

THE LEADING MARITIME CITIES OF THE WORLD 2024

A Menon Economics and DNV Publication



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CONTENTS

EXECUTIVE SUMMARY	4
THE MARITIME INDUSTRY	6
THE LEADING MARITIME CITIES OF THE WORLD	10
SHIPPING CENTERS	16
MARITIME FINANCE AND LAW	22
MARITIME TECHNOLOGY	28
PORTS AND LOGISTICS SERVICES	36
ATTRACTIVENESS AND COMPETITIVENESS	40
APPENDIX A: LIST OF OBJECTIVE INDICATORS OF 30 CITIES	44
APPENDIX B: METHODOLOGY AND DATA SOURCES	46

EXECUTIVE SUMMARY



A sea of changes occurred since our last Leading Maritime Cities (LMC) publication. Global tensions reverberated through the maritime industry, leaving an enduring impact on its course. The war in Ukraine, simmering disputes in the South China Sea and the ongoing conflict in the Red Sea contributed to a complex geopolitical landscape influencing maritime routes, regulations, and market dynamics. Despite this, the industry demonstrated remarkable resilience. Maritime trade volumes experienced a slight dip of 0.4% in 2022, but the trajectory is optimistic with further annual growth projected at over 2% between 2024 and 2028.

The world's climate crisis is another major force driving change, leading to a significant shift in attitudes globally and especially within the maritime community, exemplified by the 2023 IMO Strategy on 100% Reduction of GHG Emissions from Ships by 2050. This includes a vision for a just and equitable transition, as well as specific targets for carbon intensity reduction and the uptake of zero or near-zero emission technologies. The technological progress is startling, but we are still far from the GHG goals set by the IMO. However, actors in maritime industry worldwide are preparing for a low- or even zero-carbon future, and we can expect rapid implementation of zero-carbon fuels in the next ten to fifteen years. We predict that cities taking the lead in the green transformation will become the leading maritime cities of the world within the next decade.

United Nations estimates that by 2050, two out of every three people will be city dwellers. This implies that cities will become increasingly important. Cities are the hubs of knowledge, skill, innovation and specialization of production and services. In today's world, especially

for the maritime industry, cities are vying to draw in the best businesses, startups, and brightest minds. The ones who succeed in this race for attractiveness are – and will remain – the leading maritime centres of the world.

The LMC report returns with its 2024 edition, offering new insights into the leading maritime cities of the world that offer the best facilities to enable maritime companies and individuals to connect and prosper. As in its previous editions, the report examines 5 pillars – Shipping Centres, Maritime Finance and Law, Maritime Technology, Ports and Logistics, Attractiveness and Competitiveness – on which the maritime cities are benchmarked. Under each pillar, a comprehensive set of objective and subjective indicators have been considered (45 in total). For the 2024 report, we have refined our objective and subjective indicators by incorporating recent key trends in the sector, such as the green transition. Since the last edition of the report, we also have gained access to new and more detailed data. In this way, we ensure that the analysis is based on reliable and complete data for the various cities, which ultimately allow for a more refined benchmarking of the relative performance of each city compared to the previous reports. The subjective indicators under each pillar come from the perception and evaluation by nominated business executives – mostly shipowners and managers – from all around the world. Of these 190 experts called upon for this study, around 37% are based in Europe, 31% in Asia-Pacific, 26% in the Middle East, India and Africa and the remaining 6% are from Americas.

Singapore continues to be the leading maritime city in the world unaffected by the global conflicts and the rising environmental changes of the industry. Singapore has

RANK	SHIPPING	FINANCE AND LAW	MARITIME TECHNOLOGY	PORTS AND LOGISTICS	ATTRACTIVENESS AND COMPETITIVENESS	OVERALL RANK
1	SINGAPORE	LONDON	BUSAN	SINGAPORE	SINGAPORE	SINGAPORE
2	ATHENS	NEW YORK	SINGAPORE	SHANGHAI	ROTTERDAM	ROTTERDAM
3	TOKYO	OSLO	OSLO	ROTTERDAM	LONDON	LONDON
4	SHANGHAI	SINGAPORE	SHANGHAI	NINGBO	COPENHAGEN	SHANGHAI
5	HAMBURG	TOKYO	LONDON	HAMBURG	HAMBURG	OSLO

	2022	2024
SINGAPORE	1	1
ROTTERDAM	2	2
LONDON	3	3
SHANGHAI	4	4
OSLO	7	5
NEW YORK	8	6
TOKYO	5	7
HAMBURG	9	8
COPENHAGEN	10	9
BUSAN	11	10
DUBAI	13	11
HONG KONG	6	12
VANCOUVER	17	13
PARIS	14	14
HOUSTON	15	15
BEIJING	18	16
ANTWERP	19	17
SYDNEY	20	18
LOS ANGELES	21	19
OSAKA	28	20
MIAMI	23	21
ABU DHABI	32	22
SHENZHEN	-	23
NINGBO	25	24
GUANGZHOU	-	25
INCHEON / SEC	16	26
BARCELONA	34	27
QINGDAO	30	28
MADRID	-	29
MARSEILLE	31	30

retained its spot as a world-leading maritime hub due to being ranked as number one in three out of five pillars. Singapore continues to maintain its leading position in the Attractiveness and Competitiveness pillar, and has reclaimed its top spot in Shipping Centres and Ports and Logistics, overtaking Athens and Shanghai respectively. A consistent strategy for innovation and investment in green transformation and digital technologies has enabled Singapore to regain its position. On the Maritime Finance and Law pillar, Singapore has climbed significantly, going from 8th to 4th Place. However, Busan overtook Singapore and has the leading position in the Maritime Technology, leaving Singapore in 2nd Place.

Rotterdam and London continue to hold their second and third place, respectively. Rotterdam scores high on most pillars, especially on Ports & Logistics and Attractiveness and Competitiveness, even though it is only number 10 on Maritime Finance and Law and does not have any number 1 position. London has regained its number 1 position in Maritime Finance & Law from New York. On the overall ranking, Shanghai remains in the fourth position, but Oslo moved ahead of Tokyo to take the fifth spot.

Below the top five cities, there is a lot of dynamics. Hong Kong, ranked 4th in 2019, has now fallen to 12th place. Athens has also experienced a significant drop on the total ranking, even though they are still no 2 on the shipping pillar. On the other hand, Middle East, despite war and turmoil in the region, has strengthened its position. Dubai improved its position to 11th overall since the previous edition. Abu Dhabi made the most remarkable jump, moving up 10 places

from 32 to 22. This is a result of strategic public policies and consistent investment, making the city a magnet for talent and companies. This in turn, creates a ripple effect on the cluster dynamics, improving the long-term industry performance, reflected in the strong performance in many indicators and the overall LMC ranking. Other sharp climbers on the ranking are Osaka, Vancouver and Barcelona. Several cities have entered the top 50 this year: Shenzhen, Madrid, Gdansk, Jeddah and Naples, ranking 23rd, 29th, 39th, 43rd, and 45th, respectively.

In the 2024 edition of LMC, new indicators are introduced to address the transformative effect of decarbonisation and digital revolution. As the industry embraces new and cutting-edge technologies, the impact of these two dimensions cut across the five pillars that the cities are benchmarked on. The maritime industry experts voted Singapore, Oslo, Shanghai, and Rotterdam to be the cities best prepared for the digital transformation of the industry. Singapore's investment and focus on maritime decarbonisation has also further consolidated its position as the world's leading centre for green technologies and solutions, followed by Oslo and Rotterdam.

According to our experts, Singapore will remain the leading maritime city of the world for the next five years, while Shanghai will grow in importance and become the second most prominent maritime city. The leading city in the European region is Rotterdam, with London and Oslo ranked closely as the major contenders. Furthermore, the experts predict that Dubai will keep increasing in significance and is projected to grab its spot in Top 5 in the coming years.



THE MARITIME INDUSTRY

2022/2023 – SNAPSHOT

The international shipping industry serves as the backbone of global trade, facilitating approximately 90% of the world's commerce. International trade experienced a considerable rebound after the Covid-19 pandemic-induced disruptions. However, the conflict in Ukraine during early 2022 significantly impacted seaborne trade, particularly affecting dry bulk and tanker shipments. The trade volume dropped by 0.4% in 2022, with shipments reaching 11.0 billion tons, slightly below pre-pandemic levels. Shifts in shipping patterns and increased travel distance for commodities such as oil and grain were observed. Despite this, oil and gas trade volumes experienced robust annual growth rates in 2022, with a 6% increase for oil and a 4.6% increase for gas. Container freight rates reached all-time highs in the first half of 2022 due to the supply chain crisis, but then declined in the second half due to economic pressures, eventually returning to pre-pandemic levels in 2023. Dry bulk freight rates exhibited high volatility, initially declining in the second half of 2022 due to weakened demand in China, before rising sharply in 2023. Tanker freight rates, particularly for Aframax, recovered in 2022 and continued their upward trend in 2023, with expectations of further increases driven by geopolitical tensions and energy security concerns.

In 2023, various sectors experienced longer cargo distances. Disruptions from the war in Ukraine led to long-term highs in oil cargo distances as the Russian Federation sought new export markets and Europe explored alternative energy suppliers. Similarly, grain shipments travelled longer distances than ever before, as several grain-importing countries had to rely on alternative exporters, necessitating longer hauls. Containerized trade distances have been subject to fluctuation since 2020, with a marginal increase noted in 2023. Intra-Asian containerized trade, constituting the bulk of intraregional trade, witnessed a rise in its share. Asia retained its position as the leading maritime freight area, accounting for around 42% of total goods loaded globally, predominantly consisting of dry cargo, including bulk and containerized goods. The North Atlantic trade lane underwent a transition to a "new normal" in 2023. Unlike the previous year, which saw double-digit growth in imports from Europe, 2023 experienced falling demand, excess capacity, and economic/geopolitical uncertainty.

Towards the end of 2023, conflicts in the Middle East significantly disrupted shipping in the region, affecting major East-West trades, especially those passing through the Red Sea. Attacks on commercial vessels increased the risks for vessels

navigating the route and forced carriers to opt for longer and costlier routes around the Cape of Good Hope. Consequently, freight rates surged, leading to potential inflationary effects on consumer prices worldwide. Additionally, natural factors like atypical climatic conditions affected key waterways, including the Panama Canal and the Rhine River, resulting in limitations on vessel capacity and disruptions to barge movements. Other key shifts include over supply in container shipping, limited ship order book compared to existing active capacity, subdued ship recycling activity and shrinking shipbuilding and yard capacity.

Despite economic downturns affecting the industry periodically, shipping has seen a general trend of increasing total trade volume, quadrupling over the last four decades. The volume of world trade carried by sea has again begun to steadily increase in past year. Over the medium term (2023–2027), seaborne trade is projected to grow by 2.1% per year, slightly below the historical average of 3.3%. This growth is attributed to demographic shifts and economic factors. The structure of seaborne trade is expected to undergo a transformation, with a shift towards more intra-regional trade, particularly in Asia, and an increase in trade of intermediate and finished goods rather than raw materials, reflecting evolving global production and consumption patterns. However, significant challenges persist, such as environmental

and social pressures, including the need to reduce greenhouse gas emissions, enhance safety and security standards, and navigate geopolitical dynamics. Furthermore, the world fleet is aging, specifically in some sectors such as the tanker segment, and the limited yard slot for newbuilding will result in capacity crunch leading to anticipated higher revenue and profitability for the shipping segments with imbalance supply and demand.

The fact that shipping is the most fuel efficient and carbon friendly form of commercial transport should work in favour of an even greater proportion of world trade being carried by sea in the longer term. Looking ahead, a diverse range of challenges and opportunities, including digitalization, decarbonisation, and diversification, which will shape the future trajectory of the maritime industry.

Q: "The transformations that will have the strongest impact on the future competitiveness of shipping:"

A: "Enhance a vessel's efficiency, increase its controllability, and enable better remote support for the vessel."

– Maritime Technology Provider

ALWAYS FOR A GLOBAL REACH

Globalization motivates businesses to protect their own market from rivals while also looking for new, attractive markets and customers for their products and services. It boosts income and sales, improves efficiency and productivity through economies of scale and access to specialized resources and technologies. It enables the spread of knowledge and innovation, crossing boundaries and helping industries around the world. It also increases competition, pushing companies to enhance quality standards while giving consumers a wider variety of products and services.

Achieving complex trading networks for these organizations is key to benefit from opportunities in capitalizing on labour cost differentials and availing raw resources in specific nations. Development of rules and technology, such as the existence of trade groups like the EU/EEA, NAFTA, and the capacity of companies to control freight movements, using advanced IT systems, are eliminating obstacles to cross-border movement and lowering related “barrier costs”. As a result, the maritime industry today is mostly globalized, however often concentrated around ship owning companies.

Ship finance sector quickly embraced globalization, but legal services faced challenges due to jurisdictional limitations. However, English law firms have been exceptions, establishing branches in major shipping hubs worldwide. This is largely due to the widespread preference for English law in trade and chartering contracts.

Technological improvements and innovations enhance the global impact of the maritime industry. From sophisticated navigation systems to state-of-the-art containerization techniques, technology plays a pivotal role in enhancing efficiency, safety, and sustainability in maritime operations. The demand for high-quality service, such as continuous satellite cargo monitoring, has prompted organizations to form international alliances or merge regional entities into a single global network. Moreover, the widespread adoption of digitalization and automation has revolutionized processes such as cargo tracking, route optimization, and supply chain management, enabling seamless coordination and communication across continents.

DIGITAL TRANSFORMATION, CYBERSECURITY AND INNOVATION

The maritime industry is currently experiencing a significant transformation propelled by digitalization. Vessels, ports, and associated infrastructure are swiftly embracing cutting-edge technologies such as the Internet of Things (IoT), cloud computing, data analytics, and robotics. These advancements are revolutionizing the sector, fostering greater operational efficiency and effectiveness. Yet, the level of digital adoption within the maritime industry lags, unlike other sectors in terms of comprehensive integration across maritime transportation and associated services.

Smart Ports are leveraging digital technologies to optimise cargo handling processes, streamline logistics operations, and enhance security measures. Vessels equipped with sensors and communication systems enable real-time monitoring, predictive maintenance, and improved navigation. Moreover, data-driven decision-making is becoming increasingly prevalent

among maritime stakeholders, who utilize data analytics to make informed choices, optimise routes, and manage resources effectively. For instance, the Port of Singapore and Port of Rotterdam uses IoT sensors to monitor ship movements, optimise berthing, and manage cargo handling. IoT-enabled container tracking systems provide real-time information on container location, temperature, and security. This improves supply chain visibility and reduces delays.

Research and development efforts in autonomous shipping promise reduced crew requirements, optimised fuel consumption, and safer navigation. Yara Birkeland, developed by Yara International, stands as a groundbreaking example of autonomous shipping. As the world’s inaugural fully electric and autonomous container ship, it exemplifies a paradigm shift in maritime transportation. Designed to operate without human intervention, Yara Birkeland integrates advanced technology, including sensors and AI algorithms, to navigate safely and efficiently. By eliminating the need for onboard crew and utilizing clean energy sources, such as electricity, it not only reduces operational costs but also significantly minimizes environmental impact. Similarly, the AUTOSHIP project, with partners like SINTEF and Kongsberg Gruppen, demonstrated features like automatic docking and remote control, marking a significant step towards commercializing autonomous maritime technology, focusing on safety, efficiency, and the development of a common framework for communication within the industry.

Digital twins, which are digital replicas of ships and port infrastructure, offer opportunities for better monitoring, maintenance, and performance optimization.

Such maritime digital transformation causes fundamental organisational changes in traditional business practices by the implementation and use of digital technology, redefining existing business capabilities, processes, and relationships, and thus new possibilities are enabled, and value is created, captured, and delivered (Tijan et al., 2021). Crucial for the success of digital transformation is the alignment between both the business and digital strategies as well as the acceptance of involved players (port administrations, shipowners, shippers, service providers) to cooperate. On the other hand, the main barriers for digital transformation appear to be the high initial implementation costs, low quality of offshore internet connections, data quality and lack of standardisation, and the lack of investment initiatives and risk aversion due to uncertainty on the returns on investment.

