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THE E-JOURNAL OF PORTS AND TERMINALS



2019 IN REVIEW WITH A VIEW TO 2020

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FROM THE EDITOR

Welcome to the final edition of 2019. In an effort to make this year one to remember, this e-Journal focuses on the major events of 2019, with reviews in key areas of the industry providing a recap, overview and insight. The edition also features an outlook to 2020, with contributors tasked with blending their 2019 review into a vision for the new year.

This edition offers the aforementioned dynamic with regard to environmental issues, container automation, global news and shipping. We hope this provides you with the perfect end-of-year summary.

Much of the content herein will prove foundational regarding the way we begin 2020 and it will also have a bearing on our upcoming CTAC 2020 in March. CTAC, now in its fifth year, looks to be bigger than ever, and we look forward to welcoming you to the most extensive conference yet in PTI's 25th year of operations.

Next year will also see Port Technology's 100th edition go to print, so it's a very exciting year for us and more info will be released regarding our plan for the 25th year and the 100th edition in January.



In the meantime, I do hope you enjoy this edition and from myself and the whole team at PTI, let me wish you all a very Merry Christmas and a Happy New Year. You, our readers, make PTI what it is, so thank you for your continued readership and support.

Finally, let me also say a huge thank you to our fantastic partners and friends in the industry, we've had a great year with you and look forward to an even better 2020.

Richard Joy
Senior Editorial Consultant

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2020: THE FUTURE IS NOW

Lars Jensen, CEO, SealIntelligence, Copenhagen, Denmark

When it comes to the transformation of the container shipping industry, the past 20 years can be considered a gradual “warm-up” leading to the stark changes which are now rapidly beginning to make their mark. This also means that 2020 and the years following will see more rapid and profound changes in business and operating models than we have been accustomed to.

A number of different forces have been gradually moving into position and are now all coming to maturity at more or less the same time. As space is limited in an article such as this the following are merely a few examples and should not even be seen as exhaustive.

Anyone who has been involved in the container shipping industry will recognize a series of topics which has been the cause for much talk and contemplation over the past two decades. Of note are the topics of consolidation, ever larger vessels, digitalization and automation as well as environmental performance.

MERGERS AND ACQUISITIONS

Since the turn of the century, one of the key drivers for many liner shipping companies

has been growth through acquisition. While every deal done in and of itself did not change the overall consolidation much, the compounded effect has completely revamped the landscape. At the turn of the century the 10 largest carriers controlled 11% of the capacity. Now this has increased to above 80%. Furthermore 60 out of the 100 largest carriers in the year 2000 has now either entirely disappeared or is owned and controlled by one of the remaining carriers.

This means that the market, at least for the main deep-sea carriers, has become an oligopoly and the carriers are now beginning to learn how to effectively use the increased market power which comes with this. It does not mean that they will suddenly control the power – the internal competition between the carriers is too intense for that – but it does mean an increased level of negotiation power versus ports and terminals as well as towards shippers. For the shippers, the primary tool being honed presently is the increased use of blank sailings to manage the supply/demand balance. For the ports and terminals, it is an increasing concentration

of multiple services into the same terminal hubs. With only seven to nine truly large global carriers remaining (depending on definition), we have come to the endpoint of this journey for the main carriers. The 2020's are going to be about utilizing the power which comes with consolidation.

BIGGER NOT ALWAYS BETTER

The second change is the increase in vessel sizes. The largest vessels have tripled in size to 24,000 TEU. As the normal annual demand growth has dropped from 8.5% per year to 2-3% per year the response has been a drastic decline in the number of weekly services as well as continued enlargement of the operational alliances to the point where three large alliances now control the key east-west trades. Whilst a case can be made that even larger vessels are more efficient when compared directly to a smaller vessel, these gains are more than negated when network effects and land-side externalities are considered. Hence, we are seemingly also at the endpoint of getting larger vessels and the 2020s can well see a retrograde movement



towards slightly smaller, technologically more advanced, vessels to better tap into network value.

DIGITAL DRIVERS

In the past 20 years there has been much talk about the potential of digitalization. However, beyond the adoption of Electronic Data Interchange (EDI) for basic message transmissions, the first couple of decades saw actual traction being slow. Many digital concepts were launched in 2000-2010 only to fail in getting any meaningful adoption. In the past five years, investment funds increased sharply into freight technology leading to a plethora of pilot projects on digital and automated tools across shipping lines and terminals. In the past couple of years the speed has ramped up significantly – shifting away from pilot tests to actual full-scale implementation. Just as a simple example, true online sales of freight on a carrier website was essentially non-existent 18 months ago, at least no meaningful volumes were booked this way. Now, at the edge of the 2020's this has shot up to cover 9% of Hapag-Lloyd's bookings and 12% of Maersk's spot bookings. Hence, we are at the endpoint of the experimental phase of digital technologies and are now in a rapid adoption phase.

