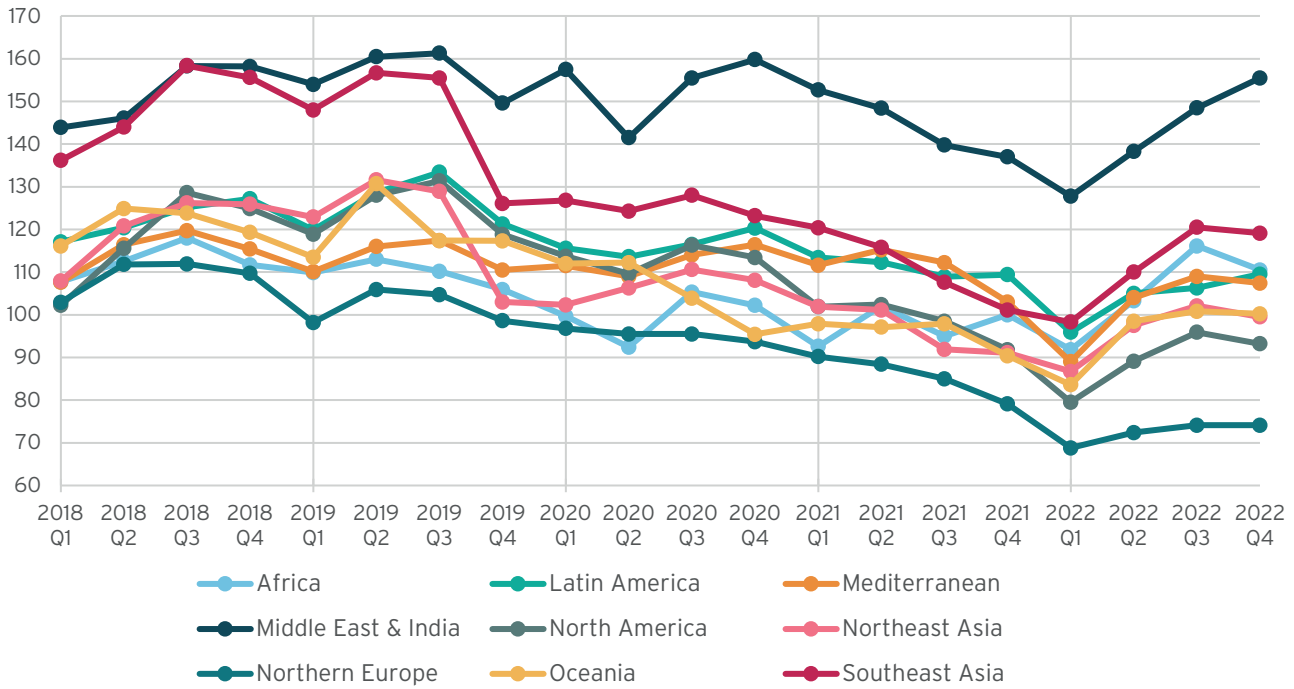
About 49% of ports expect growth of at least 2% in the container throughput, while this figure amounted to 52% in the November 2022 survey.

The percentage of respondents reporting an underutilization of warehousing and distribution facilities increased to 14% in the fourth quarter of 2022 from 11% in the third quarter of 2022. Yet, at the beginning of 2023, such underutilization was minor in all cases. This is an improvement from the previous measurement, when the tracker recorded 3% of ports facing rather severe underutilization.

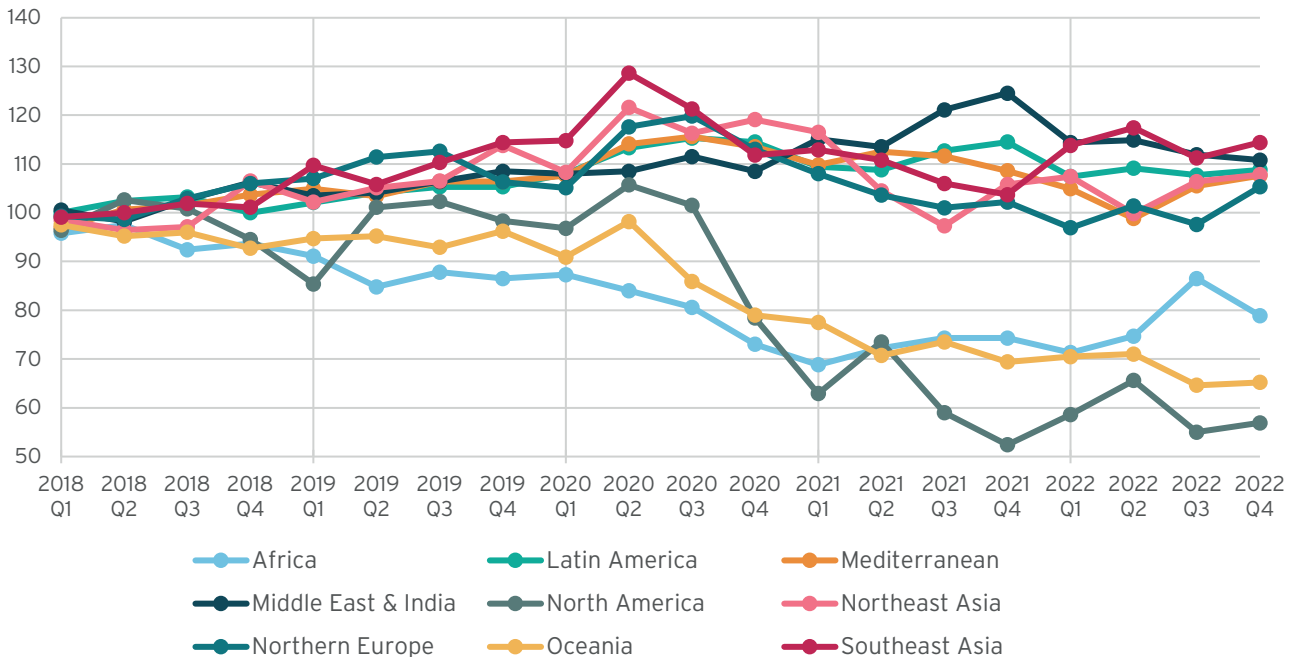
The survey results also revealed that the vast majority of responding ports face insignificant shortages of operational workers, making for smooth operations. ■



Vessel calls per region (index-based reporting with Q1 2017 = 100)



Port-moves-per-hour per region (reporting quartile development, index-based with Q1 2017 = 100)

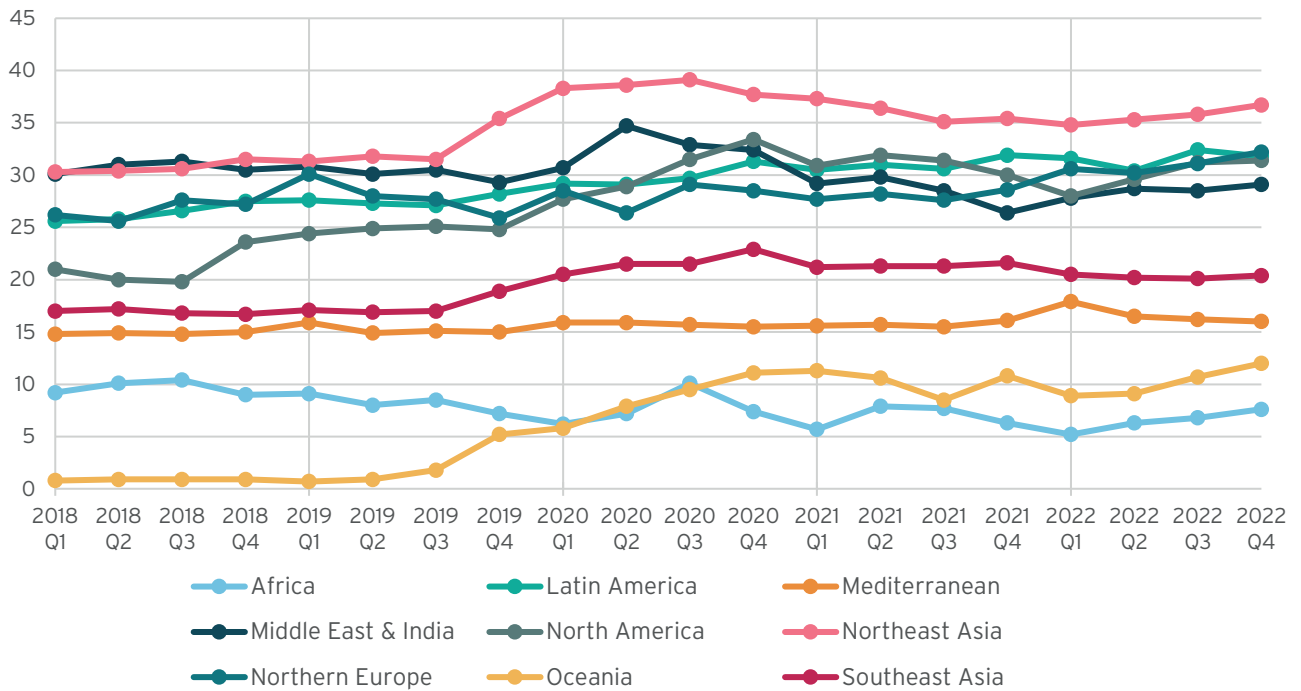


Port-moves-per-hour: Total moves recorded divided by total port hours recorded over the period.