The number of cyberattacks in the maritime industry is increasing at an alarming rate in recent years, some targeting facilities and companies ashore whilst others are focusing on the maritime fleet, resulting in breaches to IT systems, hardware, sensors, data confidentiality, with the gain of unauthorized access to manipulate or disrupt business operations. Vulnerabilities in networks and connected devices become targets for malicious hackers. These cyberattacks compromise sensitive information and system control, leading to reputational damage and increased legal costs. Incorporating encryption and secure access controls is crucial for maintaining confidentiality in shipping operations. Moreover, the complex ecosystem of the maritime industry involving various stakeholders poses additional cybersecurity risks. Cyberattacks have the potential to disrupt supply chains, affecting cargo movement, port operations, and global trade.

Efforts to address these challenges include the development of

international standards, policies, and frameworks. For instance, to enhance the cyber resilience of ships, last year IACS published UR E26 “Cyber Resilience of Ships”, and UR E27, “Cyber Resilience of On-Board Systems and Equipment”, to be applied to new ships from 1 January 2024.

Overall, digitalization poses challenges to existing business models while simultaneously presenting novel opportunities. The future of maritime industry involves striking a delicate balance between technological advancements and robust cybersecurity measures, while embracing innovation to enhance safety, efficiency, and sustainability.

EVOLVING MARITIME REGULATORY FRAMEWORK FOR GREEN TRANSFORMATION

In response to global concerns regarding the climate change and greenhouse gas (GHG) emissions from the shipping industry, the International Maritime Organization (IMO) adopted the ambitious 2023 IMO Strategy on “Reduction of GHG Emissions from Ships” in July 2023 (MEPC 80). This strategy sets targets to reduce carbon intensity by at least 40% by 2030 and increase the uptake of zero or near-zero GHG emission technologies to at least 5%, with a target of 10%, by 2030. Long-term goals include reducing GHG emissions as soon as possible and reaching net-zero by around 2050. Implementation measures focus on technical and economic elements, emphasizing the importance of technological innovation and alternative fuels. Additionally, the strategy underscores the need for a just and equitable transition, considering the impacts on developing countries.

“The challenge to meet the regulations are the infrastructure for new fuel capabilities and also a function of trade routes.”

– Shipowner

While the ambitions of the IMO are clear, the road to achieving these ambitions remains uncertain. For instance, the specific policy measures that the IMO can employ to incentivise the necessary changes are still being determined. This process is ongoing within the IMO, with various measures being considered and extensively discussed. Ultimately, the IMO has opted to introduce a combination of technical and operational measures to address these challenges. EEXI (Energy Efficiency Existing Ship Index) is a technical measure that evaluates a ship’s design, similar to how EEDI (Energy Efficiency Design Index) assesses newbuildings. On the other hand, the CII (Carbon Intensity Indicator) measure is operational, focusing on the actual fuel consumption and distance travelled by each ship during service.

In addition to the IMO’s CII Rating Scheme, other organizations – such as the EU, Sea Cargo Charter and financial institutions – have their own environmental compliance requirements (which in some cases are more ambitious than the IMO’s GHG Strategy) with a goal to align global shipping with society’s goals and to promote and incentivise the decarbonisation of international shipping.

The EU Emissions Trading System (ETS) now includes the maritime sector as of January 2024, functioning as a carbon tax to curb greenhouse gas (GHG) emissions. Shipping companies must monitor, report, and verify their emissions, covering both berth

and port emissions. The Fuel EU Maritime Regulation complements the ETS by gradually reducing the greenhouse gas intensity of fuels used in shipping to contribute to the EU-wide goal of reducing net emissions by at least 55% by 2030 and achieving climate neutrality by 2050. These initiatives by the EU, collectively aim to align maritime transport with broader climate goals and sustainability efforts, emphasizing the reduction of emissions from the sector to meet IMO 2050 goals.

“The Poseidon Principles” represent an initiative embraced by financial institutions, with 34 institutions having signed on as of February 2024. This collective encompasses over 80% of the global ship finance portfolio in bank loans to global shipping. At first, Western banks made up most of the signatories, but there has been a recent increase in participation from Asian banks like OCBC and SMBC. Prominent signatories include BNP Paribas, Credit Agricole, Citi, Credit Suisse, ING, SuMi Trust, Nordea, DNB, Danske Bank, and others. These principles provide a framework for assessing and disclosing the climate alignment of ship finance portfolios, enabling quantitative evaluation against established climate objectives. The Poseidon Principles underwent revisions in 2023 to ensure alignment with the latest IMO GHG Strategy.

“Sea Cargo Charter” launched in 2020 for bulk ship charterers, now has 37 signatories including notable major players like Trafigura, Dow, Total, Shell, Equinor, Gunvor, LDC, Cargill, AngloAmerican etc. The Sea Cargo Charter serves as a framework for evaluating and disclosing the climate alignment of ship chartering activities worldwide. It establishes a standard for responsible chartering practices within the maritime industry, offering practical guidance for achieving environmental stewardship. Aligned with the policies and objectives of the IMO, the charter supports the IMO’s latest ambition outlined in its July 2023 GHG Strategy to achieve net-zero emissions from international shipping by or around 2050. By enabling cargo-owners and shipowners to align their chartering activities with environmentally responsible practices, the Sea Cargo Charter incentivises the decarbonisation of international shipping, thereby contributing to a more sustainable future for the maritime sector and society. Although applicable currently to bulk ship charterers, the charter is expected to extend its scope to shipowners soon.

Given the past and future trends of the maritime industry, which cities worldwide will offer the best support, in terms of soft and hard infrastructure and world-class talent, to enable maritime businesses and people to connect and thrive? The following chapters aim to answer that question.



THE LEADING MARITIME CITIES OF THE WORLD

CITIES – ENGINES OF INNOVATION AND GROWTH

Urbanization is one of the strongest global megatrends in this century, with a clear shift in importance from nations to cities (Moretti, 2012; Quartz, 2015). Today, around 56% of the world's population – 4.4 billion inhabitants – live in cities. This trend is expected to continue. According to The World Bank the urban population will more than double from its current size by 2050, at which point two of three people will live in cities. Cities are the main drivers of global economic growth, as they produce over 80% of the world's GDP. Urbanization can foster sustainable development if it is well managed, by enhancing efficiency, creativity and innovation (World Bank, 2023). Population projections show that virtually all growth over the next 30 years will come in urban areas. Companies are thus increasingly focusing on city regions when developing their strategies for where to relocate or expand their operations.

Three distinct features or common indicators of “global cities” are (Goerzen et al., 2013):

- High levels of connectivity with other locations, as they typically have a good physical information and communication infrastructure that facilitates the international transfer of goods, people, and information.

- Specialized providers of high value-added services, such as financial, legal, and consultancy, which are important to the functioning and performance of multinational firms' local and global operations. Knowledge-based industries tend to centralize in a few leading city regions – San Francisco for ICT; Boston for biotechnology; Houston for O&G; New York for finance; and Singapore for maritime. This is not, however, a “winner-takes-it-all” game. There is room for cities with leadership in niches of industries, like Geneva in medtech, and London in fintech, or for cities with regional leadership such as Shenzhen in ICT and Singapore's Biopolis for biomedical science.

- An enabling environment, characterized by the presence of a culturally diverse body of players, including big corporations, highly specialized professional talent, and academia. At their core, these cities possess the capabilities for servicing, managing, and financing the global operations of firms and markets (Sassen, 2001). It is where global firms connect, build relationships and transfer knowledge, maintaining a level of connectivity, often seen as a means of achieving economic development and improving their competitiveness (Pain et al., 2015).

Shipping is a global business, encompassing a complex variety of actions taken and services performed, by an equally complex variety of players. Over time, many of these actors gather in specific geographic regions, or cities, thus forming so-called clusters. A maritime cluster can broadly be defined as “a group of industries that are directly and indirectly related to shipping and situated within a certain geographic area” (Shinohara, 2010). Maritime clusters make distinct contributions to the development of national or regional economies and provide strong support for innovation and technological development in maritime industries (Shi et al., 2019). Their vital role in enabling international trade and the global supply chain is also evident in their provision of integrated logistics and maritime services in addition to traditional cargo handling-related activities (Zhang and Lam, 2013).

Critical success factors for a maritime city may include (Monteiro et al., 2013):

- Acknowledgment of the maritime cluster as a cornerstone of the national and regional economy.
- Adoption of favourable policies, to allow actors to stay competitive in a globalized and evolving environment.
- Engagement with other maritime clusters, utilizing own strengths and supplementing for shortfalls.
- Involvement of maritime education centres, financial insti-

tutions, trade associations and other stakeholders, allowing for cooperation in businesses and R&D, information sharing, and risk sharing through investments in new markets.

Most maritime clusters owe their existence to the city's past success in its role as regional port/hub of commerce. But this is not enough, as proven by cities with a declining maritime footprint, such as San Francisco, Naples, Liverpool, and New Orleans, due to decreasing demand for traditional port services amid fierce competition (Merk, 2013). On the contrary, the operators of the Singapore maritime cluster successfully maintained their cluster's relevancy by modernizing their capacity to accommodate increasingly large ships and high cargo volumes and to offer complex, highly specialized logistical services, while catering to specialized needs for maritime finance, insurance, bunkering and other value-adding services (Jakobsen et al., 2017). Local governmental entities and maritime associations have greatly contributed to that effect by adopting and implementing pro-business policy measures, as well as continuously seeking input and feedback from industry actors, for locations such as Singapore to remain an attractive location for maritime business establishments (Osman et al., 2021). t al., 2021).

MARITIME COMPANIES – RESTRUCTURING WITHIN A GLOBAL PLAYGROUND

Cities are developing strategies to enhance their attractiveness to highly productive and innovative companies, and to talented individuals. The more mobile the companies, the stronger the competition among cities to attract them. Given the inherently global nature of the maritime sector, many maritime companies are mobile entities seeking to take advantage of localization advantages in different countries. This, combined with the maritime industry being a high value-added industry, means that the fight to attract maritime companies is tough, especially for shipping being the most highly mobile sector within the maritime industry. This implies that it may be easy to lose maritime business activities. The gains from winning the location race are disproportionately higher for the less mobile part of the industry.

Knowledge-intensive services are probably the least mobile companies in the maritime industry. The reason for this is that knowledge-based companies often have links to universities and are deeply embedded in the local milieu; for example in their reliance on specialized local expertise. Additionally, as firms increasingly disaggregate their value chains, cities compete to draw specific activities rather than entire companies. Winners will be those cities which are able to attract:

- Science and institutes of higher education
- Owners and headquarters
- R&D – product and technology development
- Financial, legal, and other sophisticated business services

While many cities are important centres in today’s maritime industry, some researchers suggest that we may see a future concentration of shipping activity, meaning a few global shipping centres (Center for Liveable Cities, 2014). The international maritime expert Martin Stopford was one of those who proposed that

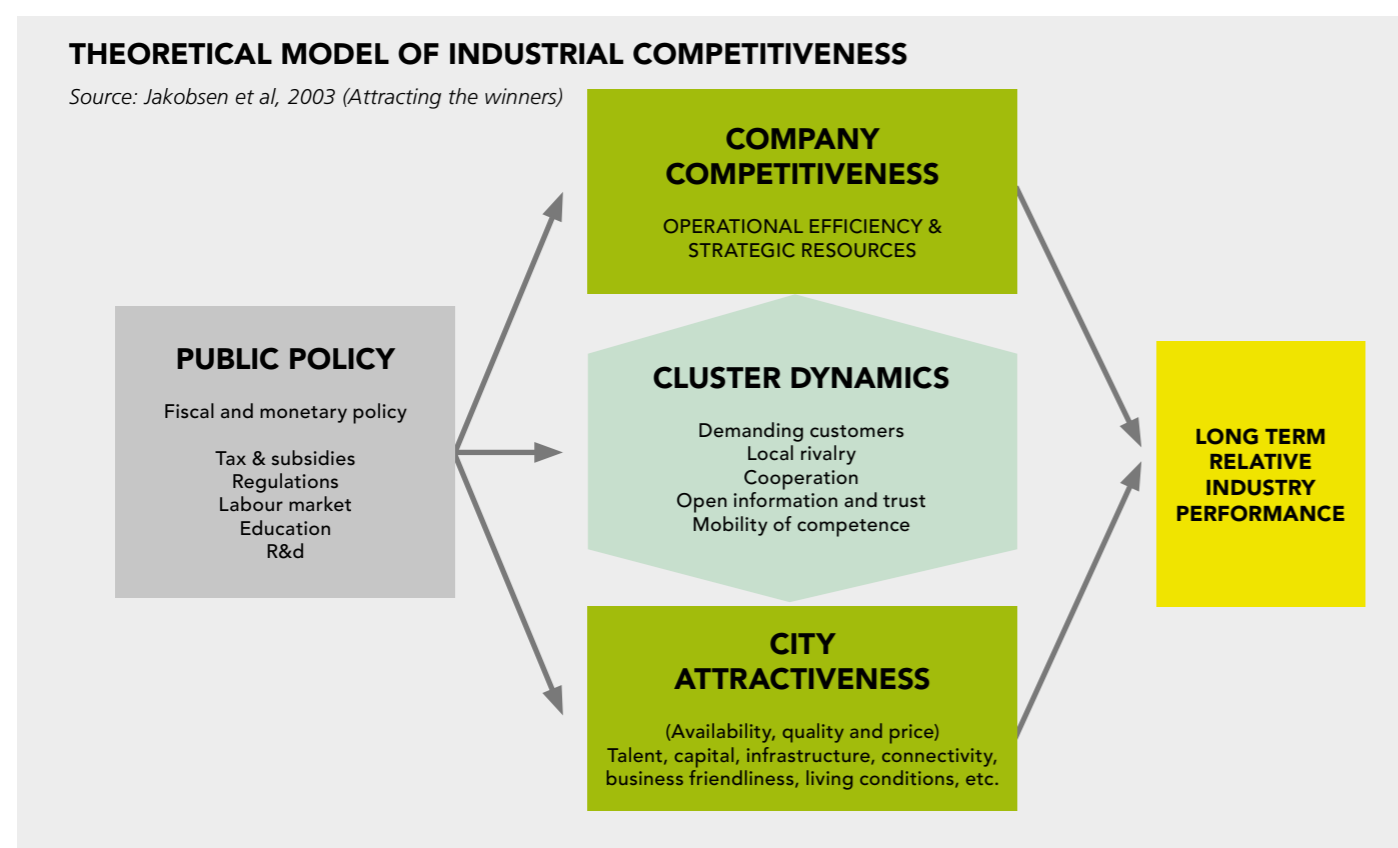
we will see a development of two or three global centres characterized as “shipping super cities” – one city in each of the eight-hour time zones (Asia, Europe and the Americas). This will mean that some of today’s shipping centres will lose importance to a few global centres that will act as shipping service hubs. Stopford also went further, dividing the cities into cargo port cities and shipping services ports. Port cities, such as Rotterdam and Shanghai, are mainly driven by their role of transporting cargo to the regional markets. For ports that provide shipping services, however, the port itself is not the primary focus. Rather, they will specialise in offering other services to the international shipping industry.

DRIVERS OF COMPETITIVENESS

The attractiveness of a city and the competitiveness of the local industries, are interconnected by numerous factors such as:

- Strategic location
- Favourable and stable political framework
- Transparent and efficient legal framework
- Proximity to large, demanding customers
- Local rivalry – creates incentives for continuous improvements and innovation
- Abundance of suppliers and service providers
- Specialized universities and research institutions
- Large pool of talent
- Rich and open flow of knowledge and ideas
- Relationships based on trust
- Meritocratic education and career system
- Access to capital
- Quality of life

Together, these factors produce spirals of self-reinforcing growth – or decline if the factors are absent. The mechanisms that drive industry competitiveness are summarized in the model below.



For the maritime industry in a city to flourish, two conditions must be satisfied: the companies must be competitive, and the city must be attractive to host these companies. These two aspects are mutually dependent: the companies gain their competitiveness from resources available in the city – for example access to capital, talent, and specialized supplies – and the price they must pay for these resources. Consequently, the city’s attractiveness increases when there are competitive industries in the city. Hence, the clue is to attract the winners (Jakobsen, et al 2003). Over time, the attractiveness of the cities is gradually shaped by the dynamics of the industry. In an industry with strong cluster dynamics, knowledge is continuously improved and dispersed, upgrading both companies and resources. Finally, governments play a central role in defining the attractiveness of the city. Through various public policy factors like taxes and subsidies, they determine the price of capital, labour, and other input factors. The quality of the resources is largely determined by investments in infrastructure, education, and R&D. Key institutions, including cluster facilitators, contribute to making a location attractive and competitive through active engagement with the maritime industry and introducing initiatives and programs based on industry feedback (Osman, 2020).