BUSINESS OF CHANGE

The boundaries of the business models amongst the industry stakeholders are being tested. That carriers want to provide inland logistics services – most clearly for Maersk and CMA CGM – is not new,

it has been tried a few times before, but the digital push behind it to regain direct control of the small and mid-sized cargo owners creates an interesting commercial battlefield. At the same time, we have seen how a terminal operator, DP World, acquired container line Unifeeder. A complete mirror-reversal of the past trend wherein it was the lines which acquired terminals. In addition, we now see a deliberate move by several terminal operators to create value propositions directly to the cargo owners, by-passing the carriers. Hence, we are the endpoint of the old traditional way of dividing up the market between the different main players.

CONCLUDING THOUGHTS

Finally, there is the aspect of the environment. This is an element where we are not at the endpoint – on the contrary we are only at the beginning. The ambitious targets laid out by the IMO to reduce total carbon emission by 50% in 2050 cannot be done by incrementally improving existing operations. This requires large-scale investment in entirely new propulsion technologies which will take a decade or more to ramp up to a size where it is commercially viable for the major vessels and trade lanes.

With all of these elements changing dramatically, the entire industry is facing an exciting – and challenging – new decade. There are large opportunities for those willing and able to embrace and master these rapid changes.

READ MORE FROM LARS JENSEN

ABOUT THE AUTHOR

Lars has nearly 20 years' worth of experience in the shipping industry, having held a number of executive positions across a spectrum of different disciplines, including eight years as Director of Driving and Developing Market Intelligence & Analysis for Maersk Line, Maersk Logistics and The Containership Company. Currently, Lars serves as CEO and Partner of SealIntelligence Consulting.

ABOUT THE ORGANIZATION

SealIntelligence Consulting is specialised within the container shipping industry. Key expertise fields include market analysis, strategic outlook, shipping network design, process optimization, eCommerce, digitization and training. Our clients are shipping lines, cargo owners, freight forwarders, IT companies and portals in the industry as well as financial investors and institutions.

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Strandboulevarden 111, 3tv
2100 Copenhagen
Denmark
Email:
Lars.Jensen@SealIntelligence-Consulting.com



AECOM

PORT PLANNING IN THE 2020S

Mark Sisson, VP, Senior Port Planner, AECOM

As we begin a new decade, this article will attempt to identify likely future trends and current industry best practice in port and marine terminal planning. A useful place to start is to look back at the trends of the past 10 years. What were the most successful ports and terminals from the 2010s? Like all-star teams in sports, this topic is endlessly debatable, but I have selected four North American examples to help explain trends in the wider industry.

PRINCE RUPERT, CANADA

From a perspective of percentage growth, the Fairview Container Terminal in Prince Rupert is by far the leader in North America, although starting at zero has given them perhaps an unfair advantage with this metric. The strengths of Prince Rupert include very deep water and no air draft restrictions, a motivated pro-growth community and labor force, and a simple, focused operation with a proactive partner in the CN railway. The CN's vast network and the low Canadian dollar have also given Prince Rupert a structural advantage against their main US competitors in Seattle/Tacoma.

LONG BEACH CONTAINER TERMINAL (LBCT)

This terminal was developed in a port with the most expensive land and labor in North America and a great deal of community opposition to development. As a result, the operators chose a system with high storage density (1-over-6 ASCs), a very high level of automation, and a nearly 100% electrified operation that generates the lowest air emissions per TEU of any terminal in the world. The terminal included development of a large on-terminal railyard, which is indicative of another global trend to shift cargo from trucks to either rail or barges to the greatest extent possible. The fact that LBCT, a three berth terminal, was recently sold for \$1.8 billion speaks to both the value of first rate terminals in premium locations, and the level of capital investment required for a terminal of this style.

PORT OF SAVANNAH, GA

Another star performer in terms of growth is the Port of Savannah, GA. All the container operations at this port take place in a single enormous terminal: Garden City. Savannah benefits from relatively low labor and land

cost by North American standards. The operator, Georgia Ports Authority (GPA), is an arm of the state government so they may have a different perspective on the optimum mix of labor vs capital compared with a private operator. Robots can do many things on a terminal, but they have not yet acquired the right to vote. Consequentially, it is perhaps not surprising that GPA has opted to stay with conventional operations. One of GPA's most important strategic moves has been to leverage the large amount of cheap land near the port to incentivize beneficial cargo owners (BCOs) to build transload warehouses near the Port. This is similar to ancillary development of free trade zones that have been so successful at driving cargo growth in places like Dubai and Panama. London Gateway is another example of a new terminal that is actively promoting adjacent warehouse space as a feature of their operation.