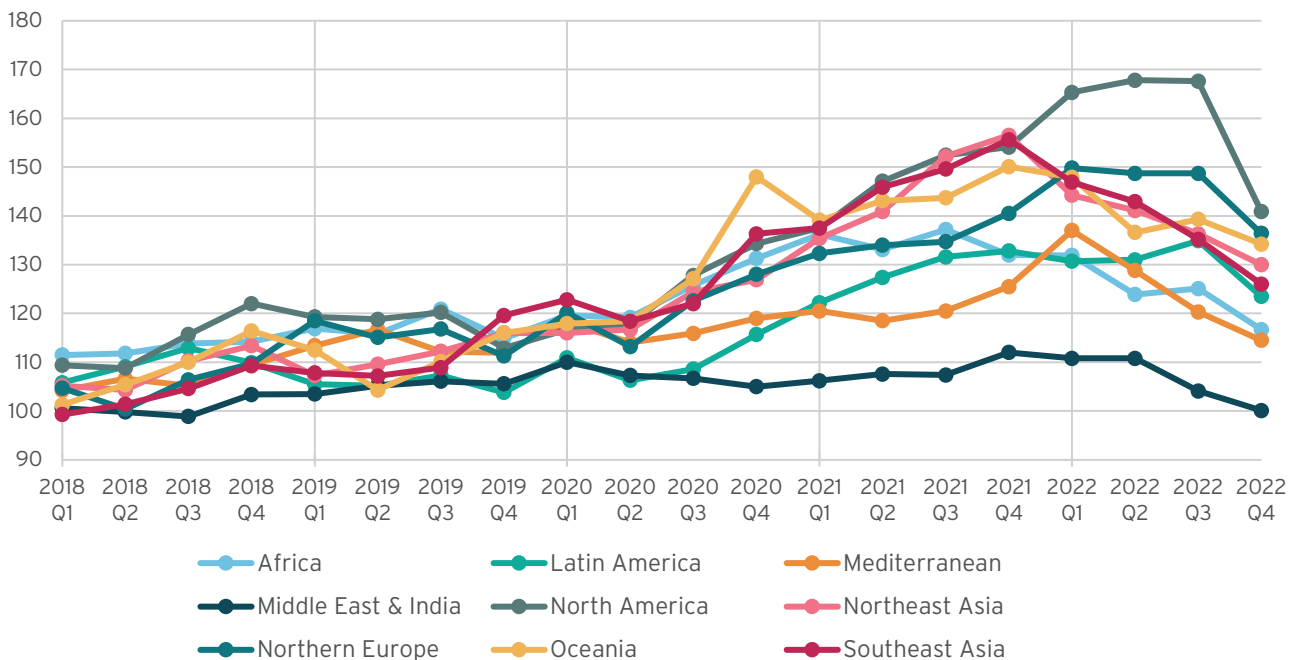




Evolution of vessel size per region (reporting share of 8,501 TEU + vessels in total container vessel calls, compared with Q1 2017)



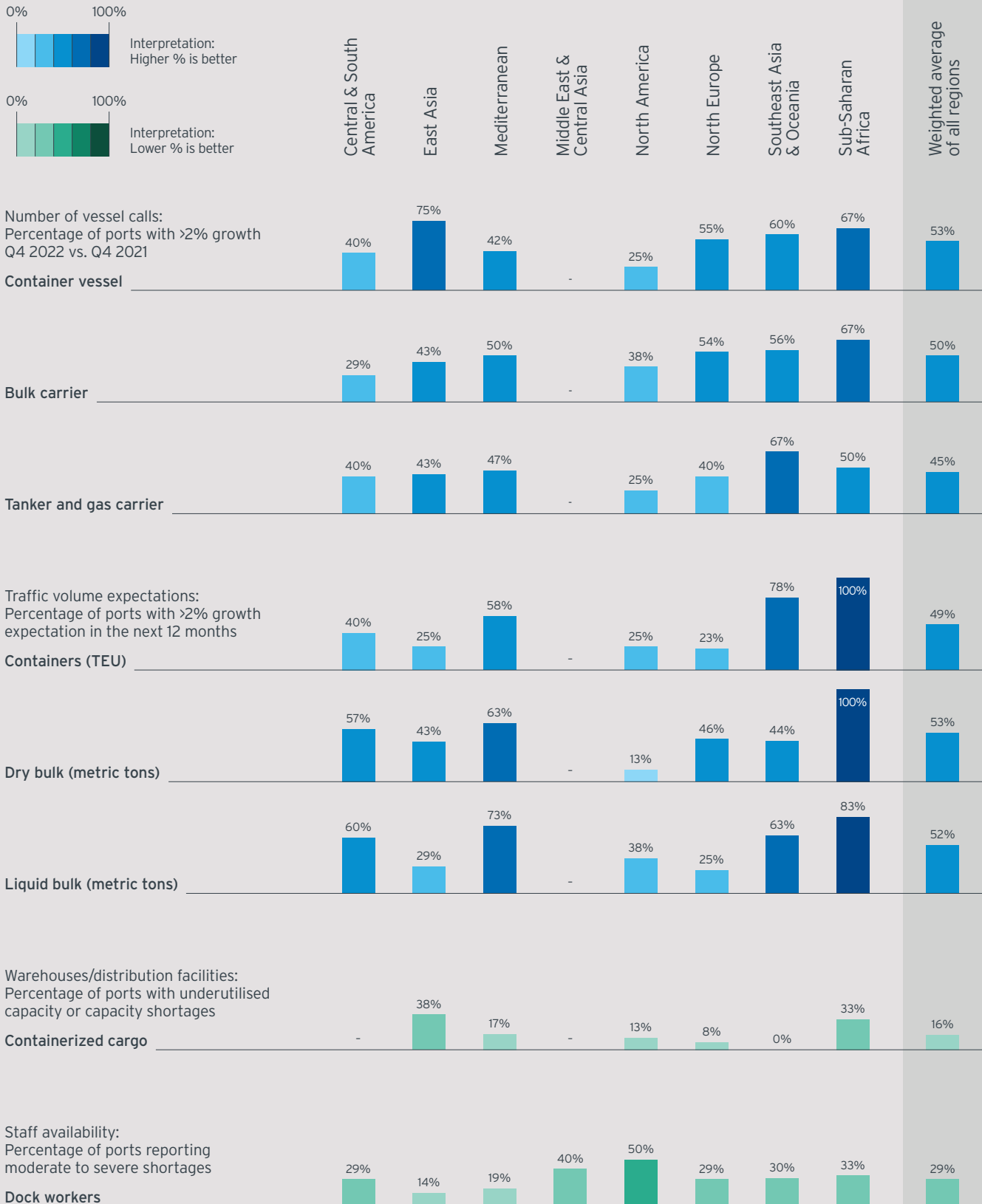
Evolution of call size per region (reporting quartile development without call size band reference, index-based with Q1 2017 = 100)



The index is created using the average regional values per quarter (total moves/total calls).



Excerpt from the IAPH World Ports Tracker (Q4 2022)





PETER TIRSCHWELL

Vice President, Journal of Commerce by S&P Global

THE COLUMN

Same procedure as every year

From a seaport's perspective, observing and interacting with the container shipping carriers over the past three years have been a dizzying experience of watching historic profits be generated but wondering what the long-term impact will be. The simple answer is: not much.