The four main elements in the model: public policy factors, the competitiveness of the companies, the attractiveness of the cities, and the dynamics of the industry clusters, are measured and benchmarked for maritime cities across the world. The results for the top 50 cities are presented in this report.

BENCHMARKING BASED ON OBJECTIVE & SUBJECTIVE INDICATORS

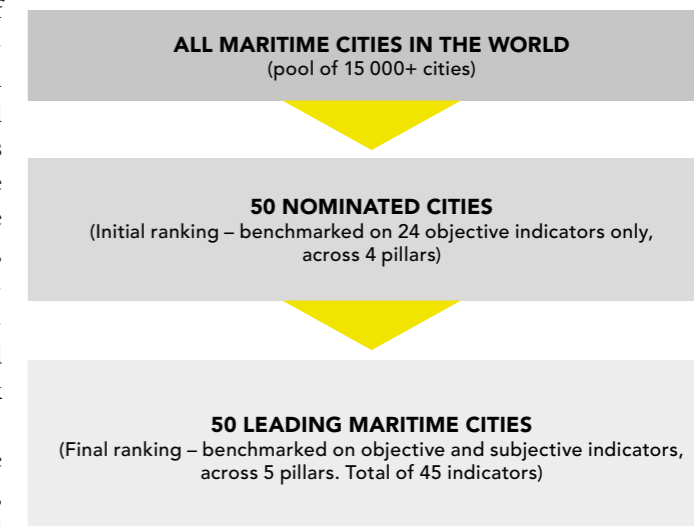
This Leading Maritime Cities report is in its sixth edition. The ranking is based on a combination of objective data from leading international sources and subjective expert assessment to evaluate and benchmark the top 50 leading maritime cities. This approach offers the advantage of considering both hard facts (objective indicators) as well as the subjective assessment by nominated maritime business executives, owners and academics from all around the globe. Expert opinions are of particular importance in areas that are difficult to measure with available objective data at city level (such as regulations, cluster dynamics, technological expertise etc.).

A bottom-up approach is used to identify the top 50 maritime cities in the world, where all cities that have some maritime activity (a sample of more than 15,000 cities) are reduced to a sample of 50 cities based on a ranking of 24 objective maritime indicators across four (out of five pillars). The four pillars include Shipping, Maritime Finance & Law, Maritime Technology and Port & Logistics. These cities are thereafter assessed by 190 maritime experts across the world along all five pillars, and their assessment in combination with the objective data is used to rank the sample of 50 cities internationally. This final round of assessment gives us the top 50 leading maritime cities of the world.

Subjective indicators are based on information we have gathered through the “Leading Maritime Cities 2024” survey. In this survey, maritime experts from all over the world with different backgrounds were asked to provide qualitative assessments on topics like green transformation, digitalization, competitiveness, and innovation. Furthermore, the 190 experts have ranked the top five or top three maritime cities on shipping, finance, tech-

nology and port/logistics, together with six other dimensions. With this data we have created a scoring system based on experts’ ranking of cities, where the city ranked first gets 5 points, the city ranked second gets 4 points etc. At the end, the total points under each ranking were summarized for each city, and these points are used as scores on each subjective indicator in our top 50 ranking. Detailed information about the composition of experts can be found in Appendix B.

The ranking approach is illustrated as follows:



Several changes were made for the 2024 edition of the report, compared to the 2022 edition. This means that the rankings from In order to ensure that the analysis is replicable and based on reliable, complete and high-quality data for the various cities, we revise all the data sources and add new ones where necessary. Several changes were made for the 2024 edition of the report, compared to the 2022 edition. This means that the rankings from 2022 and 2019 cannot be directly compared. However, these changes were deemed crucial to make the overall assessment as comprehensive as possible and aligned with the global trends in the industry. Furthermore, since the last edition of the report we have gained access to new and more detailed data making it possible to include more cities in the ranking sample and increase the data quality for the cities involved. The most important change in this edition is that we have introduced “four” additional indicators to reflect the decarbonisation and digitalization of the maritime industry. Although still in its infancy, we find it crucial to start measuring the transformation now. Other changes in the indicators compared to earlier editions are described in appendix B.

INDICATORS FOR CITY RANKING

The ranking model consists of both objective and subjective indicators for the top 50 maritime cities across five pillars. Each pillar is weighted equally (a weight of 20%) in the global top 50 city ranking. The five pillars are: Shipping, Maritime Finance and Law, Maritime Technology, Ports and Logistics, and Attractiveness and Competitiveness.

Within each pillar, all indicators are weighted equally (e.g., if a pillar consists of six indicators, all indicators will get a weight of 16,7%). For the five pillars in this study, a total of 32 objective indicators have been used. The full list of indicators is described in the tables below, and we explain the methodology data sources in the appendixes.

SHIPPING			
	DESCRIPTIONS	SOURCE	
OBJECTIVE INDICATORS	Fleet size - Management	CGT owned by shipmanagers registered in the city (Size of fleet (CGT) managed from the city)	Clarksons World Fleet Register
	Fleet size - Owner	Size of fleet (CGT) controlled by shipowners registered in the city	Clarksons World Fleet Register
	Fleet value - Owner	Fleet value assigned to cities by multiplying national fleet value with each city's corresponding national CGT ratio	Clarksons World Fleet Register & WFM
	Number of shipping companies with HQ in each city	Number of shipping companies with more than 5 vessels (shipowners)	Clarksons World Fleet Register
	Operational revenue for shipping companies	Operational revenue (turnover) for shipping companies (NAVE rev. 2: 5010 & 5020), allocated to HQ locations for each company	Bureau van Dijk (ORBIS database, most updated data by december 2023)
	Low carbon intensive fuel types - share of fleet size	Environmental impact of shipowners' fleet - measured as share of fleet (in GT) with low carbon intensive fuel types.	Clarksons World Fleet Register & Alternative Fuels Insights'
SUBJECTIVE INDICATORS	SURVEY QUESTION		
	Global Expert Assessment: Shipping centers of the world	Global experts' answer to "Which cities do you consider the five leading shipping centers of the world?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Number one choice for relocation of operations	Global experts' answer to "If your company should consider relocating, which cities would in your opinion be the most attractive location for operational units?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Cargo owners and charterers	Global experts' answer to "Which cities host the most influential cargo owners and charterers capable of reshaping traditional shipping activities?"	Menon Economics & DNV 2024: Global maritime expert assessments
MARITIME FINANCE AND LAW			
	DESCRIPTIONS	SOURCE	
OBJECTIVE INDICATORS	Maritime Legal Expertise by Who's Who	Number of legal experts per city, assessed by Who's Who (Lexology)	Who's who Legal (Lexology) 2023
	Number of maritime lawyer companies	Number of maritime lawyer companies registered in each city	World Shipping Register, world-ships.com
	Insurance Premiums	National collected insurance premium for P&I, hull, cargo, offshore from IUMI and CEFOR. Allocated to cities after economic activity of marine insurance companies (NAACE code 6512)	IUMI, CEFOR, Bureau van Dijk (ORBIS database)
	Shipping banks portfolio	Top 40 shipping portfolios by banks across the world, where sums are allocated to cities after the location of the bank's HQ. Lending as of 31. December 2022	Petrofin Bank Research, 2022
	Number of listed maritime owner groups	Number of listed maritime owner groups on city's stock exchange	Bureau van Dijk (ORBIS database)
	Market cap of listed companies on the city's stock exchange	Market cap of maritime companies (NAACE rev. 2: 5010, 5020, 5030, 5040, 3011, 3012, 3315, 5222, 5224 and 7734). Allocated to cities based on listing information on stock exchange.	Bureau van Dijk (ORBIS database)
	IPO/Bonds/Follow ons	Trading volume of bonds, IPO and follow ons for maritime listed companies. Volumes distributed by location of stock exchanges.	Clarksons Shipping Intelligence Network
	Green IPO/Bonds/Follow ons	Trading volume of green bonds, IPO and follow ons for maritime listed companies. Volumes distributed by location of stock exchanges.	Clarksons Shipping Intelligence Network
SUBJECTIVE INDICATORS	SURVEY QUESTION		
	Global Expert Assessment: Maritime finance center of the world	Global experts' answer to "Which cities do you consider the five leading centers of maritime finance of the world?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Sustainable maritime finance	Global experts' answer to "Which cities are perceived to be proactive in implementing green and sustainable financing practices?"	Menon Economics & DNV 2024: Global maritime expert assessments

MARITIME TECHNOLOGY			
	DESCRIPTIONS	SOURCE	
OBJECTIVE INDICATORS	Shipyards (CGT)	Size of fleet (CGT) delivered by shipyards, including orderbook and ships built later than 2020. Fleet size per yard distributed to the city location of the shipyard	Clarksons World Fleet Register
	Shipyards (GT) - Low carbon intense ships built	Size of fleet (CGT) delivered by shipyards, including orderbook and ships built later than 2020, measured by low carbon intensive fuel types	Clarksons World Fleet Register & Alternative Fuels Insights (DNV 2019)
	Operational turnover of companies in maritime technology industry	Operational revenue (turnover) of companies in the maritime technology industry (NAACE rev. 2: 3011, 3012, 3315, 2822, 5222, 5224). Turnover values are aggregated and distributed to the HQ of the shipyard companies.	Bureau van Dijk (ORBIS database, most updated data by december 2023)
	Classified fleet	The sum of CGT controlled by each Classification Society, distributed to cities based on each HQ location.	Clarksons World Fleet Register
	Market value of ships built at shipyards	Purchasing price of ships built at shipyards, sold in the in the year of 2020, 2021 or 2022. Purchasing price aggregated on city level after location of the shipyard.	Clarksons World Fleet Register
	Number of maritime patents	Number of patents produced by maritime firms with HQ in the city in 2021, 2022, 2023 that has more than 1 patent family member. IPC classification: B63B, B63C, B63G, B63H, B63J	Bureau van Dijk (ORBIS Intellectual Property Database)
	Number of maritime education institutions in each city	Number of maritime education institutions in each city	World Shipping Register: world-ships.com
SUBJECTIVE INDICATORS	SURVEY QUESTION		
	Global Expert Assessment: Maritime technology center of the world	Global experts' answer to "Which cities do you consider the five leading centers for maritime technology of the world?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Leading city in terms of green transformation	Global experts' answer to "Which cities are taking the lead in the green transformation of the maritime industry?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Best positioned city in terms of digital transformation	Global experts' answer to "Which cities have the strongest capabilities and are best positioned for the digital transformation of the maritime industry?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Number one choice for relocation of R&D	Global experts' answer to "If your company should consider relocating, which cities would in your opinion be the most attractive location for R&D unit?"	Menon Economics & DNV 2024: Global maritime expert assessments
PORTS & LOGISTICS			
	DESCRIPTIONS	SOURCE	
OBJECTIVE INDICATORS	TEU in port	Volume of TEU handled by ports around the world for 2020. Measures how "busy" each port is. Data for top 100 ports globally.	Lloyd's Top 100 Ports 2023 (2022 data)
	Liner Shipping Connectivity Index	Liner Shipping Connectivity Index, disaggregated on port level (2023 data)	UNCTAD 2023
	LNG available at ports	Ports with available LNG bunkering facilities. Ports are ranked based on the aggregate tank capacity of LNG bunker vessels who use the port for bunkering	Alternative Fuel Insights DNV
SUBJECTIVE INDICATORS	SURVEY QUESTION		
	Global Expert Assessment: Ports and logistics center of the world	Global experts' answer to "Which cities do you consider the five leading centers for ports and Logistics of the world?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Digitalized ports	Global experts' answer to "Which cities have the strongest capabilities in the adoption of digital technologies and automated processes for port operations?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Multifuel ports	Global experts' answer to "Which cities have the strongest capabilities and infrastructure to be best positioned as a leading multi-fuel bunkering port?"	Menon Economics & DNV 2024: Global maritime expert assessments
ATTRACTIVENESS & COMPETITIVENESS			
	DESCRIPTIONS	SOURCE	
OBJECTIVE INDICATORS	Ease of doing business	Measures ease of doing business, by assessing regulatory performance. Country-level data	World Bank 2020 (doingbusiness2020.org)
	Transparency/ corruption	Measures the perceived level of public sector corruption (Corruption Perception Index) 2022: Country-level data	Transparency International (CPI 2022)
	Entrepreneurship	Measures, with several indicators, the health of the entrepreneurship ecosystems 2022/2023: Country-level data	Global Entrepreneurship Index (Global Entrepreneurship Monitor) 2022/2023
	STRI OECD. Sectors: Maritime transport and logistics cargo handling	STRI OECD. Sectors: Maritime transport and logistics cargo handling. Country-level data 2022	OECD 2022
	Global innovation	WIPO's Global Innovation Index (GII) 2023	WIPO (World Intellectual Property Organization)
	Quality of Living City	Mercer's Quality of Living City Ranking 2023	Mercer 2023
	Economic freedom	Index of economic freedom 2023	The Heritage Foundation
	SUBJECTIVE INDICATORS	SURVEY QUESTION	
Global Expert Assessment: Leading maritime center of the world in 5 years		Global experts' answer to "Looking forward 5 years from now: Which cities will be the five leading maritime centers of the world?"	Menon Economics & DNV 2024: Global maritime expert assessments
	Global Expert Assessment: Number one choice for relocation of headquarters	Global experts' answer to "If your company should consider relocating, which cities would in your opinion be the most attractive location for headquarters?"	Menon Economics & DNV 2024: Global maritime expert assessments

SHIPPING CENTERS

SUMMARY



“The centre of international trade is gradually moving towards the East or Asia, with more shipowners emerging from this region. This shift could elevate Asian maritime cities like Shanghai and Singapore in terms of their importance in global maritime trade.”

– PORT AUTHORITY IN SHANGHAI

The three positions in the overall ranking of the major shipping centres go to Singapore, Athens and Tokyo, while Shanghai and Hamburg are the next two in line. This is consistent with the 2022 rankings, with the only exception that Singapore beats Athens this year. Three European cities, Copenhagen, Rotterdam and Oslo are moving up on the ranking, while two Asian cities, Hong Kong and Djakarta, are dropping.

Globally, there has been a significant rise in the world’s fleet value in recent years, from USD 873 bn in 2016, to USD 951 bn in 2019, to about USD 1.3 tn in 2023. The rise in value is mostly attributed to the enhanced shipping economic outlook that dominant market segments, such as the dry bulk and containership segments, have been experiencing in the recent years, compared to the previous decade. At a city level, the top 10 cities in terms of owned fleet value control more than USD 576 bn, which is approaching 44 percent of the world fleet’s value, illustrating the importance of these cities in the global world of shipping. However, the top 10 cities’ share was even higher, 50 percent, in 2022.

Historically, European cities have owned most of the ships, but this is slowly shifting, as Asian shipowners have acquired most of the fleet expansion in the last ten years. Asian owners have increased their market share to 48% of the global fleet, up from 36% in 2012 (in terms of GT), with Chinese owners clustered in Shanghai and Hong Kong facilitating most of

this change. The European share of the world fleet, accordingly, has fallen slightly from 43% to 42%. The remaining 10% is divided between the other continents.

Singapore’s strategic advantages are rooted in its geographic position along the East-West trade route and its proximity to densely populated markets like China and India. It serves as a crucial hub for shipping and commercial management. Notably, Singapore boasts the world’s second-largest city-owned fleet and the second-largest city-managed fleet in terms of tonnage. Experts recognize it as the prominent shipping centre and a top choice for relocating shipping operations. The city’s global attractiveness is further underscored by its significant presence of foreign ownership.