PORT AUTHORITY OF NY AND NJ

The most notable projects in the 2010s in New York were the raising of the Bayonne Bridge and the building of a new near-



terminal railyard to support GCT. These are both consistent with wider trends of investment to allow for ever larger ships, and to facilitate shifts of cargo away from truck. In North America, all major east and west coast ports are to some extent competing for the same rail cargo to destinations in the center of the continent, so having high quality rail facilities is a priority for every major port on the coasts.

In general terms, ports and terminals develop in response to the desires of their customers: shipping lines and BCOs. What these folks want in a port is unlikely to change much from the current list of:

- **No restrictions on ship size; deep channels and no air draft restrictions.** Ships of 18,000 TEU+ will be used on many routes worldwide so the ability to serve these ships without restrictions is a big advantage for any port.
- **Big terminals with on-terminal rail.** This allows for convenient working of large ships with large call sizes. It's much easier to manage a 10,000 container call on a terminal with 400 acres than it is with 100 acres. Rail is more efficient than truck, and allows ports to compete for discretionary inland cargo.
- **Full service operations.** Starting from the waterside, this could include bunker supply of clean fuels including LNG or any variety of biofuels that may become popular in the medium term future. It may also include cheap and low-CO₂ electric power, a convenient supply of chassis, convenient warehousing, and rail networks that can manage domestic containers.
- **Last but not least, low price.** Price refers both to the terminal operation and to the end-to-end logistics chain. This is driven by a combination of cheap land, cheap labor, clever automation, and good warehouse and rail connections.

From a terminal development perspective, the global trends are very clear and are expected to accelerate into the 2020s.

ALMOST EVERYTHING WILL BE ELECTRIC

All of the equipment you see on container terminals today that runs on diesel should have proven electric options by 2030. These will either plug in like RTGs or run off batteries in the case of tractors, strads,

and top-picks. Some ports have mandates for electrification today, but electric motor technology is superior to internal combustion engines (ICE) that once options are reasonably price competitive, there will be a massive shift away from ICE equipment.

Consider that STS cranes have been running on electricity for many years now, not because of any particular mandates but because compared with a diesel STS, an electric STS performs better, costs less to operate, and of course emits zero pollution. All these same characteristics will be true for an electric tractor or reachstacker. The only uncertainty is the pace of progress on reducing equipment prices, which depend primarily on economies of scale and battery price.

Between shore power for ships (possibly even some integrated ship batteries) and tugboats, and a significant fraction of over-the-road trucks, a great deal of electric power will be required on terminals in the future. There will also be increasing opportunities for clever technology to manage this power including vehicle-to-grid connections which would allow terminal equipment to feed back into local grid during times of low demand on the terminal. Ports with uncertainty about the reliability of grid power, a big issue lately in parts of California, may invest in microgrids that can isolate the port from wider grid on either a temporary or permanent basis.

ALMOST EVERYTHING CAN BE AUTOMATED

After 25 years of refinement in robotic terminal operations, it may be easier to describe the elements of a container terminal that cannot be automated in 2020. These elements typically revolve around mechanically complicated items such as IBC handling and lashing, although robotic IBC machines exist in prototype mode, and will be a very appealing option if they can be perfected. The maintenance of equipment is another area that will require direct human contact indefinitely.

Just because a task can be automated does not necessarily mean it should be automated. The ILA labor union, which works ports in the US East and Gulf coasts has specifically prohibited "full" automation in their contract. This effectively means that

manual tractors or straddle carriers will be used for STS service indefinitely in these areas. Ports in areas with cheap labor, or with government mandates to positively impact the regional economies may prefer to avoid highly automated operations. Similarly terminals with low volume may opt to stay with the lower up front cost of manual operations.

Since the dawning of the container era over 60 years ago, container terminals have been big success stories in their ability to adapt and grow while dramatically reducing both emissions and workplace injuries. These positive trends can and should continue indefinitely with proper planning and focused effort from decision makers.

MORE AECOM PAPERS

ABOUT THE AUTHOR

Mark Sisson leads AECOM's marine analysis group. He is responsible for business development, project execution, and oversight of research and development of AECOM's simulation models. Mark has over 20 years' experience managing and executing a wide range of marine and rail terminal planning, simulation, and analysis projects. Typical projects involve supervision of field data collection, model development, and presentation of analysis results. Sisson received his BS in Civil Engineering at California State Polytechnic University and his MS in Civil Engineering from Northwestern University and is a registered professional engineer in the state of California, US.