"With the earnings before interest and taxes generated by liner shipping carriers during 2020, 2021 and 2022, the carriers have over the past three years made far greater operating profits, than they did in the combined previous 63 years, since the maiden voyage of the first container ship," SeaIntelligence wrote in March.

But in important ways, that does not matter. In the absence of another historically disruptive event like COVID-19, the long-term economics of the container sector have not fundamentally changed. COVID-19 may very well turn out to be a one-time windfall never to be repeated. True, the ownership groups of the major container shipping companies possess a massive windfall to invest as they please, some of which will be directed toward familiar logistics industries.

But when it comes to managing their core container shipping businesses, the carriers will almost certainly behave no differently than prior to COVID-19, irrespective of their massive war chests. With freight rates continuing to be driven by supply and demand — in other words largely out of the control of the ocean carrier to influence — cost management is the well-known tool carriers will fall back on as their main lever to manage their P&Ls.

That means they will continue to drive hard bargains on everything from marine terminal to tug, port and inland services. They will fiercely resist price increases and miss no opportunities to leverage their bargaining power to their advantage.

This determination to continue in their day-to-day approach to the business, as if the pandemic never happened, will only be reinforced by the very different outlook the industry sees when looking out into the balance of 2023 and beyond.

Although some analysts believe profitability will likely continue for the industry this year, the good days are disappearing fast. According to Seaintelligence, fourth-quarter earnings of the carriers were 46% below the prior year quarter. The online freight exchange Freightos reported on 4 April

that its Asia-US West Coast daily FBX ocean rates dipped to \$990 per FEU, a new FBX low for this lane and in loss-making territory, according to some analysts.

In other words, prepare yourself for business as usual. ■

"In other words, prepare yourself for business as usual"

ABOUT THE AUTHOR

PETER TIRSCHWELL is a vice president within the Global Intelligence & Analytics division of S&P Global Market Intelligence. In his role he leads the Journal of Commerce, a team of specialized journalists covering ocean containerized supply chains on JOC.com and organizing the TPM, Breakbulk and Inland events.

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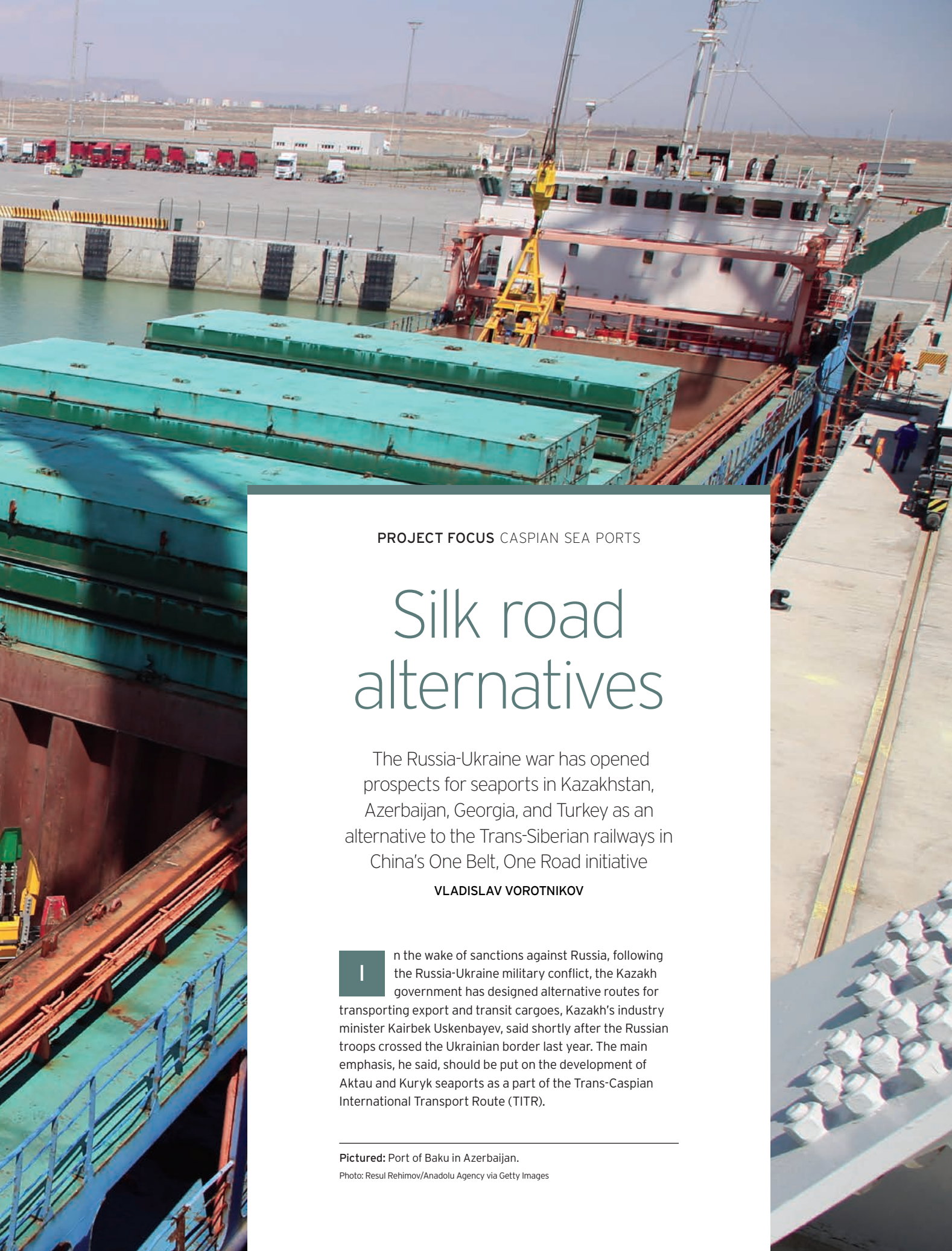
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Silk road alternatives

The Russia-Ukraine war has opened prospects for seaports in Kazakhstan, Azerbaijan, Georgia, and Turkey as an alternative to the Trans-Siberian railways in China's One Belt, One Road initiative

VLADISLAV VOROTNIKOV

In the wake of sanctions against Russia, following the Russia-Ukraine military conflict, the Kazakh government has designed alternative routes for transporting export and transit cargoes, Kazakh's industry minister Kairbek Uskenbayev, said shortly after the Russian troops crossed the Ukrainian border last year. The main emphasis, he said, should be put on the development of Aktau and Kuryk seaports as a part of the Trans-Caspian International Transport Route (TITR).

Pictured: Port of Baku in Azerbaijan.

Photo: Resul Rehimov/Anadolu Agency via Getty Images



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All eyes on Kazakhstan

Kazakhstan is the key element of the new silk road initiative. In the past, goods flowed through the country to Russia's Siberia and then westward by rail to Ukraine and Belarus through transport corridors known as northern routes. Now, Western sanctions have pushed numerous businesses to refrain from using this supply channel, meaning that from Kazakhstan, goods from mainland China, instead of going north, need to turn south toward the Caspian Sea.

To facilitate the growth in cargo turnover of the Caspian seaports, the Kazakh government plans to attract the world's largest container operators: Maersk, MSC, and Cosco Shipping, Uskenbayev said. These companies suspended operations in Russia in 2022.

In December 2022, the ministry rolled out a new program for the Kazakh seaport development, under which the capacity of Aktau and Kuryk ports should grow by 9.4 million metric tons (MMt) from 21 MMt in 2022.

Kazakh president Kassym-Jomart Tokayev disclosed that Kazakhstan plans to invest \$20 billion into logistics and diversifying transport routes. In addition to expanding the existing infrastructure, the countries participating in TITR will take steps to establish a digital transport system with simplified custom clearance and prompt exchange of transport documentation, Tokayev said during a press conference in Samarkand in November 2022.

In the next few years, Kazakh seaports are likely to enjoy an inflow in investments, which, to a degree, will be secured by sweeping Western sanctions against Russia. "The fact is that today European and Asian countries consider everything connected with Russia and Belarus toxic. So, the sanctions are being expanded. Each new set comes with a greater price for Russia," Konstantin Selyanin, head of the Russian think tank Ural school of negotiations said, adding that it cannot be ruled out that at some point, all cargo deliveries through Russia could fall under Western restrictions.