Although beaten by Singapore on the shipping pillar as a whole, Athens is by far the city in the world with the largest fleet of ships. Since 2022, Athens’ both fleet ownership and ship management have surged by approximately 10% in terms of tonnage. The city’s strengths are deeply rooted in its robust ship-owning community, with Greek shipowners playing a pivotal role in the maritime industry for decades. Its maritime cluster also caters to this community, offering top-notch shipping services covering shipping operations, and technical and crew management while employing qualified local talent. However, there remains a perception that Athens primarily serves local Greek shipping companies rather than international shipping entities. Consequently, experts



	SHIPPING								
	Fleet size - management	Fleet size - owner	Fleet value - owner	Number of shipping HQ	Turnover shipping companies	Env. friendly fleet size - owner	Q: Shipping	Q: Operations	Q: Cargo owners and charterers
SINGAPORE	2	2	3	3	12	4	1	1	1
ATHENS	1	1	1	2	35	1	4	8	4
TOKYO	6	3	2	9	4	2	10	13	10
SHANGHAI	5	5	5	7	9	8	3	3	2
HAMBURG	4	6	7	6	6	3	8	5	8
LONDON	7	9	8	14	5	7	2	7	3
COPENHAGEN	13	13	12	33	1	11	11	10	6
ROTTERDAM	8	11	10	4	19	17	6	4	5
HONG KONG	3	4	17	12	26	9	7	12	13
OSLO	23	17	9	27	8	5	5	6	8
INCHEON / SEOUL	17	7	6	13	7	6	31	34	24
DUBAI	9	15	22	11	46	33	9	2	7
JAKARTA	10	10	24	1	32	32	31	34	29
BEIJING	29	18	20	21	2	26	20	34	17
MARSEILLE	30	20	15	40	3	10	30	34	23

have shifted their confidence toward other prominent shipping centres, notably Singapore and Dubai. These cities have emerged as preferred choices for global shipping activities, drawing attention away from Athens' historical prominence.

Tokyo, a longstanding hub in global shipping, maintains its position as the third-largest player in the industry as of end 2023. Shipowners based in Tokyo have significantly expanded their involvement in key growth sectors, particularly emerging as the top two for owners of environmentally friendly fleets worldwide. Additionally, Tokyo ranks among the top three cities globally in terms of ownership of tonnage capable of utilizing alternative fuels. They facilitate Japanese and global trade by chartering out many of their vessels on long-term contracts with established ship managers or large players in the manufacturing and energy sectors, ensuring stable sources for their earnings. Despite this, several factors such as high operational costs, and lack of local talent have lessened Tokyo's attractiveness as a base for ship management, a sentiment that is also shared by the industry experts.

Shanghai has achieved remarkable progress in its maritime activities in recent years, creating a network of Chinese owners and international managers that handle the majority of the Chinese imports and exports, managing to surpass the competition from other shipping centres in the region, especially Hong Kong. The city hosts the Shanghai Containerized Freight Index (SCFI). Another attractive feature for industry experts is the ongoing efforts from local authorities invested in enhancing the city's modern shipping services, such as digitalization practices in shipping operations, shipping finance, with vessel leasing becoming increasingly

popular among global shipowners; maritime arbitration; and other legal services. Global shipping organizations are paying attention, and the experts rank Shanghai among the top 3 for leading shipping centres, as well as choice of relocating their shipping operations.

Hamburg has kept its overall 5th place but has faced difficulties to compete with other shipping centres in the recent years. Its ship owning community has become smaller and surpassed by the Chinese owners from Shanghai and Hong Kong. As we reported in 2022, the shipowners in Hamburg had some specific challenges, because part of their fleet was financed through the KG system (a governmental tax incentive), which gave them little control over the fleet. However, Hamburg is still a global centre for ship operations, home to some of the most successful ship owning and ship management companies, such as Hapag-Lloyd in containerships and Oldendorff Carriers in the dry bulk segment. It is worth mentioning that German Shipowners are more optimistic about returning to their business, and this is echoed by Global experts who rank Hamburg among the top 5 cities for them to move their shipping operations.

EXPERT ASSESSMENT

When considering the breakdown of the industry experts' assessment for the shipping pillar, it can be seen from Figure 1 below that experts perceive Singapore, London, Shanghai, Athens, and Oslo as the leading shipping centres in the near future. Shipping executives, furthermore, indicate that in case their company had to move their operational units, they would choose Singapore as the first option (Figure 2), followed by Dubai and Shanghai. Underscoring the pivotal role of cargo owners/charterers (Figure 3) in shaping the industry's direction towards sustainability and shipping performance, experts also perceive Singapore of having influential cargo owners and charterers capable of transforming the traditional shipping operations, followed by Shanghai, London, Athens and Rotterdam.

Undoubtedly, Singapore's strong holistic focus on the maritime sector and the establishment of an International Maritime Cluster (IMC) awards the city the top position in the assessments, by a wide margin. The city is attractive due to its location, pro-active governance, transparency, presence of mature and complete maritime ecosystem. The Singapore government has for many years supported this segment both financially, by establishing a stable, pro-business environment, and by taking a consultative approach to the sector. It has retained a strong position for shipping activities, both commercially and operationally, and has also been an important meeting place for international shipowners.

While London may not hold the same perception as the leading maritime centre in the eyes of industry experts, its deeply rooted and extensive maritime cluster remains a magnet for numerous highly successful shipping companies and industry professionals worldwide. Experts believe that London's status as a top shipping hub is unlikely to face immediate challenges due to its robust supporting services in finance, insurance, and law. However, the elevated costs linked with business operations could force shipping companies

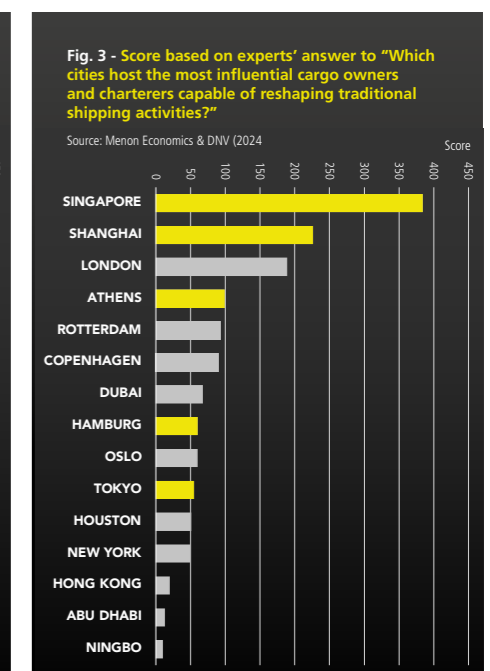
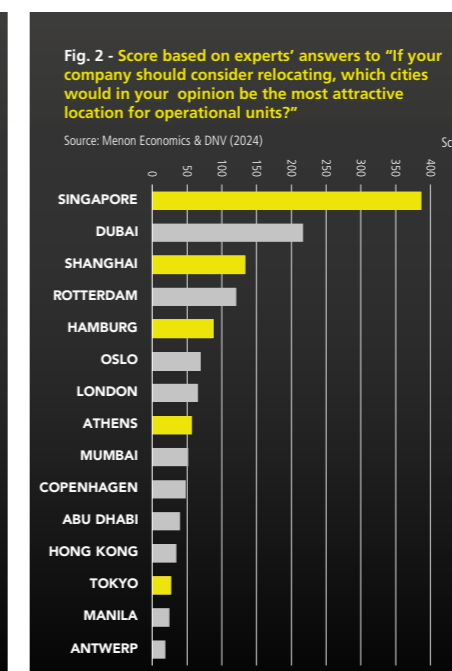
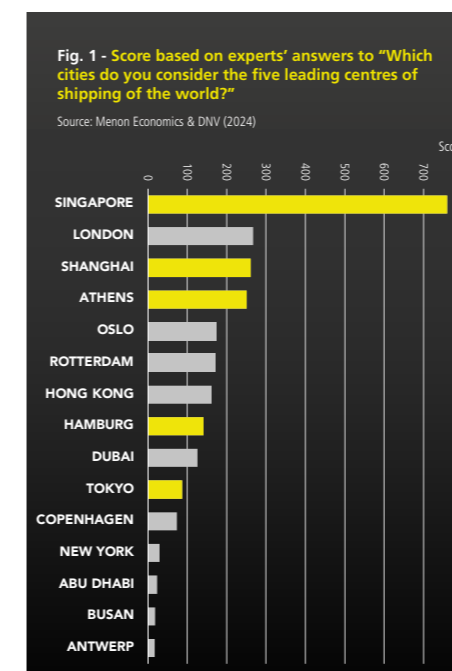
to relocate their operational units from the city, opting for more economical destinations instead. Consequently, this factor contributes to London's ranking in 7th place.

Shanghai is maintaining a strong position due to its proximity to the Chinese production bases, needing streamlined shipping clusters to facilitate the ever-growing export volumes. Hong Kong is instead experiencing a downturn. While Shanghai maintained its second spot after Singapore, as a potential for the leading shipping centres of the future, Hong Kong dropped to 6th overtaken by European cities like Oslo and Rotterdam. In the choice of relocation, Shanghai lost its 2nd spot to Dubai and Hong Kong dropped significantly to 12th from 4th.

Athens places 4th on the subjective ranking of future leading shipping centres, with Greece's shipping magnates having emerged largely unscathed from the country's financial crisis and one of the shipping industry's longest downturns during the 2010s. The city has been developed as a principal ship owning and management location due to its historical position as one of the great maritime centres and its highly qualified maritime workforce. However, it is perceived as catering mainly to the numerous Greek shipowners/managers, and less so to international players. Thus, it does not score as highly when viewed as a choice for relocation, ranking 8th overall.

Dubai has emerged as a thriving maritime hub, securing the second position as a favoured destination for relocating shipping operations, after Singapore. This achievement is propelled by several key factors. Firstly, the Middle East Region's growing trade demands have elevated Dubai's prominence, strategically positioning between Asia and Europe to facilitate global commerce through its ports. Secondly, Dubai's ability to attract and retain skilled professionals has been crucial, owing to its cosmopolitan environment, liberal working visa policy and advance infrastructure that draw talent from around the world. Thirdly, governmental support plays a pivotal role, with Dubai's government actively fostering

an environment conducive to international investments through incentives, policies, and strategic initiatives that encourage businesses to establish their operations in the city. Although currently ranking 11th overall, just below some established European maritime centres, Dubai is rapidly gaining recognition among experts, solidifying its position as the dominant maritime cluster in the Middle East Region.



OBJECTIVE INDICATORS' ASSESSMENT

A leading shipping centre arises from the location attractiveness, presence of robust infrastructure, efficient logistics, skilled workforce, thriving maritime industry, continuous investment, safety measures, and environmental sustainability. Six objective indicators were chosen to benchmark the leading shipping centres. To be recognized as a leading centre for shipping, a city must host a substantial number of registered shipowners and managers, considering both the size and value of their fleets. The decision of shipping companies to establish their headquarters in a specific city significantly influences its ranking in our comprehensive benchmarking of objective indicators within the shipping sector. Additionally, the assessment of shipping centres includes an evaluation of their ownership, measured in tonnage of vessels capable of using alternative fuels. This is expected to change the usual shipping scene, becoming a key factor that decides the fate of future shipping businesses.

SIZE OF SHIPOWNERS' FLEET AND MANAGEMENT OF FLEET

In the Figure 4 and Figure 5, cities are ranked by the size of total fleet in compensated gross tonnage (CGT) based on shipowners and ship managers located in each city. For an international industry like the shipping business, ownership and management of companies can easily be split up to take advantage of specialized local competence and cost differentials in different cities. Data was compiled for the entire world fleet and vessels were then assigned to the individual cities where their owners and managers are located.

On this indicator, Athens comes out strongly in the 1st position, both in terms of shipowners' and managers' operating tonnage, at about 117 million and 125 million CGT, respectively. Singapore follows in 2nd place, with about 45% more managed than owned tonnage, at 90 million and 63

million CGT, respectively. Tokyo has in contrast close to 96% more owned than managed tonnage, showcasing a different approach to successful shipping norms and practices.

Hong Kong and Shanghai have been rapidly climbing on this indicator in recent years, as Chinese owners and managers add tonnage to their ranks, at a rate surpassing all other cities. Hong Kong and Shanghai have managed to retain the 3rd and 5th place respectively since 2022, in the ship management measurement. Both Hong Kong and Shanghai have easily surpassed Hamburg and London in the ownership indicator, and now aims to take on Tokyo, indicating that these are cities with the potential to win over the bigger piece of the Chinese ship management/ship ownership pie in the future.

Lastly, Dubai is ranked as number 9 in ship management by CGT, pushing Jakarta to 10th from 8th since 2022. It has also made it to the 15th place in the ship ownership. Dubai's growth is attributed to easy accessibility to foreign talent, favourable time zone, and lower corporate taxes formulating a mix of favourable conditions for shipping activities.

VALUE OF CITY-CONTROLLED FLEET

The tonnage (CGT) of a ship does not reflect fully the economic value of the ships. For example, advanced offshore vessels and LNG ships have higher value per tonnage than container and oil tankers. The market value of the ships also depends on the business cycle of the segments. With strong market conditions for both renewable and fossil based energy, the value of LNG and offshore vessels are strengthened. Hence, cities like Oslo and Houston, that possess a high ratio of offshore vessels, experience increased value.

Still, as shown in Figure 6, the world's total fleet value is concentrated in Athens, and in Asian centres, such as Tokyo, Singapore, Imabari and Shanghai. The composition of the merchant fleet differs between them. Athens may be best known for being home to a large tanker fleet, but the city

also has a substantial fleet within the bulk and gas carrying segments. Tokyo has a well-diversified fleet consisting of bulkers, containerships, ro-ro vessels and gas carriers, while Singapore has its strength within tankers, bulkers, offshore and containerships.

Athens has recently added quite a few vessels (bulk carriers, containers and tankers) to their arsenal, viewing vessel ownership a prime form of capital investment. From 2021 to 2023 their fleet value has increased by around 8%, and they are with that comfortably in the top position. Shanghai houses the bulk of Chinese-owned ocean-going fleet, including the fleet of COSCO Shipping, the largest shipowner in the world in terms of total gross tonnage, whose aggressive tactics in ship acquisition and ship newbuilding have contributed to Shanghai taking the 5th place, and continues to compete with Imabari for the 4th position. Hamburg has fallen behind, dropping from 3rd to 7th position, to a large extent due to the fact that it is dominated by containerships and dry bulk vessels, two segments with weak value development after the pandemic years. Despite being home to Maersk, the world's largest container shipping company, Copenhagen fell sharply to 12th place.

TOTAL ANNUAL TURNOVER OF SHIPPING COMPANIES

The annual turnover of shipping companies in each city serves as a vital indicator of the local shipping community's size and significance in the global markets. However, it is noteworthy that many shipping firms opt for non-public equity trading to safeguard their competitive advantage, often concealing their financial outcomes from the public eye. This, combined with variations in reporting methods and local legal regulations, poses challenges in accurately measuring the financial performance of each city's shipping sector.

The ranking on this indicator reveals a strong corporate factor, where several businesses might

be grouped in one large corporation. The high turnover of major shipping corporations, many of which are publicly traded, are predominantly generated by chartering out their vessels on medium-to long-term contracts. For example, Copenhagen secures the top spot in the overall annual turnover, overtaking Beijing. This is mainly due to the presence of large shipping corporations like AP Moller-Maersk Group, benefitting from surging demand in container shipping stemming from the global economic recovery following the COVID-19 pandemic.

Significant movements have occurred since 2022. As in Figure 7, Shanghai, home to COSCO, the largest corporation with numerous subsidiaries, has experienced a significant decline from 2nd to 9th place. Meanwhile, Marseille, where CMA CGM is headquartered, has surpassed London in total turnover, securing a position in the Top 3. Tokyo and London follow closely in the rankings. Hamburg, Incheon/Seoul, and Oslo occupy the 6th, 7th, and 8th spots, respectively, with a high number of medium-size shipping companies.

Dubai has dropped out of the top 15 positions, despite revenues generated from transporting general cargoes, crude oil, or oil product shipments in the Middle East Region. Singapore and Athens, being the top two on the shipping pillar, scores poorly on this indicator. This is likely due to lack of reporting of their financial results to the public.