ABOUT THE ORGANIZATION

AECOM is made up of a global network of experts working with clients, communities and colleagues to develop and implement innovative solutions to the world's most complex challenges. Those challenges include delivering clean water and energy, building iconic skyscrapers, planning new cities, restoring damaged environments, and connecting people and economies with roads, bridges, tunnels and transit systems. We connect expertise across services, markets, and geographies to deliver transformative outcomes. Worldwide, we design, build, finance, operate and manage projects and programs that unlock opportunities, protect our environment and improve people's lives.

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2019 HIGHLIGHTS, 2020 NEWS

Wolfgang Lehmacher, Thought Leader & Advisor, Geneva, Switzerland

The year 2019 brought a shift in two areas: one is digitization, and the other sustainability. Both will remain center stage in 2020. Advancing both topics globally requires innovation from incumbents, startups and research – both in the West and the East. The current value of the global 'ShipTech' – shipping and maritime technology – market is estimated at over US\$100 billion dollars today and is set to grow to be worth \$278 billion by 2030. Spending in sustainability is also on the rise with A.P. Moller Maersk leading the way by investing \$1 billion on the way to the pledged net-zero CO₂ emissions target from own operations by 2050. Technology and innovation are needed to reach IMO, ICAO and COP21 targets.

2019/2020

In 2019, digitization activities gained in focus with specific initiatives and innovations in key areas ranging from platforms and portals, to data sharing, monitoring, vessel automation and cybersecurity. Discussions around IMO 2020 was another highlight as industry has taken up the challenge, with serious measures

supporting the pledges. However, not every good idea succeeds and 2019 saw also some retreats. Hong Kong's cryptocurrency startup 300cubits admitted defeat in its attempt to gain traction with its blockchain-enabled container booking platform.

Among the expected 2020 developments are increasing data sharing efforts between ports – enabled by concepts like PortCDM (Port Collaborative Decision Making) developed by the Research Institute of Sweden (RISE) and other standardization initiative-s. Another big topic will be clean steaming. The approach towards the execution of IMO 2020, the 0.50% global sulphur cap for marine fuels will prepare the grounds for the implementation of IMO 2050, the reduction of the maritime industry's total annual greenhouse gas (GHG) emissions by at least 50% by 2050 compared to 2008.

DIGITAL CONTAINER SHIPPING ASSOCIATION (DCSA)

A 2019 breakthrough was the creation of the Digital Container Shipping Association. "For the first time in twenty years, the container

shipping industry has come together with a common goal to move the industry into the digital era. With the regulatory approval in place, we look forward for the association to take up work and to begin to collaborate with multiple stakeholders from the entire value chain," André Simha, CIO of MSC and Chairman of the Supervisory Board of DCSA, said in evaluation of the event. In 2020, we can expect first tangible results of the work on standardization and interoperability.

INCREASING INVESTMENT IN INNOVATION

As digitization continues, companies are ramping up their resources and capabilities. A.P. Moller Maersk reported that the company has built a new technology team of close to 3,000 staff needed to achieve the company's vision. Big corporates also turn to startups to find ways to solve their digitization challenges.

Testbeds and accelerators have been on the rise. In August 2019, Inmarsat, Cargotec, Shell, HHLA and Wärtsilä launched the second cycle of the Trade & Transport Impact Program in search for 10 mature startups. Traxens, the container Internet of Things

(IoT) firm backed by CMA CGM, Maersk and MSC, has become the new partner joining the Port of Rotterdam's Container 42 smart container exploration project. Container 42 will be shipped to ports around the world to gather and share information about global supply chain activities, equipped with solar panels and technology that can measure changes in vibration, acceleration, position and sound to local air pollution, temperature and humidity.

Meanwhile, Tromsø-based Dualog signed a project with Tokyo-headquartered NYK to develop digital products across a testbed of 50 vessels. In addition, Singapore's largest shipping company, Eastern Pacific Shipping (EPS), teamed up with investor and accelerator Techstars to create a global maritime accelerator. In 2020, we will see more of such developments as the knowledge and experience gap in the industry needs to be closed. Experimenting and learning will be key themes in 2020.

PORT PLATFORMS, PORTALS AND APPS

The TradeLens digital platform gained traction in 2019. The platform offers one single, secure source of shipping data and was launched by Maersk and IBM in 2018. It claims to process 2 million events daily and 100 thousand documents weekly, supporting more than 150 ecosystem members in August 2019. With Hapag Lloyd and ONE announcing to join, five of the largest six carriers are now expected to be on the TradeLens platform by the end of 2019.

Hamburg Süd launched INSTANT, a digital application for container booking. Early bookings will enjoy lower pricing as subsequent price changes or additional fees will no longer apply. Bunker procurement platform Bunker Connect announced integration with BunkerTrust, allowing for projecting ratings on the live incoming quotes received from suppliers through the Bunker Connect system.