The gaps to be filled

Other countries engaged in the trans-Caspian route are also taking steps to expand seaport capacity, anticipating a rise in transit flows in the coming years. For example, Azerbaijan is scheduled to begin the next stage of the Baku port construction this year. It envisages increasing cargo traffic volume to 25 MMt, including 500,000 TEU containers. Head of the strategic planning department of the Baku International Sea Trade Port Khudayar Hasanli, called to speed up the expansion program during a press conference in November 2022.

Georgia also mulls expansion plans of its Poti Sea Port, which are aimed at doubling its annual container capacity to over 1 million TEU. APM Terminal Poti is in final negotiations with the government for an agreed expansion of the seaport, chief financial officer of APM Terminal Poti Ian Rollinson, disclosed in January 2023.

Since early 2022, cargo handling has increased at Poti port, raising the demand for further capacity. Poti seeks an increased role in the middle corridor, another name for TITR, according to APM Terminal Poti.

The Ukrainian crisis, in fact, has created competition for the cargo that used to be delivered through Russia. Selyanin said the countries expanding their seaport capacities "are now taking advantage of the situation in a very timely manner, according to the principle: strike while the iron is hot. Because there are certainly other alternatives to TITR. In my opinion, everything will result that a bypass to Russia will eventually appear."

Eliminating bottlenecks

The trans-Caspian route, however, is unlikely to fully replace transit through the northern routes in the foreseeable future. Cankat Yildiz from Middle Corridor Logistics estimated that the volumes transiting through northern routes reach approximately 1.5 million TEU, while the trans-Caspian route in its current shape can accommodate only 3%-5% of that flow.

Deeper cooperation is needed between European and Chinese companies to bring more vessels to the Caspian Sea. However, this is not the only part of the supply chain where problems are seen.

The Baku-Tbilisi-Kars(BTK) railway line between Azerbaijan, Georgia and Turkey is also congested, Yildiz said during an industry conference last year.

Turkey is also taking steps aimed at expanding its seaport infrastructure. For example, Turkey's southern Mersin province will be expanded from 2.8 million TEU to 3.6 million TEU, according to the country's Transport and Infrastructure Ministry. To some extent, this is also done in anticipation of the rising transit supplies.



Pictured: Aktau Port in Kazakhstan.

Photo: Matyas Rehak/Alamy Stock Photo

In 2022, Kazakhstan alone recorded a 150% increase in volumes of goods transported via TITR to 1.5 MMt, Rauf Agamirzoev, an independent transport analyst based in Azerbaijan, said, admitting that there are several problems constraining the further growth in traffic.

“The Kazakh port infrastructure is not capable of handling large volumes of cargo. In addition, Kazakhstan’s main interest is related to the transportation of oil, coal and uranium, but the Chinese One Belt, One Road concept is primarily aimed at increasing container traffic,” he said.

In addition, to secure growth in traffic, all countries involved in the TITR initiative should act in concert, which is not the case. For instance, the delays in building new seaport capacities in Georgia are believed to discourage investors from scaling up business in Azerbaijan.

“Sometimes, cargo sent from Azerbaijan is delayed in a Georgian port. Currently, the priority for Georgia is the construction of the deepwater port of Anaklia on the eastern coast of the Black Sea. The port will be able to receive up to 100 MMt of cargo and up to 1 million containers. Panama-type ships will moor in this port,” said Agamirzoev.

While the Ukraine war, and hence the new cargo transit streams, led the Georgian government to revive the Anaklia port project in late 2022 following its initial cancellation in 2020, an opening is uncertain. The government and the Anaklia Development Consortium are fighting in legal proceedings over the project.

Russia is yet to give up

The future of the TITR initiative lies in the political and economic fields. Selyanin said that while political decisions can be revised or canceled, economic impact usually cannot be reversed. Currently, the cost of mainland China to Europe cargo deliveries through the northern routes is lower compared with TITR, but the additional investment can change that.

After a slump in the first half of 2022, the turnover of Russian seaports picked up pace in the last months of the year. Turnover reached 841.5 MMt, 0.7% up compared with the previous year, said the Russian Federal Customs Service.

Despite the sanctions, Russia-China trade turnover last year jumped by nearly a third, reaching a record-breaking \$190 billion. Russia is not disclosing much information about its trade operation owing to sanctions, but even transit deliveries partly bounced back in the second half of 2022 after a slump at the beginning of the year.

“Volumes definitely picked up again, in the first place, thanks to Turkey,” commented a source in the Russian transport industry who wished not to be named. “It is too early to say that the volumes could reach the pre-crisis level soon, but it would also be wrong to say that Russia is isolated. A growing number of companies import and export goods, including European, through the Middle East, including some stuff that the sanctions directly prohibit to sell to Russian customers, like luxury cars.”

The source added that he doubts that businesses, including Chinese, indeed will be betting on the TITR since this route is moving through the region, which itself is highly unstable, citing an armed conflict between Armenia and Azerbaijan for control over the Karabakh region, unrest in Kazakhstan at the beginning of 2022, and historically strained relations between Turkey and Georgia, and most recently, a series of earthquakes in Turkey.

“Until the Ukrainian conflict is over, and sanctions against Russia have taken their final shape, I think business will take a waiting stance. After all, the uncertainty in the post-Soviet space now is unprecedented, including in Central Asia and the Caucasus. I would expect moderate growth in the trans-Caspian route, but I highly doubt it will become as important as some people forecast,” he added.

The future of the trans-Caspian route will depend on various aspects. While cargo flows are expected to grow, and pledged investments in capacity expansion look promising, there are factors in play that could constrain the future development of this transport corridor in the coming years. ■





LOOKOUT MEGA VESSELS

Ever expanding

There is a race on to lead the table of the new generation of mega-large container ships. After Evergreen's series of three vessels, which were launched in 2022 with a capacity of just over 24,000 containers, MSC's *Loreto* is now in sea trials to test the construction of the 24,346 TEU behemoth.

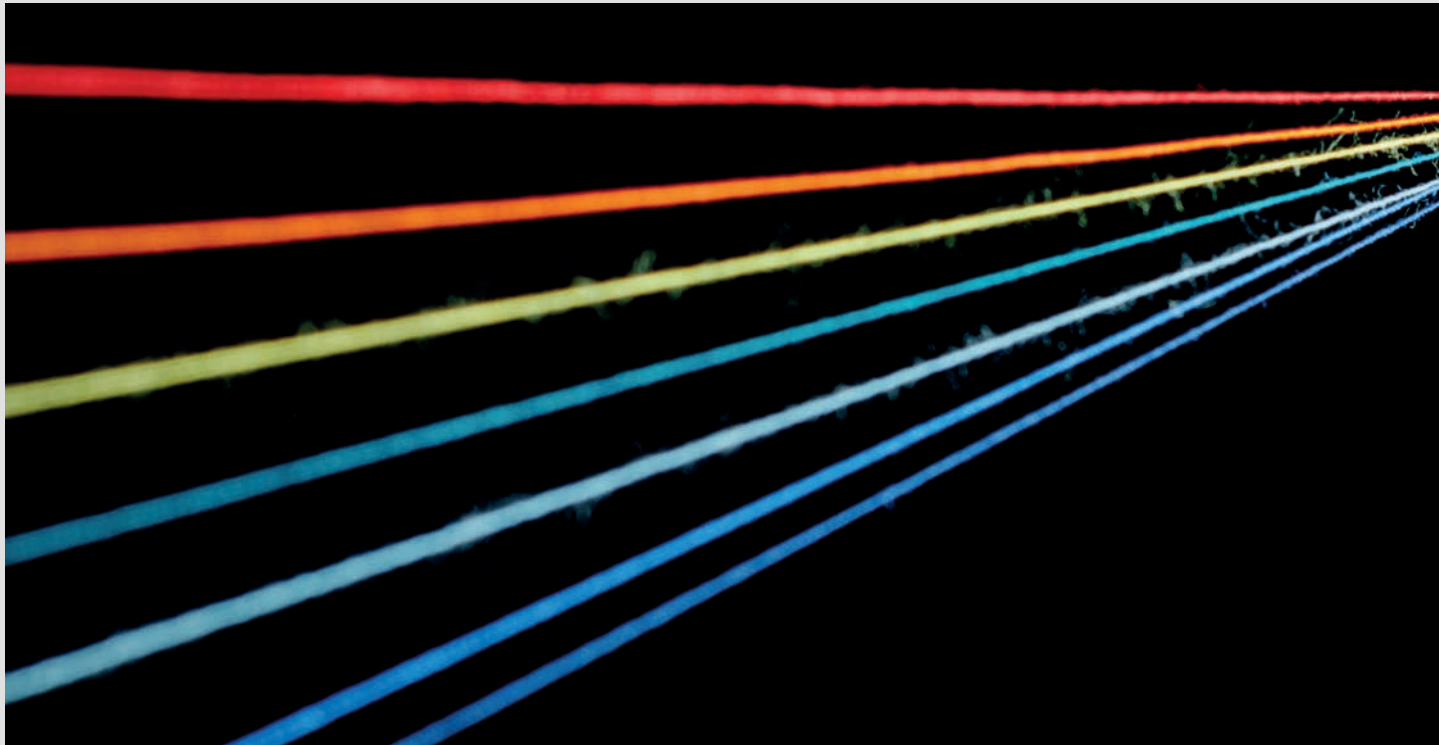
One of the several MSC sister ships, *Tessa*, as well as OOCL *Spain*, were delivered in March 2023. Together, these new vessels signify another step toward ever growing vessel sizes.