NUMBER OF SHIPPING HEADQUARTERS

The number of shipping companies located in a city may give a different perspective on the shipping community than the value of the ships and revenues of the companies. Figure 8 shows the number of shipping companies with headquarters in each city. Jakarta is leading this indicator with 261 shipping companies registered there. Most of these are very small in size, operating small regional vessels that service the needs of the archipelago islands. Athens follows closely with 248 shipping companies. The majority of these are family-owned small enterprises. Singapore retains its 3rd rank, attracting owners and managers from all around the world, servicing every segment of the shipping industry. The city owes much of its success to the incentives provided by Singaporean Register and the active role of MPA and Maritime Singapore in attracting shipping companies to the city. Surprisingly, Ningbo, a bustling port city in China housing 120 shipping companies, has climbed up significantly from 13th to 5th spot. This is attributed to its strategic location in the middle of the Chinese coastline, particularly for ocean containers between mainland China and the Pacific Ocean, facilitating significant trade in iron ore, crude oil, coal, liquid chemicals, and grains. In the trailing cities of Rotterdam, Hamburg, and Shanghai, there are about 100+ shipping companies each. These are mostly large corporations, owning a diverse portfolio of vessels.

ALTERNATIVE FUELS CAPABLE FLEET SIZE

To align with IMO's recent strategy to cut down GHG emissions by 100% by 2050, some shipowners have begun to equip their newbuild projects with engines that can run on alternative fuels, such as LNG, LPG, ammonia or methanol. However, there are still significant obstacles for various fuels on many levels – from technical readiness (of designers, yards, engine/equipment suppliers, ship/cargo owners), fuel availability (from feedstock suppliers, fuel suppliers

and authorities), infrastructure (by fuel supplier, authorities, bunkering terminals, ports), capital expenditures (for shipowners,) and regulatory status (from IMO, Class, regional and national authorities). Shipowners must consider these factors in their choice when investing in alternative fuels-capable vessels, where the initial investment costs for new technologies are high. To reduce their investment risks, large shipowners like Mitsui O.S.K., BW Group and Angelicoussis Group secure long-term deals, from 5 to 15 years, with reputable charterers like BP and Total, and then proceed with alternative fuels-capable newbuild projects, with the vessels deployed under charter contracts.

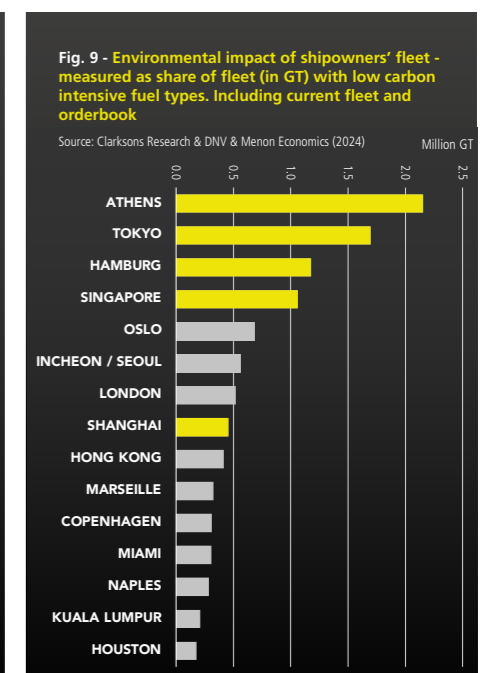
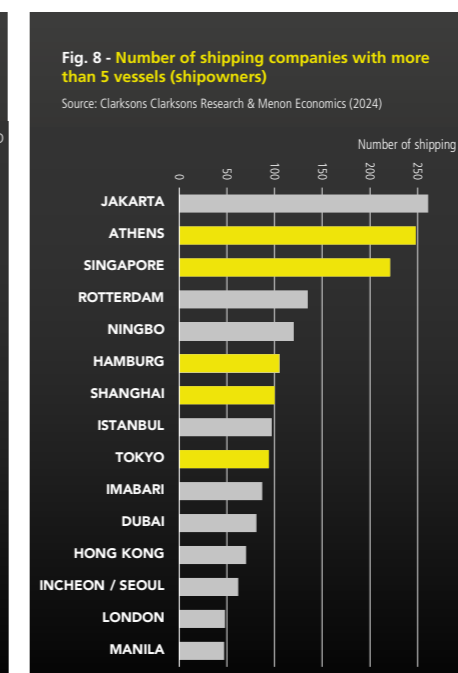
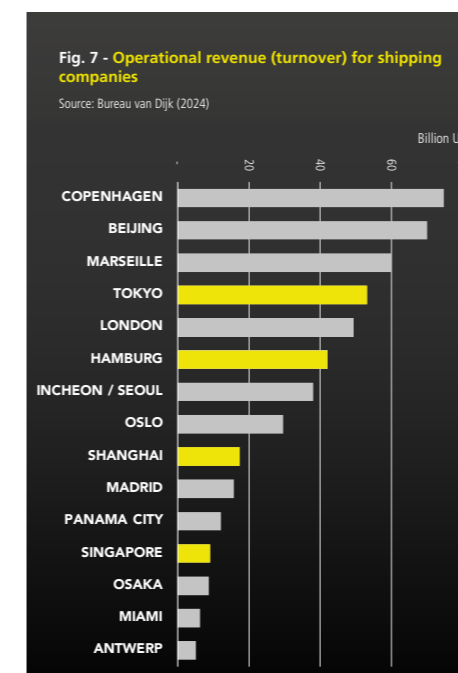
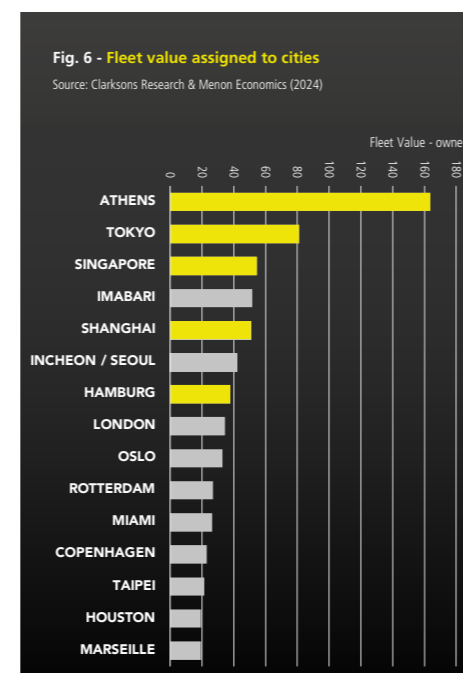
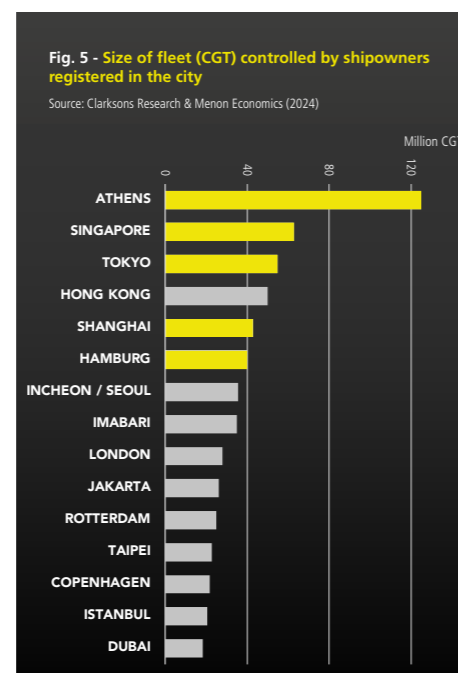
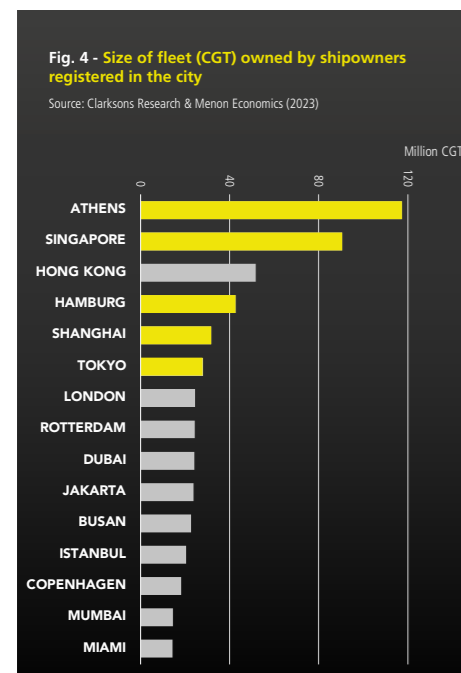
Figure 9 shows the environmental impact of shipowner's fleet in the different cities. Athens and Tokyo have the fleets with the highest tonnage of low carbon intense fuel types, owning about 2.1 and 1.7 million GT respectively. Hamburg and Singapore trail closely behind and claim the 3rd and 4th positions respectively, by owning over 1 million GT of alternative fuel-capable tonnage. Oslo secures the 5th position with approximately 0.7 million GT. In the rest of the Asian shipping centres, such as Incheon/Seoul, Shanghai and Hong Kong, local owners are progressing faster than the European Cities in their investment in environmentally friendly tonnage.

"We must be here in Singapore because of the attractiveness. You have the whole cluster here. So, we will be here in one form shape or the other."

– Ship Owner in Singapore

"Greeks excel in operating shipping, particularly due to the formidable union of Greek ship owners, which is a force to be reckoned with. There is a huge group of experienced people who are there because there are a lot of Greek ships and cruises, as well already officers and crew there."

– Ship Manager in London



MARITIME FINANCE AND LAW

SUMMARY

1

2

3

4

5



LONDON



NEW YORK



OSLO



SINGAPORE



TOKYO

“London, as a leading player, relies on English law. Many maritime contracts are based on English law, and consequently, utilize the English legal system and English lawyers.”

– MARITIME EXPERT IN LONDON

Overall, London is ranked first in the world for maritime finance and law, scoring No.1 in five out of ten indicators. London is widely recognized for its maritime law-related and marine insurance services. It is home to world-leading institutions, such as Lloyd’s for insurance, and English law is the most widely applied in shipping disputes. New York, despite being the home to the world’s largest stock exchange for maritime listings, lost its overall top spot to London in 2024. However, it still plays a key role in financing maritime operations.

Oslo, Singapore and Tokyo take up the 3rd, 4th and 5th spots, respectively. Oslo’s strong position in maritime finance is due to Norway’s strong historical position in the maritime industry and the development of world leading financial services that have supported this industry. Oslo is home to the world’s two leading shipping banks, DNB and Nordea, and has a strong position with a maritime focused stock exchange and leading insurance and brokering entities.

Singapore has climbed from 8th to 4th place in this year’s ranking, taking Paris’ spot on the top-five list. Paris, an inland city without a significant port or a shipping community, is still home to the headquarters of leading ship financing banks such as BNP Paribas, Credit Agricole and Société Générale. However, Paris dropped from 5th to 9th on the Maritime Finance & Law pillar in 2024.

Tokyo is the centre of gravity for the Japanese shipping community with several banks that are strong in ship finance and the presence

of a strong Export Credit Agency (ECA). Its insurance companies generate the 2nd largest insurance premiums and many of its maritime companies are stock listed. However, Tokyo does not perform as well on legal indicators, since its law firms are less recognized on a global scale. When assessing top shipping portfolios by banks headquartered in various cities across the world, Tokyo is the top performer. Recently, Asian (particularly Chinese) banks have emerged in ship finance and as of today, three out of the global top ten banks are now Chinese (e.g., Bank of China, ICBC, China Exim).

According to the industry experts, the top 5 cities for maritime finance are London, Singapore, New York, Oslo and Shanghai. Tokyo scores high on the objective indicators, though it is not acknowledged among the top 5 cities by the industry experts. Instead, they rank Shanghai as the most important city, even though the city is in the 7th position on the objective criteria. Experts nominated London, Oslo, Singapore, New York and Rotterdam to be the top 5 cities proactive in implementing green and sustainable financing practices.



MARITIME FINANCE AND LAW

	Legal experts	Maritime lawyers	Insurance premiums	Shipping banks portfolio	Number of listed maritime owner groups	Market cap maritime companies	IP/Bonds/Follow ons	Green IPO/Bonds/Follow ons	Q: Finance	Q: Sustainable finance
LONDON	1	1	1	5	13	16	18	3	1	1
NEW YORK	3	2	21	10	1	1	1	-	3	4
OSLO	11	16	8	9	2	9	2	8	4	2
SINGAPORE	4	7	4	14	6	8	9	5	2	3
TOKYO	11	25	2	1	5	4	15	12	7	11
HONG KONG	2	9	18	-	4	3	14	6	6	13
SHANGHAI	14	14	7	-	8	2	4	9	5	9
COPENHAGEN	15	34	30	11	19	15	5	2	13	6
PARIS	11	11	5	2	18	11	-	-	11	8
ROTTERDAM	7	5	10	4	-	-	12	7	10	5
MADRID	16	15	14	-	-	-	6	1	-	-
BEIJING	24	23	3	3	-	-	16	-	23	15
ATHENS	19	3	26	8	16	20	-	-	12	14

EXPERT ASSESSMENT

Maritime activities tie up large amounts of capital. The industry is characterized by cyclical markets. Hence, access to capital will determine the long-term success of many companies. Companies raise capital with debt, by taking on bank loans or issuing bonds, or with equity, by issuing shares or receiving private investment. Without a change from 2022, London, Singapore, New York and Oslo remain the clear leaders within this field, according to the industry experts, due to their strong positions in banking, law, insurance and brokering services. As seen in Figure 10, Tokyo is now ranked 7th by the experts and 5th on the pillar as a whole. Conversely, Shanghai is 5th in the expert assessment, makes it to our overall top 7. Judging by this it appears the experts prioritise a strong stock exchange over the bank loan indicators. In addition, the deals and transactions often take place where the large maritime companies are located, not necessarily in the cities of the banks and other financial providers.

For this year's edition, an additional expert evaluation was carried out to incorporate cities actively supporting maritime decarbonisation through the adoption of green and sustainable financing initiatives. In this indicator, experts rank London, Oslo, Singapore, New York, and Rotterdam as the top five cities (Figure 11). Rotterdam is now ranked 5th by the experts, although ranked 10th on the pillar overall.

OBJECTIVE INDICATORS' ASSESSMENT

Eight objective indicators were chosen to benchmark the leading maritime financial and legal centres. These indicators measure the volume of legal and financial expertise and associated activities in each selected city – from the number of maritime legal experts rooted in each location to the volume of mandated loans issued from the financial institutes and companies that

provide financing (debt, equity, mezzanine) for the industry, primarily for the sale and purchase of vessels. These companies also include international and investment banks, private equity firms as well as smaller boutiques, which act as arrangers or introducers of capital. Data on the number of listed maritime companies, and volume of normal as well as green bonds, IPO and follow-ons from stock exchanges headquartered in each city was also used as an objective indicator.

"There is nowhere in the world that has a maritime finance environment as competent as in Oslo. The level is high in banks, ship brokers, financial advisors, insurance companies and law firms, as well as in investment banks and other types of investors."

– Shipping company CEO in Oslo.

LEADING FINANCIAL CITIES

Maritime cities have been benchmarked based on the market value and the number of listed maritime companies on their local stock exchanges (Figure 12). New York is by far the largest equity market in the world for maritime stocks, both in number of tradable stocks and market capitalization of the companies.

New York has maintained its first position when it comes to the number of tradable stocks. There is a clear trend towards de-listing however, as all the highest ranked cities from our last assessment have suffered large drops in the number of listed maritime companies. Similarly, in terms of market capitalization of maritime stocks, New York has

maintained its leading position.

Chinese players, Shanghai and Hong Kong maintained their 2nd and 3rd spot like the last assessment. In Shanghai, two major companies dominate the value of maritime stock. China Shipbuilding Industry combined with Shanghai International Port Group has a market capitalization of USD 32.3 billion. Rounding out the rest of the top 5 are Tokyo and Busan.

When considering the trading volume of bonds, IPO, and follow-ons from each city's stock exchange during the period 2022 to 2023, New York is leading, followed by Oslo, Shenzhen, Shanghai, and Copenhagen. New York and Oslo retained its position same as last assessment, where New York as the leader traded more than twice the volume of Oslo. Singapore, Taipei, and Rotterdam lost their top 5 stand (Figure 13). Additionally, this year's assessment includes the volume of green bonds, IPOs and follow-ons (Figure 14), Madrid is leading, followed by Copenhagen, London, Sydney, and Singapore.