BASS, a maritime software company launched web-based app BASSnet Crew Portal to provide seafarers access to personal data, sailing plans and travel documents from ship or shore. NYK plans to support seafarers by means of the electronic money platform "MarCoPay" – in collaboration with Accenture and Citi. Bureau Veritas has released Veristar Equipment, a digital platform to assist equipment manufacturers in obtaining certification for products.

In 2020, more can be expected. The Maritime and Port Authority of Singapore (MPA) has already announced digitalPORT@SG, Singapore's digital portal for processing regulatory transactions. The maritime industry is integrating itself into the global platform economy.

DIGGING DIGITAL OIL: DATA SHARING TAKES OFF

The aim of the European Union (EU) STM initiative is to improve the maritime transport chain by making real-time data available to all interested and authorized actors. As part of STM, the Port Collaborative Decision Making (PortCDM) concept has been developed. PortCDM aims at predictable timings and operations in sea transport by building upon unified and standardized data exchange protocols among all stakeholders involved. Preliminary estimates suggest annual savings between \$7 and \$12 billion. The 2019 breakthrough was the adoption of the port call message format S-211 which allows ships and ports to exchange port call data in a standardized way to enhance coordination and synchronization of port visits.

K Line, MOL and NYK began sharing data through the common data platform "IOS-OP" across vessels operated under charter by the Ocean Network Express (ONE) joint venture. ONE and TPS Valparaiso implemented the Xvela cloud-based collaboration platform at the Chilean terminal to improve planning through data exchange between stakeholders. The report 'Enabling Logistics Visibility by Interconnecting Logistics Information Service Systems in a Standardized Way' encourages participation in the development of the standardization process underway. The report was launched by the logistics visibility task force, created by Alibaba, the Chinese Ministry of Transport's National Logistics Information Platform (LOGINK) and the International Port Community System Association (IPCSA). Data sharing has become a key trend in the industry which will only accelerate.

VESSEL AUTOMATION CONTINUED

Integrated maritime value chains enable larger scale automation as benefits are easier to reap. Despite regular skepticism, the autonomous vessel concept saw continuous uptake. NYK reports autonomous vessel tests with ships compliant with IMO's Interim Guidelines for maritime autonomous surface ships (MASS) pilots as preparation for the introduction of manned autonomous ships to improve safety and reduce crew workload. ONE SEA, the autonomous ship alliance launched in Finland in 2016 to develop a roadmap, international rules and technology standards is growing and added maritime technology start-up Awake. AI to its membership. By the end of 2020, the first autonomous tug built by ABB and Keppel Offshore & Marine is scheduled to commence service in the Port of Singapore.

CYBERSECURITY REMAINS TOP OF MIND

In 2019, the Operational Technology Cyber Security Alliance (OTCSA) which helps companies to address the OT security risks was created by ABB, Check Point Software,

BlackBerry Cylance, Forescout, Fortinet, Microsoft, Mocana, NCC Group, Qualys, SCADAFence, Splunk and Wärtsilä. Many companies continue to improve capabilities and cyber defense systems, including Pacific Gas implementing Inmarsat's cyber security system and Shipmanager Anglo-Eastern investing in security research and consultancy services to ensure cyber resilience of its over 600 vessels.

ENVIRONMENTAL CONCERN

2020 will be the year of the environment. IMO 2020 implementation will mark the beginning of a new era of clean shipping. An exercise to prepare for IMO 2050. Technology will play an important role to ensure compliance. But, so will fuels. Stena Line proves that AI can increase fuel-efficiency by 2-3%. In 2019, the UK government outlined its pathway to zero emissions shipping and committed £1 million (\$1.3 million) to fund the development of clean shipping technology projects through the industry-led MarRI-UK initiative. Countries across the globe are working on similar road maps.

As technology gets us only that far, we need to new-think vessel propulsion.

"Efficiency measures have positioned Maersk 10% ahead of the industry average. But getting to net zero requires a total shift in the way deep sea vessels are propelled. The shipping industry needs to introduce carbon neutral propulsion fuels and new technologies," Maersk's website claims. Probably, this is a long shot. But to reach our targets we better start today. Based on a joint study with Lloyds Register, the leading container shipping line will focus its research and development effort on alcohol, biomethane, and ammonia.

MORE WOLFGANG LEHMACHER PAPERS

ABOUT THE AUTHOR

Wolfgang Lehmacher is thought leader, advisor and practitioner in supply chain and logistics. During his career, he was Director, Head of Supply Chain and Transport Industries at the World Economic Forum, Partner and Managing Director (China and India) at the global strategy firm CVA, and President and CEO of GeoPost Intercontinental, the global expansion vehicle of French La Poste. He is advising Fortune 50 companies, investors and start-ups. He is member of the IATA Air Cargo Innovation Awards Jury and the Logistikweisen, a think tank under the patronage of the German Federal Ministry BMVI. Wolfgang Lehmacher is FT, Forbes, Fortune, BI contributor and author of numerous books, including The Global Supply Chain.