The development also confirms Asia's position as the top mega-vessel shipbuilding region with some being built at Jiangsu Yangzi-Mitsui Shipbuilding in mainland China, and other contracts by Evergreen, MSC and OOCL handed over to several China State Shipbuilding Corporation yards.

More vessels of +24,000 TEU capacity will enter into service over the course of the year. MSC alone has 14 vessels of such magnitude on order, which will serve the Europe-Asia trade and are thus confined to the 400-m length restriction of the Suez Canal and various ports.

Time will tell how the addition of capacity will pan out for the world's largest container ship carrier MSC, with about 20% of blank sailings for westbound sailings having been reported by the 2M alliance of MSC and Maersk in the first seven weeks of the year, according to industry monitor Alphaliner. ■

Pictured: Tugboats push OOCL *Spain*, the first of a series of six 24,188-TEU vessels ordered by COSCO-owned OOCL, off the outfitting quay of a joint shipyard of COSCO and KHI for a sea trial in Nantong in east China's Jiangsu province in February 2023. Photo: XU CONGJUN/Alamy Stock Photo



PERSPECTIVE VOYAGE OPTIMIZATION

Developing a digital ecosystem for a quick turnaround in ports

Digital technologies are enabling shipping companies to make great strides in automated routing to optimize voyages according to time, speed or cost, and thereby cut emissions to improve their carbon intensity indicator (CII) rating. However, port calls remain a decarbonization challenge because of the rush to wait and the lack of compelling business incentives to alter current sailing patterns. Data-driven logistics with a common ecosystem for all stakeholders is key to realizing more efficient port turnarounds through just-in-time (JIT) arrivals.

Ports are vital hubs in the global supply chain, given that around 90% of world trade is carried by sea, but recent issues of port congestion have highlighted the importance of efficient logistics coordination to cut both

the cost to the environment and operational costs for shipowners.

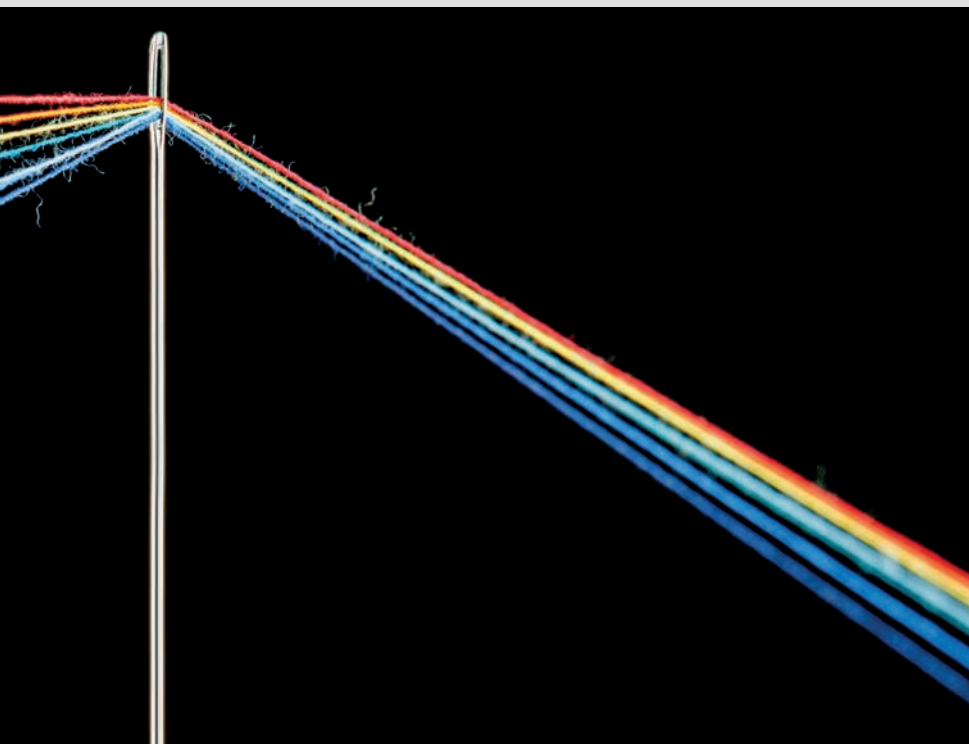
An analysis of global AIS data carried out by MarineTraffic showed that on average, ships spend up to 9% of their time waiting at anchorage, which results in burning more fuel from the use of auxiliary engines and boilers. About 15% of marine fuel consumption occurs at anchorage or while vessels are maneuvering at low speeds in port, according to DNV's analysis of AIS data.

In an ideal scenario, ships would sail at the optimal operating speed to arrive at port with the availability of a berth, fairway, and services, such as pilotage for a JIT arrival. Such arrivals are a feasible opportunity to cut greenhouse gas emissions through improved fuel efficiency during the voyage and reduced waiting time at ports.

Lack of visibility

Additional benefits from JIT arrivals are improved safety as a result of reduced port congestion and potential increase in revenue for ports from faster turnarounds. However, this has proven highly challenging to implement in practice, largely because of the complexity in orchestrating the interactions among all relevant stakeholders, including port authorities, inland transport providers, cargo services, and ship operators. Without an efficient exchange of high-quality, reliable, and accurate data to give visibility to all these parties, optimizing port calls will remain difficult.

For example, a vessel may not be notified of delays to berth availability until two hours before the scheduled arrival when it is within the 30-nautical mile range for radio contact.



ABOUT THE AUTHOR

DAVID LEVY is the chief marketing officer at OrbitMI. He joined the firm in 2019 after the company's spinoff from Stena Bulk. Levy focuses on go-to-market activities, partner relations, and customer success management. He has been instrumental in advancing OrbitMI's sustainability efforts.

Fragmented systems

In addition, tracking vessel activity requires a lot of time-consuming manual communication, with hundreds of emails and phone calls every day with different stakeholders to keep track of changes to vessel estimated time arrivals – for example, owing to adverse weather conditions or bunker stops – as well as keep logistics providers in the loop.

The issue of logistics coordination is compounded by port actors, such as agents and terminals, working on fragmented data systems and similar limitations on interaction between ports in the same region.

According to the IMO-backed Global Industry Alliance To Support Low Carbon Shipping (Low Carbon GIA), sharing port updates on berth availability with the ship much earlier through satellite connectivity would enable it to adjust its speed and sail more efficiently. A study commissioned in 2022 by the Low Carbon GIA on the implementation of JIT in the containership sector, which analyzed the impact on 26 ships calling at the Port of Rotterdam, found that optimizing vessel speed over the last 12 hours of a voyage could result in a 4.23% fuel saving and as much as 14% over the entire voyage.

“The issue of logistics coordination is compounded by port actors working on fragmented systems”

DAVID LEVY
Chief marketing officer, OrbitMI

Plotting a route to API economy

To achieve port call optimization, all stakeholders need to be able to easily access key operational, administrative and nautical data – such as vessel arrival and departure times, service completion times, and other timestamps – on a unified platform with common global data standards.