BANKS – SHIP FINANCING

Many ships are financed by syndicated loans, which reduce the risk for the individual lenders. In this process one bank usually functions as the mandated lead arranger. That means that the bank has the leading role in the financing stage of a project. During the syndication process one of the banks may also fulfil the role of book runner. When the structure and terms of the loan have been agreed, one (or a number) of banks will be appointed "book runner" and sell the loan to other banks in the syndicated loan market. In some markets national export credit banks also play a key role in the financing process.

In general, Asian and Australian banks (APAC) have significantly grown their market share, increasing from 40% to 44%, with their portfolio now totalling US\$127.3bn compared to US\$115bn in 2021. European banks' share has declined to 49.5%, falling below 50% of global exposure for



the first time. German banks witnessed a notable decline, while Greek banks experienced a year-on-year growth of 4.6% to US\$13bn in 2022, and Scandinavian banks decreased to US\$27.8bn. The Poseidon Principles now include 30 signatories, representing \$200bn in shipping finance. The Japanese banks are emerging as significant players in global ship finance. Furthermore, ESG considerations and bank strategies continue to impact bank ship lending, particularly towards non-eco vessels.

When assessing top shipping portfolios by banks headquartered in various cities across the world, Tokyo is the top performer, followed by Paris and Beijing, where Tokyo and Beijing swapped placed compared to the last assessment.

Whilst Tokyo stands out as the leading financial city of the world as in Figure 15, Paris is now the leading European city for ship finance followed

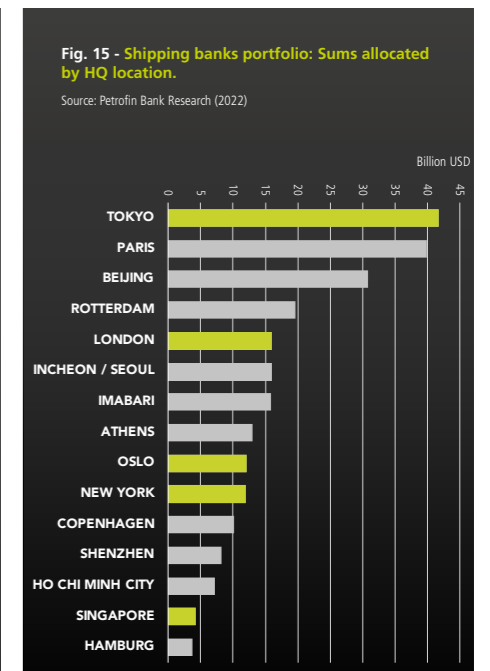
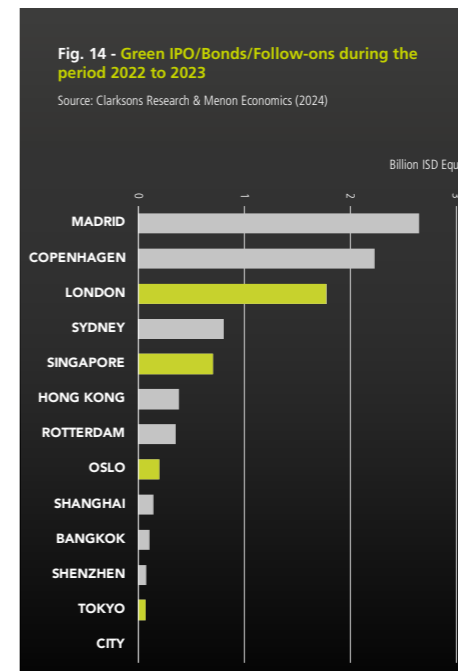
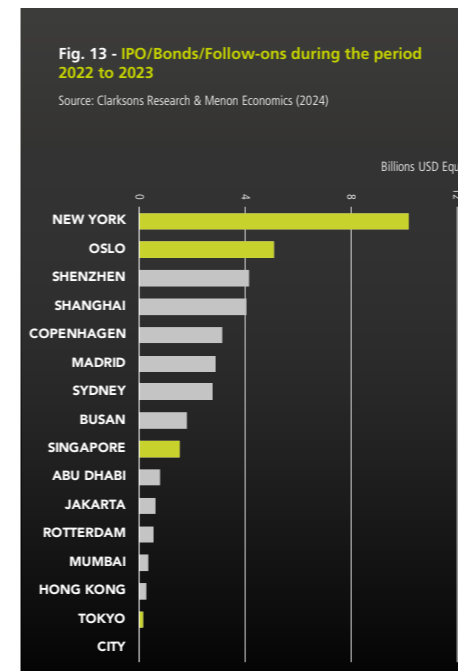
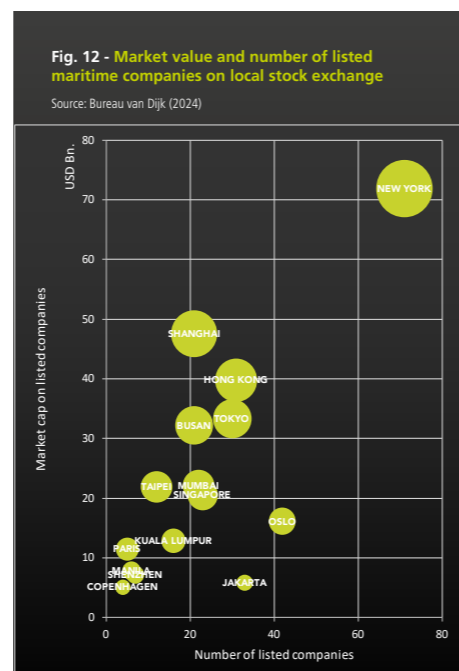
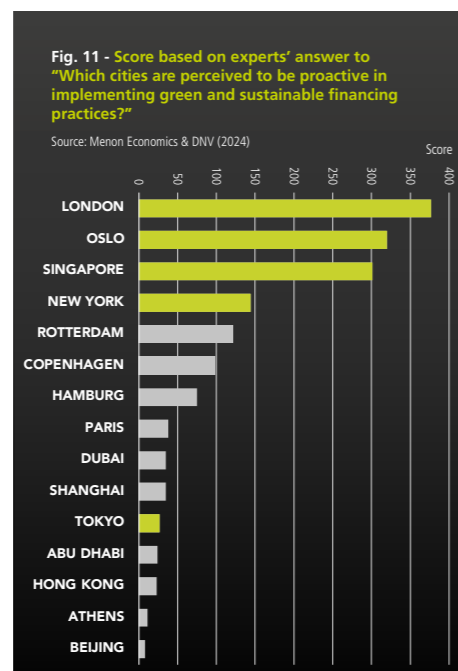
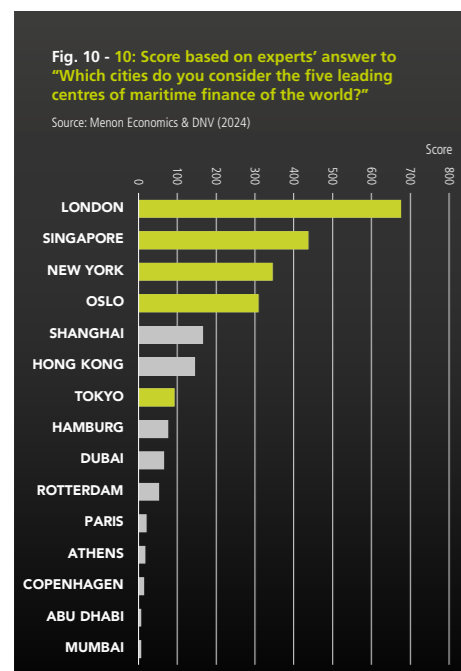
by Rotterdam and London. Paris has grown since 2019, with BNP Paribas now the leading ship finance bank in the world measured in terms of loan books, as well as Credit Agricole CIB and Société Generale. In Rotterdam, ING and ABN AMRO have boosted their position for both bookrunner loans and in MLA. Oslo-based DNB and Nordea (shipping division) are also among the leading ship finance banks measured in terms of book runner and MLA (Mandated Lead Arranger) portfolios.

LEGAL CENTRES

To assess the strength of cities in maritime law, indicators such as the presence of prominent legal experts in shipping law and the abundance of maritime law firms, provide insights into a city's significance in financial and legal transactions within the maritime sector. Strong knowledge

centres with many experts also attract more business to a city. Who's Who Legal, a law firm in England, identifies the foremost legal practitioners in business law based upon comprehensive and independent research. Figure 16 shows that London has the largest number of leading legal experts (81) in maritime law. After London are Hong Kong, New York, Singapore, and Hamburg. When considering the number of maritime law firms operating in each city, the situation stays unchanged from 2019, with London in the lead, followed closely by New York, Athens, Panama City and Rotterdam. Whilst Athens is home to 60 maritime law firms, Singapore, Hamburg and Hong Kong have an average of 30 such firms.

As seen in Figure 17, London has sealed its position as the best location to resolve maritime disputes and for international maritime arbitrations leveraging on the wide use English law in resolving shipping disputes. Singapore and Hong



Kong have made significant progress, where the former climbed from 8th to 4th and the latter rose from 9th to 2nd. The strength of both Singapore and Hong Kong seems to be related to the maturity of the maritime judiciary, their proximity to commercial operations and access to key industry players, with Hong Kong positioned as a gateway to mainland China.

MARINE INSURANCE

Marine insurance was the earliest well-developed type of insurance, with origins in the Greek and Roman maritime loan. Marine insurance in the modern world is a prerequisite for a functioning shipping market. Large shipping companies transport cargo worth hundreds of millions of dollars every day on large ships that themselves may be as valuable as their cargo. To reduce risk involved in such operations, shipping companies insure both the cargo and the hull of the ship.

To assess a city's position in terms of its reputation as a marketplace for insurance coverage and its marine insurance services, several factors were considered such as concentration of P&I clubs and the collected insurance premium at city level, and the presence of commercial insurances covering cargo, hull and machinery (H&M). This assessment shows that London, home to the first marine insurance company in the early 18th century with Lloyd's of London and complemented by the International Underwriting Association (IUA), continues to be the unrivalled city for marine insurance. More than 50% of International Group (IG) of P&I clubs covered gross tonnage is served by UK-based clubs. Further on more than 30% of global cargo and H&M premium is collected by UK-headquartered insurance companies and they have the highest number of representation offices of all clusters. Other European cities with a significant role in marine insurance are Paris, Genova, Oslo, and Rotterdam.

In Asia, Tokyo, Beijing, and Singapore have maintained their positions in the top 5 ranking. Their focus is mainly on domestic clients. In China, Beijing continues to climb and secured a 3rd spot. This is most likely due to a change in reporting standards which has moved some of the insurance premiums produced in Shanghai over to Beijing. Singapore's 4th position on this indicator is due to its efforts to increase its marine insurance activities by introducing its own Singapore War Risk Mutual supported by its industry association (Singapore Shipping Association, SSA). Shanghai is restoring its status by moving up considerably from 16th place to 7th, with the efforts undertaken by the Chinese government to develop the Shanghai International Shipping Centre, including the shipping service sector such as hull and cargo insurance services.

Fig. 16 - Number of legal experts

Source: Who's Who (2021)

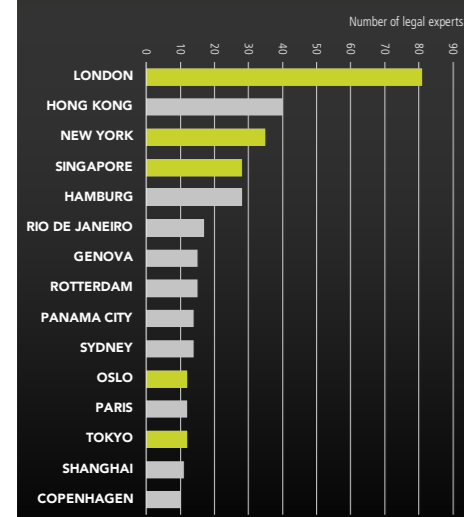


Fig. 17 - Number of maritime law companies

Source: World Shipping Register (2021)

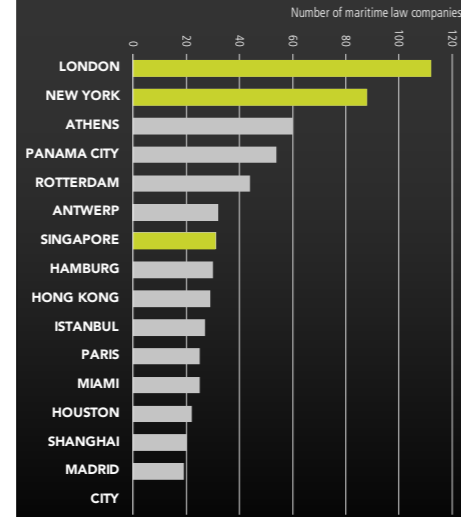
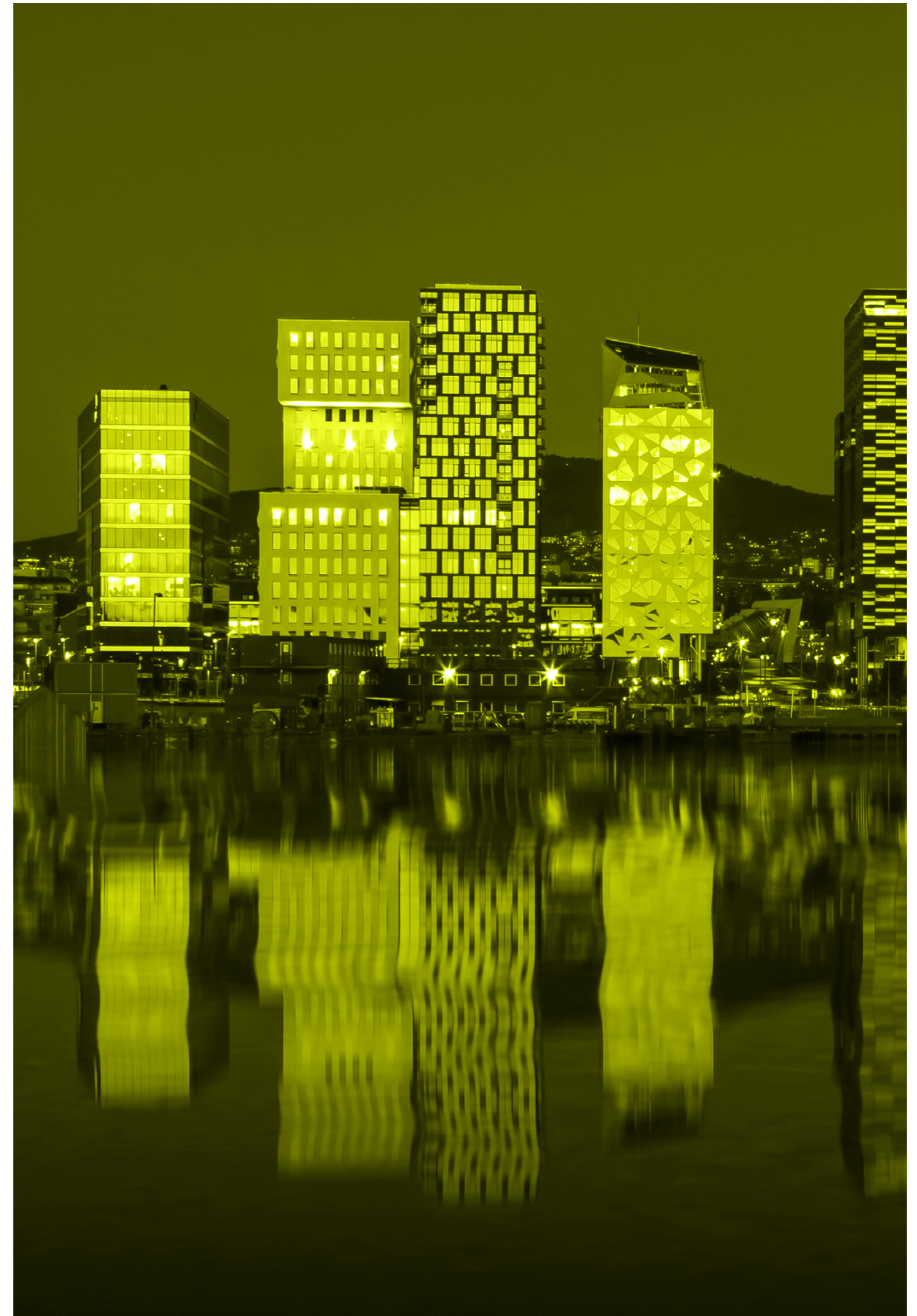
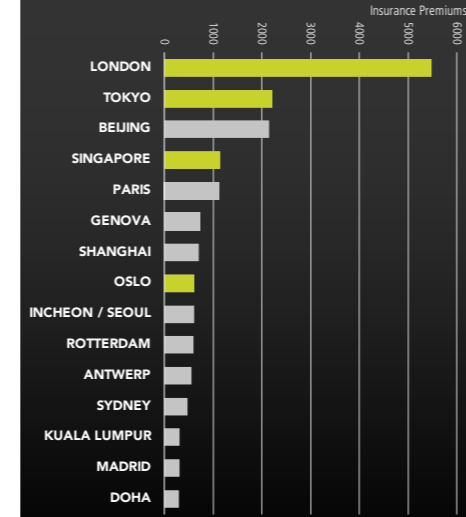


Fig. 18 - National collected insurance premium for P&I, hull, cargo, offshore

Source: IUMI & CEFOR & Bureau van Dijk (2024)



MARITIME TECHNOLOGY

SUMMARY

1

2

3

4

5



BUSAN



SINGAPORE



OSLO



SHANGHAI



LONDON

“Norway is the pilot country. Other countries are better at standardizing and creating volume, while Norway is more focused on customized solutions.”