PortEconomics

THE EUROPEAN CONTAINER PORT SCENE 2019 AND OUTLOOK FOR 2020

Professor Theo Notteboom, Shanghai Maritime University, Shanghai, China; Ghent University, Belgium; Antwerp Maritime Academy, Belgium; and University of Antwerp, Belgium

The year 2019 brought a range of challenges and opportunities for European container ports. In this contribution we summarize the main developments and present an outlook for 2020.

CONTAINER VOLUMES UP, BUT CONCERNs ABOUT RISING TRADE BARRIERS

The year 2019 will go down in history as a year that brought healthy container volume growth for most European container ports, although growth slowed down in the second quarter. The year-on-year growth figures for the top 15 European container ports in the first nine months of 2019 were particularly high in Piraeus (+20.7%), Valencia (+8.3%), Algeciras (+7.2%), Hamburg (+6.9%) and Antwerp (6.4%), closely followed by Gdansk (+5%), Barcelona (+4.1%), Le Havre (+4%) and Rotterdam (+3.8%). Containerised throughput in Genoa saw a close to zero growth, while Bremerhaven, Felixstowe

and Southampton are expected to end 2019 with traffic losses.

The top four European container ports have remained unchanged since the start of containerization in Europe in the late 1960s: the Dutch port of Rotterdam (14.5 million TEU in 2018), the Belgian port of Antwerp (11.1 million TEU) and the German ports of Hamburg (8.73 million TEU) and Bremerhaven (5.45 million TEU) have always occupied the top spots in TEU terms in the European container port system. These four ports are all located in the so-called Hamburg-Le Havre range in northwest Europe. The hegemony of these top four container ports is now undermined by strong growth in the main container ports in the Mediterranean. The growth figures in Q3 2019 confirm that Bremerhaven is very likely to lose its number four spot in the European container port rankings. In 2019, Piraeus will unseat Bremerhaven to become

the fourth largest container port in Europe. Even Valencia and Algeciras are likely to overtake Bremerhaven in 2019 pushing the German port to position seven in the European container port ranking. However, the position of the top three European container ports remains undisputed. While Rotterdam and Antwerp have recorded healthy growth figures in the past five years, 2019 brought container growth back to Hamburg after many years of stagnation.

The planned Brexit, the uncertainty over the China-US trade war and the difficulties surrounding new bilateral and multilateral trade agreements are just some of the developments affecting free trade. The resulting volatility and uncertainty in global trade flows challenges European container ports and port actors and forces them to demonstrate a high level of flexibility and resilience. The pressure on container flows is likely to remain high in 2020 despite

the partial relocation of manufacturing activities from China to other countries (such as Bangladesh, Vietnam, Indonesia, but also countries in East Africa) and some level of reshoring and nearshoring of industrial and semi-industrial activities. Overall, there are growing concerns about lower GDP growth levels and rising trade barriers which are expected to negatively affect global container volumes and freight rates. Therefore, prospects for 2020 seem somewhat gloomy compared to the results achieved in 2019.

DYNAMICS IN CONTAINER LINER SHIPPING

The risk of persistent slower volume growth is having an impact on the competitive pressure and the behaviour of container shipping lines. The year 2019 did not bring any large-scale mergers and acquisitions in the industry. Thus, it remained very calm at the M&A front after one of the biggest consolidation waves in the container shipping industry in the period 2014-2017 (e.g. Cosco/China Shipping, CMA CGM/NOL, Hapag Lloyd/UASC, Maersk Line/Hamburg Sued and the creation of ONE, a Japanese super carrier combination of K-Line, MOL and NYK Line). Furthermore, the alliance structure in liner shipping remained relatively unchanged throughout 2019 with the three big alliances still shaping the business: 2M, Ocean Alliance and THE Alliance. The only change involved the inclusion of South Korean carrier HMM in THE Alliance after some years of loose partnership with 2M. These alliances continue to have their full impact on port competition. As port loyalty is not guaranteed in the era of mega alliances and large individual carriers, winners of today could be the losers of tomorrow and vice versa. The year 2019 brought quite a bit of action at the regulatory front. After a lengthy consultation round, the European Commission (EC) concluded in late 2019 that the container shipping's consortia block exemption regulation (BER), which allows shipping companies to operate within alliance structures, does not damage competition and should be extended for an additional four years after the expiry of the current BER on April 25 2020. The decision is subject to a short feedback period. The likely prospect that alliances won't be outlawed by the EC reduces the risk of having a (new) shock wave affecting the container shipping market.