The IMO, which has identified JIT arrival as a priority to reach its climate goals, is promoting a standardized single-window concept for electronic data interchange (EDI) to digitalize ship-reporting formalities at ports under the FAL Convention.

This mirrors increasing adoption by vessel operators of digital technology for optimized voyage routing using multiple application programming interfaces (APIs) – for example, real-time weather data – streamed via a single-user interface, such as that delivered by software-as-a-service provider OrbitMI, to give actionable insights for better vessel decision-making.

This enables ships to adjust their speed according to a range of criteria – such as CII rating, fuel consumption, or ETA – and it is not inconceivable that the voyage management system could also be fed with real-time

port data in future for improved routing optimization using predictive analytics. Similarly, EDI can provide the platform for shipowners' emissions data reporting in relation to CII.

Smart ports emerging

Many ports are yet to make the digital shift. In 2020, only 49 of the IMO's 174 member states had so-called port community systems for data sharing. However, some are investing heavily in smart digital technologies to automate operations, interactions and processes to boost efficiency, while increasing transparency across the supply chain by harmonizing standards to give a single source of truth for data sharing.

As well as the need for collaboration and standardization, there are contractual obstacles to port call optimization as charter party terms may need to be adjusted to allow for JIT arrivals – especially in voyage charters with a Due Dispatch clause where slowing the vessel's speed could result in a contractual breach. BIMCO has therefore developed a JIT arrival clause for voyage charter parties.

However, technologies exist to overcome these barriers as other industries have done and, as ship operations become more data-driven and interconnected through the API economy, it is surely only a matter of time until the missing links are found for digital evolution of the wider supply chain. ■



ABOUT THE AUTHOR

PASCAL OLLIVIER is the president of Maritime Street, a digital trade logistics strategic advisory and expert services firm to shape the future of maritime trade. He is also the chairman of the IAPH Data Collaboration Committee.

How to

...implement a maritime single window

The IMO Facilitation Committee, at its 46th session in May 2022, adopted the resolution FAL.14(46) on amendments to the annex of the FAL Convention, which will make the implementation of a maritime single window (MSW) for data exchange in ports around the world mandatory from 1 January 2024.

The implementation of a MSW is not only an information technology, but a major change-management project related to the port call process, aiming at reducing delays and congestion, improving operational efficiency, saving costs, and reducing emissions.


Here are 10 key recommendations to assist port authorities in getting ready for January 2024. ■


N°1		Five principles of public-private data collaboration
<p>A maritime single window (MSW) is a public-private data collaboration platform that allows the submission to a single-entry point of standardized and harmonized information related to the electronic exchange of data required on the arrival, stay, and departure of ships in ports and harbors. As public and private stakeholders are part of the port call process, the implementation of a MSW requires a holistic approach and must consider the five principles of data collaboration: engage stakeholders, establish data governance, orchestrate data, drive change management, and establish long-term financial sustainability.</p>		


N°2		
<h3>Legal framework</h3>		
<p>From day one, a major focus should be placed on the legal framework by the director of legal affairs of the port authority. A recent analysis of two international financial institutions projects highlighted that the port call legal framework could impact 18 laws, decrees, and regulations in a large South American state and 11 legal instruments in a small island developing state in the Pacific. The digital transformation of the port call will require early on an as-is business process analysis that will map the legal instruments associated with the vessel clearance process. Beyond this first analysis should highlight other legal instruments.</p>		


N°3		
<h3>Coordinated border management</h3>		
<p>Engaging the main governmental agencies related to vessel clearance process is essential for an MSW project. Collaborating with the maritime authority, customs, agriculture, health, environment, and immigration agencies is required to move toward a coordinated border management that will be facilitated by the MSW. Equally important, the MSW will become a pillar to foster coordinated risk management. The port authority will play a role in leading the engagement of the governmental agencies to build trust and to collaborate on the as-is and to-be analysis, the evolution of legal frameworks, and the way toward a coordinated border management.</p>		


N°4		Road map
<p>The FAL 46 resolution is an opportunity to develop the road map for the digitalization of the port call. In a first instance, the focus should be placed on the mandatory data requirements related to the 13 declarations mentioned in resolution FAL.14(46), Section 2. Do note that FAL.14(46) has removed the notion of forms, instead introducing the notion of information, data and data sets related to the declarations. The digital transformation of the vessel clearance process – that in many countries is quite cumbersome – should be implemented in a second phase, if not in parallel to the first phase. Finally, digitalization of the fully fledged port call process, including all vessels services, shall be considered from pilotage to shipyard maintenance in a third phase.</p>		

N° 5		Just-in-time port call
<p>The holy grail of the MSW project is the route to port call optimization and the just-in-time arrival of a ship, since both improve operational efficiency and reduce greenhouse gas emissions for shipping lines. Once the digitalization of the port call process has been established through the MSW, a next phase must be considered to comply with the standards of the International Taskforce Port Call Optimization and the IMO Just-in-Time Arrival Guide to have a significant environmental impact through the reduction of GHG emissions. If your state is part of two-third of countries that have not yet implemented a port community system (PCS), the MSW implementation presents an opportunity, such as in Djibouti, to consider MSW as the vessel module of the PCS. Then, in a second phase, the port authority could move the port terminal dimension forward, as well as the port community area and the hinterland domain, which could also eventually enable the collaboration with other states through a digital corridor, as is the case in Djibouti.</p>		

N° 6		
Data orchestration		
<p>Data orchestration between all public and private stakeholders should take place to enable business process automation of the port call. Based on the IMO Compendium, including the IMO data set and IMO reference data model, interoperability between automated systems will be required. To that purpose, an international best practice, such as the European Interoperability Framework, could be leveraged to consider the legal, organizational, semantic, and technical dimensions of interoperability.</p>		

N° 7		Operating model
<p>As the digital maturity levels vary from state to state, you may consider implementing an MSW as a standalone data collaboration platform that is interoperable with stakeholders' automated systems. Another scenario is that MSW is implemented as the vessel module of the port community system, either as part of an existing PCS or as the first service of a new national PCS in the country. In any case, the MSW will become part of the single environment of your country.</p>		

N° 9		
Technical assistance		
<p>The complexity of the MSW implementation requires technical assistance in several domains, such as legal framework, business process, coordinated border and risk management, interoperability, digital systems, and public-private project management. Engaging IMO and strategic partners, such as the International Financial Institutions, is a must to mitigate risks associated with the project, including the project long term financial requirements.</p>		

N° 8		Human capital
<p>MSW implementation is multidimensional and requires the establishment of a project implementation team led by a leader capable to manage complex projects. Capacity building and development of human capital shall be a priority within all public and private stakeholders, particularly in developing states.</p>		

N° 10		High level political commitment
<p>Finally, our last, but most valued, recommendation for the implementation of an MSW is the mandatory requirement of a high-level political commitment to empower the necessary reforms and collaboration between governmental agencies.</p>		



ABOUT THE AUTHOR

TOM PAESHUYS is the representative of the Port of Antwerp-Bruges in North America. He brings together port stakeholders and potential business partners with their equivalents in Belgium.

7:00



8:00



9:00



12:00



Nine to five

While the Port of Antwerp-Bruges is among the largest in Europe, it also holds close relations with customers in the US, as its stateside representative tells *P&H*



The day starts early at 7 am. I catch up, reading the specialized press that has been analyzed and summarized by one of the team members in the headquarters in Antwerp.