– TECHNOLOGY COMPANY OSLO

Benchmarking of cities based on objective indicators related to maritime technology present some challenges, as sourcing global data at the city level to compare the scale, significance, and quality of maritime research, education, and innovation is complicated. However, these aspects are covered through the subjective indicators by maritime experts. Further on, the ranking utilizes seven objective indicators, each revealing different facets of maritime technology: the size of fleet (CGT) delivered by shipyards, with a separate focus on tonnage capable of utilizing low- or zero-carbon fuels; the proportion of the world fleet under classification societies; the market value of ships constructed at shipyards; the number of patents by maritime companies based in a city, along with the count of maritime education institutions situated there.

Busan surpassed Singapore and became the world leading city in maritime technology. Singapore is now in 2nd place, followed by Oslo, Shanghai and London. Busan has a large fleet size (CGT) from its shipyards including low-carbon intense fleets, high operational revenue of maritime technology companies, high market value of the ships it produces, and the most patents from the maritime firms based in the city. Busan is the centre for the South Korean shipbuilding cluster where the major shipyards focus on offshore units and high value-added “mega-ships” such as ultra large container ships, VLCCs and LNG tankers. In the first half of 2023, Busan’s ship-

building industry added \$9.22 billion to the country’s export volume, representing a 12% increase from 2022. The total orderbook stands at nearly 39 million compensated gross tons, the highest level in 12 years.

Singapore, although not traditionally renowned for shipbuilding, has emerged as a vibrant hub for maritime research and development (R&D), particularly because of the high scores in all the subjective indicators. Government efforts to foster innovation and assist maritime startups have catalysed significant progress. Initiatives like the Pier71 program facilitate international collaboration and knowledge exchange, with a goal of accommodating 150 maritime technology startups by 2025. Additionally, the MPA has allocated \$80 million funding over the next five years until 2026, through its R&D arm Singapore Maritime Institute, aiming to establish Singapore as a top global maritime research centre in Next Generation Port, Smart Shipping, and Green Technologies. Strategic objectives encompass realizing a Fully Automated Port, fostering a Sustainable Port & Shipping Industry, and prioritising safety, electrification, and future fuels.

Oslo, ranked as the world’s 3rd leading city overall in this pillar, is a prominent hotspot for maritime technology and innovation. One of the most important technology companies in the Norwegian cluster is DNV with its head office in Oslo. DNV is one of the world’s leading maritime assurance and R&D companies,



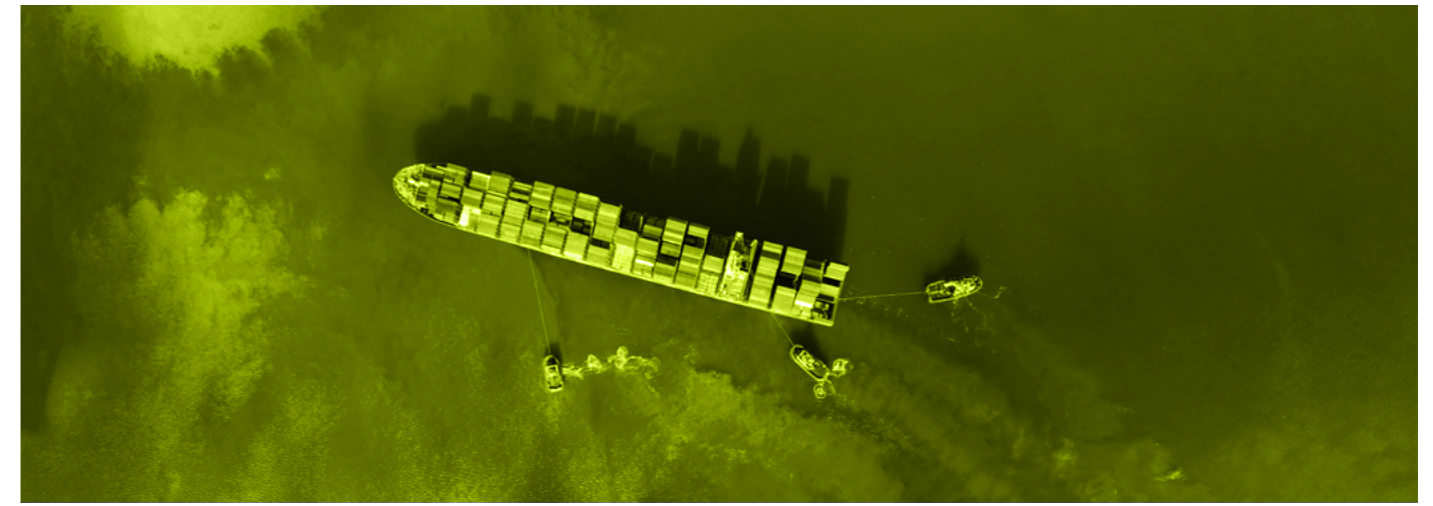
MARITIME TECHNOLOGY

	Shipyards deliveries	Shipyards deliveries - eco friendly ships	Turnover shipyards	Classified fleet	Market value of ships	Maritime patents owned by companies	Maritime education institutions	Q: Technology	Q: Sustainable	Q: Digital	Q: R&D
BUSAN	1	1	2	7	1	2	29	4	21	13	13
SINGAPORE	15	13	3	17	9	23	6	1	1	1	1
OSLO	26	18	21	1	12	12	10	3	2	2	2
SHANGHAI	2	2	5	18	2	11	10	2	5	3	4
LONDON	40	26	9	3	-	8	1	8	6	6	5
TOKYO	10	21	6	2	7	1	16	6	9	9	11
ROTTERDAM	8	12	11	-	21	7	2	5	3	4	3
BEIJING	11	6	1	5	20	15	22	16	25	24	19
HAMBURG	13	14	25	20	8	6	3	7	7	8	8
COPENHAGEN	41	26	36	-	24	9	10	10	4	5	7
HOUSTON	32	26	24	4	-	13	15	21	25	27	23
INCHEON / SEOUL	30	23	4	24	-	3	29	9	13	13	15
PARIS	-	-	8	6	10	5	29	34	19	23	32
DUBAI	18	26	40	19	15	-	22	11	8	7	6
GUANGZHOU	4	3	10	-	5	14	-	13	21	22	19

investing 5% of its revenues into new technology development, as well as the world's largest ship classification society according to Lloyd's List. Additionally, Oslo hosts leading equipment producers such as Kongsberg Maritime and specialised tech companies like Cognite. Oslo also serves as the epicentre for groundbreaking advancements in autonomous shipping. ASKO operates autonomous vessels MS Marit and MS Therese, connecting Moss and Horten seamlessly. Furthermore, Massterly, operating from its State-of-the-Art Remote Operations Centre (ROC) in Horten, orchestrates the monitoring and management of a growing fleet of autonomous ships, including the pioneering Yara Birkeland, the world's first fully autonomous electric container ship.

Shanghai stands at fourth, driven by the presence of its modern shipyards with major newbuild projects gravitating towards them. Shanghai has attained top 3 ranking for several indicators in this pillar, coming 2nd after Busan for size of fleet delivered, size of low carbon intensive fleet, and the market value of ships built at its shipyard. The experts rank Shanghai 2nd as the maritime technology centre of the world, behind Singapore but ahead of Oslo. Shanghai's shipyards have achieved notable milestones, such as launching China's first domestically made cruise ship and delivering the world's largest B-Tank Very Large Ethane Carrier (VLEC), thereby ranking them closer to Busan in shipbuilding indicators. The city also hosts Marintec China, a premier maritime exhibition, facilitating exploration of cutting-edge technologies and fostering industry connections.

Lastly, London closes the top 5 list, benefitting from its prestigious maritime education institutions and for being the home of the oldest classification society with a history from 1760, Lloyd's Register.



EXPERT ASSESSMENT

In this year's report, industry experts have been asked to rank cities on a variety of indicators where the focus has been on their status as leading maritime technology centres, their efforts in driving forward the maritime digital and green transformations, and their attractiveness for re-locating maritime R&D activities. The maritime industry is on the verge of important changes driven by a sense of urgency in terms of the climate crisis and increased efforts to cut emissions by regulatory bodies. 92% of the experts point out the availability of alternative fuels and the regulatory framework for their usage as a critical obstacle to green transformation. Many experts emphasize that most of the green technologies available has not reached commercial maturity, which is also the biggest challenge when it comes to financing the green transition. Thereby urging the need for cities to increase its financial and tax incentives to facilitate such transition.

The experts have also pinpointed the cities that produce world-class maritime IT services and IT-based products. These cities will have a competitive advantage, as they are willing to provide

advanced digital infrastructure and an environment that is conducive to innovation. The experts have also assessed cities being considered for re-locating R&D activities, local labour costs, quality of life, the presence of advanced educational institutions, and the level of cooperation and information-sharing between different stakeholders.

Even though Busan is ranked as number one on the maritime technology pillar as a whole, it is not seen as the top 3 leading centre by experts. Singapore is on the other hand consistently in the top for all 4 indicators (Figure 19-22), both standing out as the main centres for digital and "green" technologies. Singapore's leading positions stem primarily from its role as a marketplace where maritime technology producers and clients convene, serving as a hub for major marine equipment players. The city boasts a high level of sophistication and competence, supporting various high-value activities such as newbuilding of offshore assets, complex conversion projects, fabrication of process modules, and complex repair activities, despite production not typically occurring within its bounds. The Singapore headquartered Global Centre for Maritime Decarbonisation (GCMD) has initiated

several world leading projects including Ammonia Bunkering Safety Study, supply chain integrity for biofuels and LCO2 offloading. Additionally, the Maritime and Port Authority of Singapore (MPA) has prioritised research and development (R&D) and advanced maritime technology as integral to positioning Singapore as a global maritime hub. The city emphasizes close collaboration between publicly funded institutions and private enterprises, focusing on introduction of new marine fuels, digital innovation and fostering the growth of marine tech entrepreneurship.

Oslo is ranked among the top 3 on the subjective indicators and secures the 2nd spot in experts' perception on leading centres for digital and green technologies. It houses top-notch R&D organizations and is home to a highly advanced maritime equipment industry, considered to be at the top in terms of solutions offered in the field of environmentally sustainable technologies. Oslo has a long tradition of producing maritime technology solutions by focusing on the development and delivery of innovative equipment. It is recognized as the home of excellent educational centres and main beneficiaries of advanced education clusters, which make the sourcing of competent

Fig. 19 - "Which cities do you consider the five leading centres for maritime technology of the world?"

Source: Menon Economics & DNV (2024)

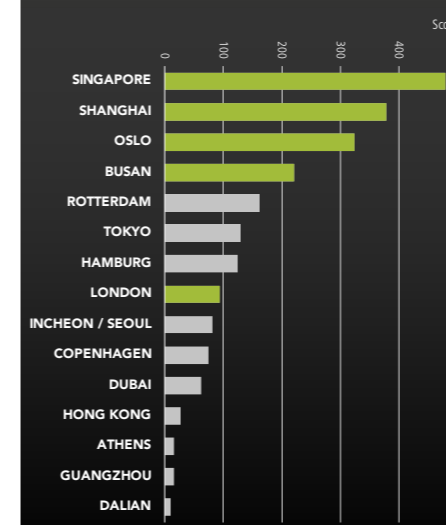


Fig. 20 - "Which cities have the strongest capabilities and are best positioned for the digital transformation of the maritime industry?"

Source: Menon Economics & DNV (2024)

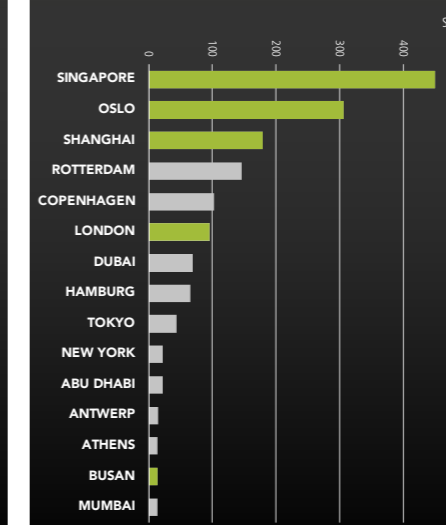
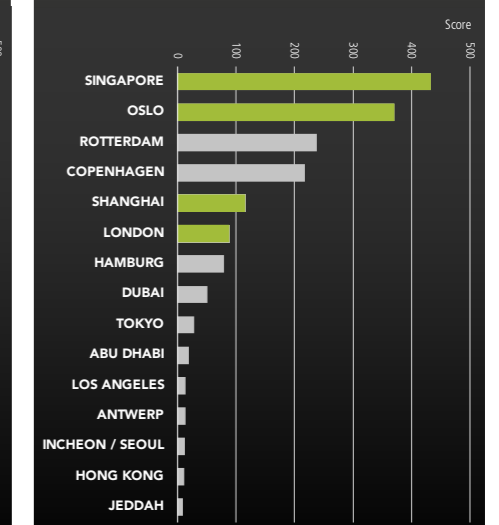


Fig. 21 - "Which cities are taking the lead in the green transformation of the maritime industry?"

Source: Menon Economics & DNV (2024)



researchers an easier task.

The proactive role led by City of Rotterdam, in collaboration with other stakeholders including Port of Rotterdam Authority, resulting in high scores both on green and digital transformation.

Shanghai is ranked among the top 5 on the subjective indicators. It is regarded as a city of world-class maritime IT, driven by governmental focus on streamlining operations for the shipping industry and port infrastructure. The presence of a Free Trade Zone with advance infrastructure, research institutions and leading universities including Shanghai Maritime University also increases the city's appeal as a candidate for relocating R&D activities.

"Singapore's top-down approach and forward-thinking initiatives make it a strong player in green technology and sustainability in the maritime sector."

– Ship Manager in Singapore

OBJECTIVE INDICATORS' ASSESSMENT

Seven objective indicators were chosen to benchmark the leading maritime technology centres. These indicators measure the size of fleet (CGT) delivered by shipyards including orderbook, as well as low-carbon intensive fleets built, purchasing price of the ships built and the operational turnover of the shipyards. Additionally, it includes the share of world fleet by classification societies. It also includes the number of maritime patents produced by maritime firms headquartered in the city and the number of maritime institutes located in the city.

SHIPBUILDING

Shipyards are where design and industry standards are implemented. Modern ships are composed of parts from many subcontractors that become high-tech industrial assets for their owners. Therefore, shipyards are often surrounded by companies supplying maritime equipment. Building ships is a complex and challenging operation. Some shipyards construct the whole ship in one place. For ships that require more advanced technology, it is usual for hull construction to take place in low-cost countries, whereas assembly and outfitting is done in countries with more expensive and skilled labour.