The industry will continue to face challenges in 2020. The uncertainty about global trade volumes affects the current demand/supply imbalance and increases the number of blank sailings. Moreover, container shipping companies are preparing for the implementation of the



IMO 2020 Sulphur Cap by shifting to low sulphur fuels or by installing scrubbers. The IMO rules have created a lot of uncertainty and volatility in the bunker market and pushed carriers towards the development of new fuel surcharge policies in the hope to pass on the costs associated with the IMO regulation.

At the same time, carriers continue to introduce ever larger container vessels despite growing concerns on the distribution of costs and benefits of these large ships among the actors involved and on the impact of mega ships on supply chains, terminal operations, public spending in nautical accessibility and the society at large. The year 2019 saw the arrival of ships of close to 24,000 TEU capacity, while several designs for units of more than 25,000 TEU have been revealed. It seems we have not reached the limits yet.

In response to the low margins in shipping and the demand of customers for door-to-door and one-stop shopping logistics services, shipping lines may extend the reach of their activities to other parts of the supply chain. In 2019, numerous container lines continued to extend their scope beyond terminal operations to include inland transport and logistics. The most striking cases of the past year were the take-over of CEVA Logistics by CMA CGM and the integration of Damco in Maersk Line. Many shipping lines are also heavily focusing on digital transformation. Through investments and initiatives in digital infrastructure and services, shipping lines are aiming for the creation of value-adding activities in the optimisation of operations, the development of advanced commercial decision-making instruments, and the development of new services that can generate new revenue streams (e.g. consultancy/advisory services related to logistics chains). Shipping lines are setting up co-operation schemes to support digital transformation processes. For example, Maersk, MSC, Hapag-Lloyd and ONE launched a digital container platform in 2019. This Digital Container Shipping Association (DCSA) has been established with the intention of setting standards for the digitalisation of container shipping to overcome the lack of a common foundation for technical interfaces and data.

TERMINAL CAPACITY PLANS AND BEYOND

Despite the existing market uncertainty, 2019 brought a new wave of large-scale terminal capacity plans and realisations. Rotterdam is capitalising on the two terminals on Maasvlakte 2 which opened about five years ago and on other large-scale facilities such as the Euromax terminal. The APM T terminal at Maasvlakte 1 is going to be transferred to HutchisonPorts. The port of Antwerp is awaiting the formal implementation of a capacity extension plan which should add a combined capacity of more than 7 million TEU spread over several locations in the port area. The Deurganckdock is now at the heart of the container business in Antwerp, particularly after the large scale MPET container terminal (TIL/PSA) moved from the Delwaide dock on the right bank to this dock in 2016. Hamburg has revealed plans for a partial reconversion of an existing port area. The port of Gdansk (1.95 million TEU in 2018) is working on the Central Port concept which could triple the container terminal capacity in the next decades. In the Mediterranean, the plan of Cosco Shipping Ports to increase Piraeus' capacity from 7 million to 10 million TEU by developing a fourth terminal was initially rejected by Greece's Port Planning and Development Committee. However, its realisation is eminent given the key position Piraeus plays in the Belt and Road initiative (BRI) of the Chinese government. The year 2019 was marked by other large-scale developments in the south of Europe such as:

- the opening of the second phase of transhipment hub Tanger Med in Morocco;
- the opening of Vado Gateway Terminal in northwest Italy, a 1.1 million TEU semi-automated facility operated by APM T and with Cosco Shipping Ports and Qingdao Port as minority shareholders;
- the extension plan for the port of Valencia: in May 2019 TIL presented the only bid to develop and operate a new terminal of 136ha and 1,970m berth length which will be developed in three phases between 2022 and 2026;
- the start-up of the concession procedure for the Vasco da Gama Terminal in the Portuguese port of Sines (1.75 million TEU in 2018) with a planned capacity of 3.5 million TEU and 1,375 m quay. The awarding phase is expected to be finalized in late 2020.

China has been in the news for much of 2019, also when it comes to European terminal activities and ports. Some of the highly visible examples of how China is enlarging its footprint in the European port system include Cosco Shipping Ports' control of Piraeus port; Chinese stakes in the new Vado Gateway Terminal; Cosco's involvement in the port of Zeebrugge; the majority stake of Cosco in Noatum Ports (active in Bilbao and Valencia), and the stronger involvement of China Merchants holding in the terminal network of CMA CGM through Terminal Link. New in 2019 is that Chinese players are expanding their investment strategy inland. For example, Cosco Shipping Logistics recently announced the development of a large inland terminal in Duisburg with the following ownership structure: Cosco 30%, Duisport 30%, inland shipping group HTS 20% and Swiss rail operator Hupac 20%. Also, Ocean Rail Logistics, a Greek subsidiary of Chinese Cosco Shipping took a share of 15% in Rail Cargo Terminal-BILK (Budapest) in late 2019. Next to terminal entry by large state-owned players such as Cosco and China Merchants Holding, there are many smaller and less visible transactions all around Europe involving Chinese investment holdings, construction companies and logistics actors with a diverse background. As the BRI is gaining momentum after its introduction in 2013, quite a few European seaports and inland logistics platforms are strategically positioning themselves in the fast developing Eurasian rail landbridges and the evolving Euro-China maritime connectivity.