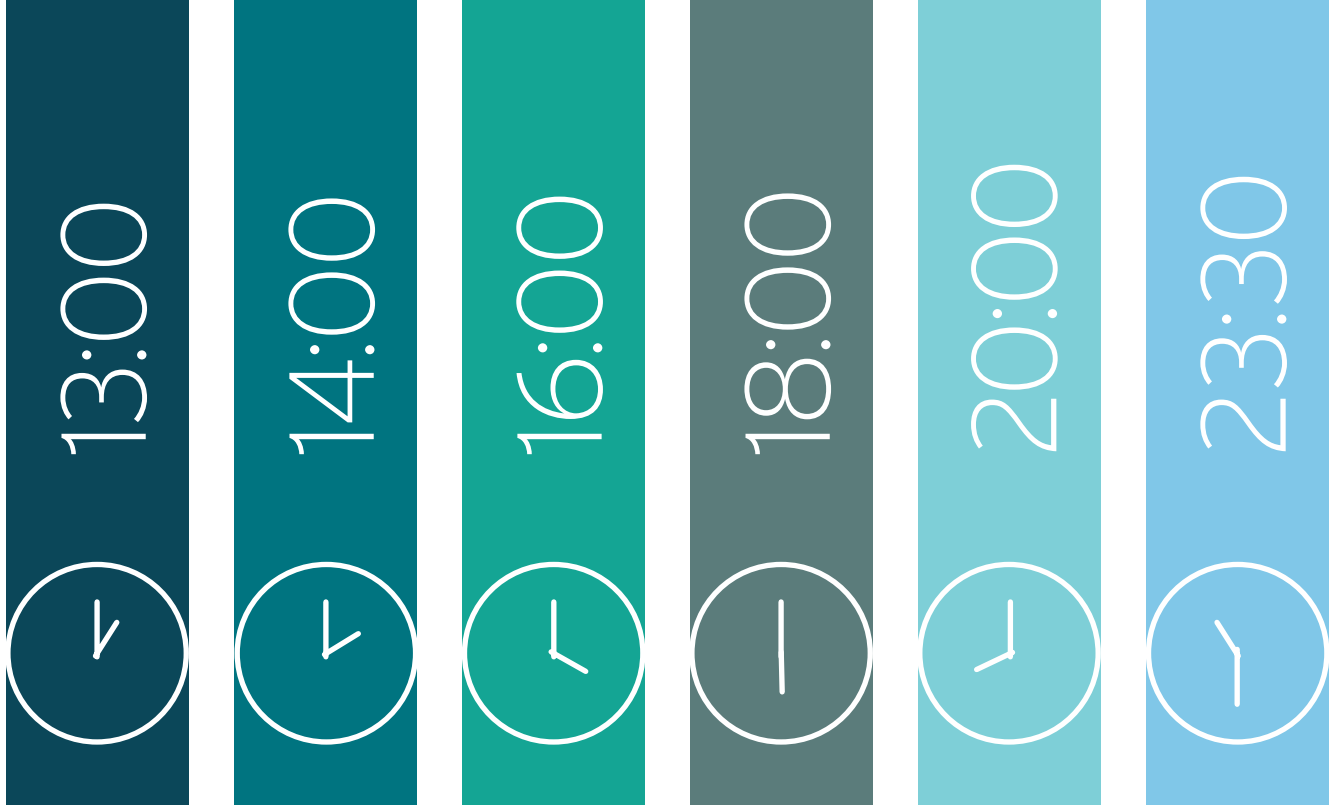
The time difference of six hours with Europe pushes me to make some early calls to connect with my coordinator Carla to go through the current agenda.



I take my bike and ride to the office. So European! Once I arrive, I read some promotional materials. I have a plane to catch: a meeting in Houston with the port authority is scheduled.



I have arrived at Dulles airport and I am Ubering to the headquarters of Houston Port Authority to discuss a joint approach on energy transition – a green fuel project. Also invited to the event are several chemical plants and potential carriers. A roadmap is defined.



I take some time out of my busy day to have lunch in between my different meetings and make my way from the port authority over to the city center.



I am visiting some old friends and one of Antwerp's finest, logistics service provider Katoen Natie. We discuss general trends and challenges in local container supply. I promote the position of Antwerp-Bruges, specifically focused on the hinterland connections and feeder possibilities.



A meeting is scheduled with the Greater Houston Partnership to discuss a potential showcase on the break bulk facilities at the Port of Antwerp.



The final meeting of the day is with the honorary consul Peter Dumolin to prepare a visit with top managers of the Port of Antwerp-Bruges this October.



A taxi brings me back to Dulles airport. My flight is at 9.30 pm – it was tight, but I made it.



I am home. Two excited dogs are happy to see me and forcing me to take them for a walk! What a wonderful day it was – interesting people and interesting challenges. Before going to bed, one glass of red wine – am I blessed?

CREATIVE SIDE SEA BLINDNESS

E

very year, the Royal Museums of Greenwich, United Kingdom, call to find the Astronomy Photographer of the Year. The competition features some of the world's greatest space photography from across the globe.

One of the recent winners somewhat also raised awareness to the fact that there is a certain sea blindness in society with seafarers rarely being visible in the public eye.

In 2021, third officer Dmitrii Rybalka won the title with his impressive Polar Lights Dance shot.

He was able to take the picture from the bridge of a tanker. The officer from Russia was on watch that night and able to capture the magical moment during the approach of the Kara Strait in Russia.

"Sometimes, even if you are not able to see it, you have the feeling that there is something in the air, that something great will happen," Rybalka said about the moment before the aurora borealis showed.

"I noticed a tiny white band approaching like a snake in the sky. I knew already, this is it, this is that I was waiting for. I took my camera, went to the bridge wing, took my position and started waiting, like a hunter waiting for its prey," said. "A few minutes later, the sky was full of bright green lights dancing in darkness and shining over everything on their way. I had felt that it was my mission to share this beauty with the world."

One of the judges, Sue Pritchard, said, "I'm intrigued by this image. It is both beautiful but extremely unsettling. The juxtaposition of the vividness of the green with the inky blue of the ship is so dense, almost like velvet. However, the lack of any sign of human life on this steadily moving vessel feels like the opening scene of a science fiction film."

Pritchard's notion of realizing the absence of other humans is something Rybalka will be painfully aware of. Seafarers, often gone for months at a time, rarely have the chance to promote their lonesome work journeying across the seven seas.

Something the National Maritime Museum, which is part of the Royal Museums of Greenwich, is committed to changing. It works on several initiatives to counter sea blindness this year, to raise more awareness to the maritime transport sector, its people, and challenges. ■

Pictured: Polar Lights Dance won the Aurorae category in Astronomy Photographer of the Year 13. The Astronomy Photographer of the Year 14 is currently on display at the National Maritime Museum, London, UK.

Photo: Polar Lights Dance © Dmitrii Rybalka

You are not alone







Membership notes

We are pleased to welcome as new regular and associate members of the association:

Regular members

Saudi Ports Authority

- 📍 Saudi Arabia
- ☎ +96 61 140 899 43
- ✉ a.almunif@mawani.gov.sa
- 🌐 www.mawani.gov.sa
- 👤 Abdullah Munif Almunif, vice president commercial business

Port Authority of Jamaica

- 📍 Jamaica
- ☎ +87 63 220 361
- ✉ dwpowell@portjam.com
- 🌐 www.portjam.com
- 👤 Dwain Powell, vice president, PCS Operator Department

Associate members

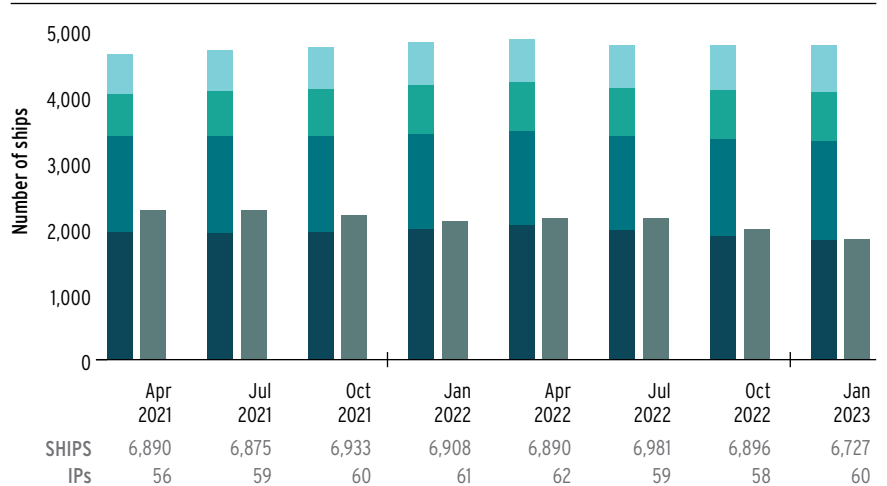
Indian Maritime University

- 📍 India
- ✉ director.chennai@imu.ac.in
- 🌐 www.imu.edu.in
- 👤 Rajoo Balaji, director, Chennai Campus

University of Houston (Port of the Future Conference)

- 📍 United States
- ✉ mmartin3@central.uh.edu
- 🌐 www.uh.edu/technology
- 👤 Kevin M. Clement, executive director, Strategic Partnerships

ESI scores: 1 April 2023



Note: Stacked bars show ESI scores above 20 points, single bar shows ESI score below 20 points

Source: IAPH | © 2023 by S&P Global Market Intelligence

Update to the ESI

As of April 2023, 6,577 vessels have been registered with the Environmental Ship Index (ESI). The ESI identifies seagoing ships that perform better in reducing air emissions than required by the current emission standards of the IMO.