While capacity extension plans, changes in terminal ownership and Chinese investments continue to shape the European container terminal business, the most remarkable advances in 2019 were made in the area of digital transformation and sustainability. Throughout Europe, container terminal operators have initiated an unprecedented wave of innovation projects in the area of (1) efficiency increases in terminal operations and TOS (quay, yard and gate); (2) advances in energy efficiency in terminal operations; (3) energy transition for yard and quay equipment; (4) on-shore power supply for ships; (5) increased transparency, visibility and optimisation in maritime-terminal-hinterland chains; and (6) reaching a greener hinterland modal split. Many of the newest innovations have been extensively covered in the 2019 issues of Port Technology International.

SMART AND GREEN PORTS

Innovation and IT are high on the agenda of many European container ports. In the past five years, more and more ports have come to understand that coordination

and integration in supply chains is key to their future competitiveness. Port-related actors and port authorities across Europe are developing initiatives to strengthen the interconnectivity of ports in physical, digital and operational networks. The number of initiatives in this area has grown exponentially in 2019 with the emergence of a wide range of platforms, incubators and new forms of partnerships and governance structures to make things happen. In this respect, the year 2019 can be marked as a key year that lifted many smart port ideas from concept to practice.

Sustainability, climate change and the environment are some of the other key concepts that have dominated port news and actions in 2019. Ports and terminals have become hotbeds for initiatives aimed at a further greening of supply chains and at reaching a more sustainable global logistics industry. Many ports have taken on a more enterprising role in dealing with the environmental, energy and climate change challenges, partly because environmental aspects play an increasing role in attracting trading partners and potential investors. A port with a strong environmental record and a high level of community support is likely to be favoured by market players. In 2019, we have been bombarded with a large stream of plans, initiatives and realisations of port-related actors in several fields of action including green shipping; green port development and operations; green inland logistics; seaports and the circular economy; and, actions in the field of knowledge development and information sharing. The long list of initiatives, actions and projects for each of these domains illustrates that the port communities are determined to reduce the environmental footprint of their activities and to make the transition to a more energy-efficient and circular economy. However, port communities also understand that the challenges remain immense and progress made is not at the same level in all domains of action. Many port ecosystems are challenged to drastically decrease their environmental footprints against a background of growth in volumes and investments. This requires drastic and large-scale solutions such as Carbon Capture and Utilisation (CCU) and Carbon Capture and Storage (CCS), a further push towards greener shipping, a strong modal shift and adoption of synchromodality, etc. Ports are part of larger networks and chains thus requiring co-ordination and co-operation between the actors involved in these networks and chains, thereby facilitated by technology, new governance and business models and facilitation and regulation by governments.

CONCLUDING REMARKS

In volume terms, 2019 was a good year for the European container port system. Despite the existing volatility and uncertainty in global trade flows and the huge environmental challenges, European container ports and port actors show a strong commitment to develop new terminal capacity and to move towards greener and more efficient operations. Some of the ports in the Mediterranean and the Baltic area are developing fast, while also the three largest container ports remain on a growth course. Europe's economic geography remains a key determinant of the traffic distribution among Europe's container ports, but the strategies of large market players, such as shipping lines and 3PL companies, and Chinese interests can have a growing impact on cargo routing patterns. As the European container market will remain very dynamic in 2020, the actors involved are challenged to push the digital and green agendas forward in order to remain competitive and resilient.

MORE THEO NOTTEBOOM PAPERS

ABOUT THE AUTHOR

Theo Notteboom is professor in maritime and port economics and management. He is Research Professor at China Institute of FTZ Supply Chain of Shanghai Maritime University in China, Chair Professor 'North Sea Port' at the Maritime Institute of Ghent University and a part-time Professor at Antwerp Maritime Academy and the Faculty of Business and Economics of University of Antwerp. He is co-director of PortEconomics.eu and council member and past president of the International Association of Maritime Economists (IAME).

ABOUT THE ORGANIZATION

PortEconomics is a web-based initiative aiming at generating and disseminating knowledge about seaports. It is developed and empowered by the members of the PortEconomics group, who are actively involved in academic and contract research in port economics, management, and policy. Since October 2012, Port Technology International and PortEconomics have been engaged in a partnership. www.porteconomics.eu

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Prof. Dr. Theo Notteboom
theo.notteboom@gmail.com

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