Most of the removed ships scored in the 20-30-point range. However, there are now more registered vessels in the higher-ranking ranges between 30 points and those scoring above 50.

The average ESI for ships now stands at 30.6 points, reflecting a steady increase over the past three years since the introduction of the low-sulfur regulations, but the IMO saw the average ESI score drop.

In the above infographic, vessels scoring above 20 points have been visualized. With 4,760 vessels, this makes up the majority.

A new ESI at-berth module to measure

the emissions performance of a given vessel port call is under evaluation, starting with the cruise industry. Connected with this, the IAPH Cruise Emissions at Berth Project Group consisting of representatives of several IAPH cruise ports, in collaboration with the Cruise Lines International Association, has further worked on mapping out a plan for data reporting. The group is now looking into the potential design, development, and implementation of the system, which will take advantages of the synergies offered by the ESI system.

Find out more about the incentive program on the dedicated ESI website or contact the Green Awards team, which works with the IAPH on the scheme. ■

- 🌐 environmentalshipindex.org
- ✉ admin@environmentalshipindex.org

EVENTS TIMELINE 2023

4

MAY 4-5

UNCTAD TrainForTrade Port Endeavor Exercise to take place in Callao, Spain www.tft.unctad.org

1

JUNE 1-2

ESPO Conference Port conference taking place in Bremen, Germany www.espo-conference.com

26

JUNE 26-30

IMO Intersessional Working Group GHG Greenhouse gas debate taking place at IMO headquarters in London, United Kingdom www.imo.org



Working toward important IMO meetings – FAL and MEPC – IAPH policy and IMO liaison officer Rhona Macdonald talks *P&H* through her preparations

Q: Can you describe your role within IAPH and what your focus areas are?

A: The purpose of my role is to engage with IMO member states and international organizations to help drive forward the agenda of IAPH's three focus areas: climate and energy, data collaboration, and risk and resilience. This includes regular reporting to IAPH membership on the outcomes of meetings or communicating with IMO delegations to gather support for submissions or cosponsoring documents on issues such as energy transition or digitalization.

Q: The IMO's FAL Committee met in March. What was discussed and what were the outcomes relevant to ports?

A: The focus for IAPH at the 47th meeting of the FAL Committee, which took place March 13-17, was based on two submissions to the IMO. The first was a window-of-opportunities symposium that was held in January this year in collaboration with international shipping association Bimco, which outlined the outcomes of the joint IMO-Bimco-IAPH MSW. The second was a submission with International Port Community Systems Association and numerous member states proposing the development of a FAL resolution on the available resources to facilitate the implementation of an MSW, which was adopted by the committee.

Q: How are you preparing for the MEPC meeting in June?

A: The MEPC 80 is taking place July 3-7 this year and is a significant date in member states' calendars as this is the agreed deadline for the finalization of the Revised IMO GHG Strategy. MEPC and the Intersessional Working Group on GHG Emissions that reports to the committee have yet to reach a consensus on the level of ambition of the strategy. While significant diverging opinions remain, there is evidence of a willingness to compromise among member states to achieve the task at hand by the given deadline; however,

there is no doubt that a lot remains on the table to help conclude the decision-making process.

Another key topic at this meeting is the disbursement of revenues generated from a possible carbon levy-based approach as part of the mid- and long-term GHG reduction measures. IAPH maintains that a percentage of the funds should go toward supporting ports in developing infrastructure to facilitate energy transition. This was also a topic at our IAPH Climate and Energy Committee meeting that took place in London on April 19. Here we heard from ports and the World Bank on their positions going forward.

Q: What are your next steps in terms of regulatory issues that you currently work on?

A: At the forthcoming meeting of the MSC, discussions will be held on reviewing the 2017 Guidelines on Maritime Cyber Risk Management and identifying next steps to enhance maritime cybersecurity, a topic that is of great interest to IAPH. Given our previous work with the IMO to have IAPH's Cybersecurity Guidelines accepted and referenced in the IMO's overarching guidance, IAPH is considering contributing to this meeting in a continued effort to highlight the critical importance of developing robust cyber risk management plans in parallel to MSW systems.

I am also currently working in collaboration with the Inter-American Development Bank to contribute to its flagship report on climate adaptation. IAPH will be contributing case studies and industry examples to this report that is to be launched at the 2023 UN Climate Change Conference this year, analyzing the impact of climate change on transport systems and providing international best practices and lessons learned for the global south.

Q: How can IAPH members engage with you?

A: Going forward, IAPH looks to continue to build relationships with member state representatives at the IMO to help ports play their role in the energy transition and in improving the efficiency of trade through digitalization. As part of this, we are open to introducing port members to their respective country representatives at the IMO and welcome those interested in attending committee meetings as part of the IAPH delegation to get a flavor of our ongoing work and collaboration with the IMO team. Any port member that is interested in such an opportunity can email me at rhona.macdonald@iaphworldports.org. ■

Q&A

RHONA MACDONALD
IAPH policy and IMO liaison officer

3

JULY 3-7

IMO MEPC 80

Carbon reduction discussions to be decided in London, United Kingdom

www.imo.org

11

SEPTEMBER (11-15)

London International Shipping Week

Maritime meetings in London, United Kingdom

www.londoninternationalshippingweek.com

31

OCTOBER 31-NOVEMBER 3

IAPH 2023 World Ports Conference

The IAPH flagship conference in Abu Dhabi, United Arab Emirates

www.worldportsconference.com



BOOK AUTHOR

CHRISTIAN DE BEUKELAER

is a senior lecturer in culture and climate at the University of Melbourne's School of Culture and Communication, Australia. He was educated at the universities of Amsterdam, Leuven, and Leeds.

THE REVIEW

Trade winds: A voyage to a sustainable future for shipping

INES NASTALI



Christian de Beukelaer's book *Trade winds* could have solely focused on the crew change crisis that unfolded when the world went into lockdown in 2020 at the start of the COVID-19 pandemic. Instead, he set out to describe how his journey on board cargo transporting sailing ship *Avontuur*, a ship that transports luxury foods, such as coffee, chocolate and rum, went. A journey through which he wanted to find out if those ships could be used in greater numbers to bring goods from A to B and reduce the carbon footprint of the maritime industry.

The circumstances make it a mix of both, and the book also touches on encountering refugees at sea, feminism, history and people – and how they interact with each when confined to a sailing ship for months on end.

Already on the first page of the initial chapter, de Beukelaer describes one fundamental issue with vessels that rely on wind power: the vessel's departure was

delayed by a week owing to having "to wait for favorable winds".

One could be ignorant and close the book at this point. A ship that does not sail cannot deliver cargo. However, one would miss the adventurous story set during a time of uncertainty as well as a straightforward suggestion on how to reduce maritime emissions – and the author is not talking about wind propulsion. He suggests limiting the transport of coal, which would both reduce emissions as a result of reduced ship traffic, but would also reduce the usage of coal as a power source, thus reducing emissions on land.

When it comes to bringing about true change, the economics need to be right. Wind propulsion might struggle with favorable financials, the most important side of business. The author himself has a stab at coming up with a comparison between the cost of transporting cargo on a sailing and on a container ship. However, this gets complicated by throwing different currencies

and units around, which makes a comparison hard, especially as a typo in the book makes the whole matter more confusing.

According to my calculations, it seems that transporting cargo on *Avontuur* is 40 times more expensive than on a cargo ship.

The book repeats a lot of decarbonization facts that those in the maritime industry come across on a daily basis. So, do we need another book to remind us in the industry what we have to do to reduce emissions or would a LinkedIn post have done the trick? Maybe, maybe not. It cannot hurt, especially if you consider an audience that might exist outside the maritime industry but also when considering that "the shipping industry has made precious little effort to instigate a shift to green propulsion technologies".

With shore leave not an option, the author and the rest of the crew also had to endure the polluted air in ports. Another issue that the industry is well aware of and needs reminding to bring about change. ■

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