Asian centres have been growing fast in the past 20 years, and now they produce more than 95% of the global CGT output. Looking at the shipbuilding activities in 2020-2023, South Korea, China and Japan are the main players in this trend, with a combined share of about 89 % of the global output. In 2023, China contributed to over 50% of the total shipbuilding for the first time in history. European centres have been finding it hard to compete and have mostly focused on more specialized and advanced markets, such as cruise ships, complex offshore vessels, and navy ships.

When looking at the size of fleet (CGT) delivered by shipyards, Busan is by far the leading city in this field, as shown in Figure 23. The region surrounding Busan is the centre for the South Korean shipbuilding cluster. The major shipyards focus on offshore units and high value-added "mega-ships" such as container ships, VLCCs and LNG tankers. The total CGT output and CGT on order with Busan's shipyards (DSME/Hanwa Ocean, Kangnam Corp & HHI) is almost three times higher than in Shanghai and nearly five times higher than in Japanese shipyards (such as Imabari and Sumidagawa yards). Busan is the biggest beneficiary from the spike in global orders in 2023 compared to the previous years, and accounts for the largest share of the global order

book in terms of CGT. Shipyards in Busan are currently the major site to build container vessels and make up 45% of the total shipbuilding production in South Korea.

Shanghai is number two, being the most advanced maritime manufacturing centre in China. Total CGT delivered by the local shipyards for the same period is lower than in Busan but twice as high as for Imabari in Japan. Overall, Chinese shipyards managed to outperform South Korea for the first time in the containership segment in terms of CGT built.

Imabari is primarily concentrating on the dry bulk, tanker and general cargo segments. Imabari's share of CGT delivered and on order accounts for 11 million CGT which is sixteen times higher than Singapore, even though Japanese yards have been steadily losing ground to South Korean and Chinese ones in terms of CGT output and contracting volumes.

Making up the remainder of the top 10 are the Chinese yards in Guangzhou, Ningbo, Dalian, and Qingdao, which are not yet considered as technologically advanced as the South Korean and Shanghai shipyards. The main vessel types leaving these yards have been bulkers, fishing vessels, tugs, general cargo ships and products tankers. Rotterdam and Istanbul are the only cities outside of Asia that reached the top 10 in this chart, having chosen to focus on and developing a good reputation for the passenger cruise and luxury yacht segments.

MARKET VALUE OF SHIPS BUILT AT SHIPYARDS

The market value of the ships built is not only a matter of size, but also the complexity of the equipment outfit, together with second-hand prices and the availability of "newbuild slots" in the larger yards. When considering the purchasing price of ships built the last three years, the top three performers are Busan, followed by Shanghai and Imabari, same as in the last assessment.

Busan's shipyards have produced ships worth a total of USD 30.8 billion (refer to Figure 24), far exceeding any other city, by at least five times – dominating the segments of oil tankers, container ships and gas carriers. The city has a leading position for this indicator thanks to its high-quality labour force, in-house design capabilities and world class engineering services. Shipyards in Shanghai and Imabari have built ships worth USD 6-10 billion each (location)FF, while yards in Tokyo and other Chinese centres have constructed vessels with total values around 2 billion USD. Singapore has a much higher market value than CGT, which reflects that Singaporean yards build semi-submersibles, FPSO conversions and other advanced units. The total value of ships built in Oslo, one of the top 3 cities in the maritime technology pillar, has not reached the 1 billion USD mark.

SHIPBUILDING - ALTERNATIVE FUELS CAPABLE VESSELS

With sustainability gaining more prominence in the maritime sector, shipyards are increasingly leveraging design and manufacturing advancements to create ships with minimal carbon emissions. Busan scores highest on this indicator as well. As shipyards globally refine their tactics to enhance competitiveness and seek distinctive strategies, Busan's shipbuilders are proactively intensifying their endeavours, recognizing this trend as a promising business prospect. A significant share of all low carbon ships, measured by GT, that have been built in the last three years or are in orderbooks originates from Busan. Korean shipyards benefit from the ongoing sound policies implemented by the government in response to the decarbonisation push. The Korean government launched a USD 144 billion package called the "Korean New Deal", consisting of environmental reforms targeting green technologies, including an overarching policy aimed at strengthening employment in the shipbuilding sector. At the national scale, South Korea persists in pouring

billions of dollars into eco-friendly and intelligent ship technologies, making significant strides in competition with China and Japan.

As seen in Figure 25, Shanghai ranks second. Overall, aggregated GT with seven Chinese yards (such as Shanghai, Guangzhou, Dalian, Ningbo, Beijing, Xiamen and Qingdao) is still 30% lesser than Busan's individual share.

Japanese shipyards having the third largest newbuilding capacity, have lost their spot in the Top 5. Tokyo's share on alternative-fuels capable tonnage drops from 5th to 21st spot. Imabari dropped from 8th to 9th spot, with their alternative-fuels capable tonnage of 1.3 million GT.

OPERATING REVENUE OF COMPANIES IN THE MARITIME TECHNOLOGY SECTOR

The indicator, operating revenues of maritime technology companies, focuses on the head-quarter function of the corporations, where strategic decisions of investments, technological direction and geographical expansion are executed. Hence, revenues are aggregated and distributed to the HQ of the shipyard companies, so yards with revenues from drydocking and retrofitting activities will also be placed under consideration in this section. Figure 26 presents the operational revenues of the shipyards in the city.

Shanghai now ranked 5th, influenced by the state-owned "China State Shipbuilding Corporation Limited" with its headquarters in Shanghai.

Korean cities Busan and Seoul retained their 2nd and 4th place respectively for this indicator. In total, the two cities constitute the bulk of the maritime yard activities in South Korea, with the industry being vital to the entire nation economic state. Companies that lead the results are "Daewoo Shipbuilding and Marine Engineering" for Busan, and "Korea Shipbuilding and Offshore Engineering" for Seoul.

Singapore has swapped its 5th spot with Shanghai and is now ranked 3rd in the operational

turnover of maritime technology companies. In 2023 two major Singaporean shipyards, Sembcorp Marine and Keppel Offshore & Marine, merged into Seatrrium Limited.

Few European cities are among top 15 on operational turnover of maritime technology companies. High personnel costs and costs of material sourcing make them less attractive to vessel owners and operators.

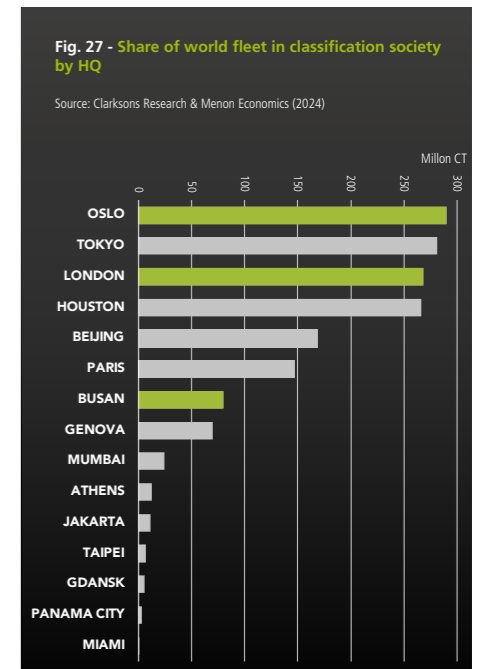
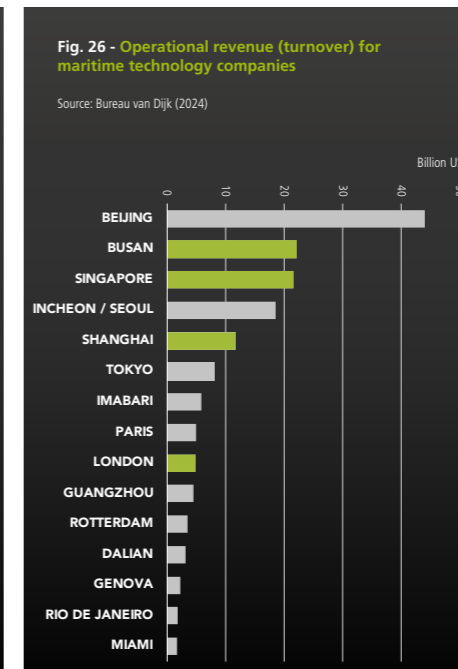
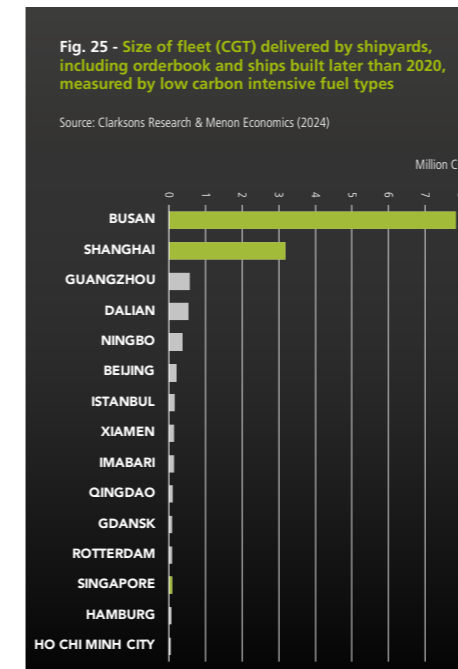
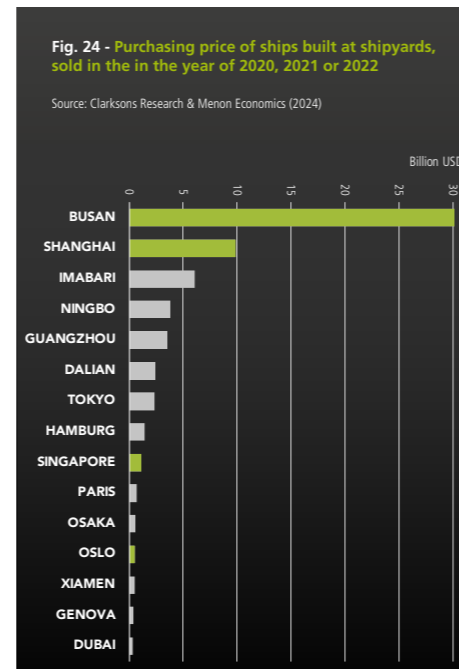
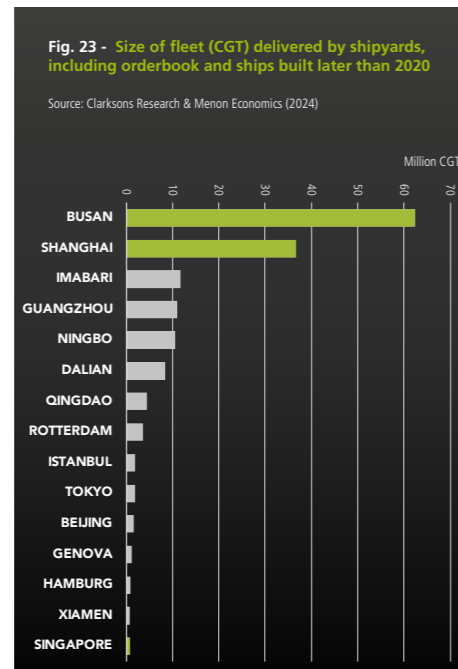
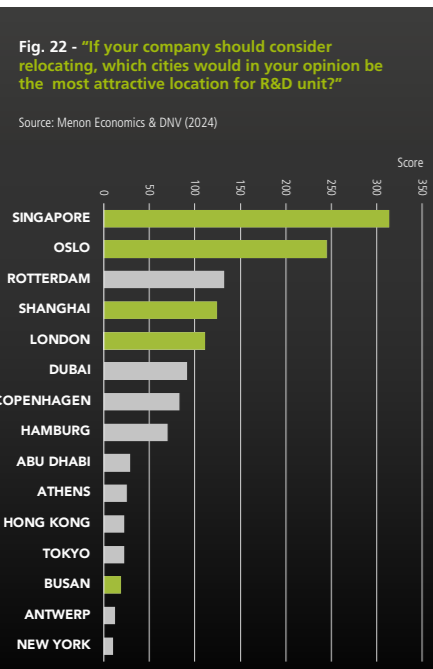
CLASSIFICATION SOCIETIES

A classification society is a non-governmental organization that establishes and maintains the technical standards for ships and offshore structures. All class societies, and especially the members of IACS (International Association of Classification Societies), have a strong focus on R&D and on supporting the environment and safety at sea. They certify technological changes in constructions and play a vital role in quality assurance in the maritime industry. Most societies have an international presence as this has become a prerequisite for serving the global shipping industry.

When ranking the classification societies in terms of the size of their classed fleets, Oslo is ranked as number one, mainly due to DNV (Figure 27). The second place goes to Tokyo, where ClassNK is located. It is followed by London, where Lloyd's Register, the oldest classification society that dates to 1760, has its headquarters. Houston takes the fourth spot due to the presence of American Bureau of Shipping (ABS). Houston is also one of the leading centres of the world for offshore oil and gas activities, and the world's leading centre for oilfield equipment. Next in line come Beijing with China Classification Society and Paris with Bureau Veritas.

PATENTS BY MARITIME COMPANIES

Patent applications and registrations in the maritime industry are growing, especially in the



field of ship design and equipment. The overall numbers are consistently going up throughout the last decade, indicating a rise in innovation in ship design and equipment. Recent trends show that several companies are using patented robotic technology for ship building and ship repair, while also exploring avenues like 3D-scanning, 3D-printing, virtual and augmented reality applications. Furthermore, there is a substantial increase in patent filings, aimed at providing solutions for environmentally friendly vessels.

During the last 20 years, Japan, China and Korea have come to dominate the world of patents. The patents analysed for this indicator have been accumulated over several years and are a good measure of the technological sophistication and innovation within a company and an industry. As shown in Figure 28, Japan remains an innovation powerhouse with Tokyo taking the top spot. More than 90% of its total patents are held by Mitsui E&S Holdings Co. Ltd. Remaining patents are mostly held by Nippon Yusen Kabushiki Kaisha connected to sea and coastal freight water transport. Still within Japan's bounds, Osaka takes up the 4th spot.

Busan rises to 2nd on this indicator, with Daewoo Shipbuilding & Marine Engineering Co. Ltd. which holds almost 80% of the patents in Busan. The remaining 20% of patents in Busan are split between more than 100 companies, primarily connected to repair and maintenance of ships and boats. Seoul ranks 3rd and holds the largest number of active maritime patents owned by firms headquartered in the city. The highest portion of them belongs to Samsung Heavy Industries.

Five European cities (Paris, Hamburg, Rotterdam, London, and Copenhagen) are considered among the top 10 centres for innovation and research in new technologies. Oslo scores significantly lower on this indicator compared with its high ranking in the pillar.

MARITIME EDUCATION INSTITUTIONS

The number of maritime education institutions located in a city, including dedicated academies and universities offering courses catering to the maritime sector, is a good indicator to assess a city's culture of learning and the level of competency of its graduates. From this, maritime companies can benefit by sourcing skilled local maritime personnel.

European cities dominate in terms of maritime education institutions. London, being home to prestigious maritime academies such as Cass Business School and London Shipping Law Centre, retained its top position and is the leading city in this indicator. Rotterdam continues to place second, with the maritime education offered in the city having a strong global reputation for excellence, and a variety/specialization of different courses available.

As shown in Figure 29, Hamburg and Gdansk also have a significant number of maritime education institutions, 23 and 15 respectively. Athens with 13 maritime related institutions and training facilities takes 5th, whilst Singapore holds the 6th position, where the Bachelor and Master in Maritime Studies degree programs offered by NTU has been a significant source of the maritime talent pipeline for more than a decade. Mumbai, Antwerp, Manila and New York follow with a similar number of maritime institutions present in each city, though specialization varies between seafarer training and business or technology focused institutions.

Shanghai provides a wide range of maritime education and training, mainly covering the needs of the Chinese centres. The system received a strong governmental push following the intention to strengthen Shanghai as an International Maritime Centre, offering a grants and scholarship funding for institutions, such as the Shanghai Maritime University.

Fig. 29 - Number of maritime education institutions

Source: World Shipping Register (2024)

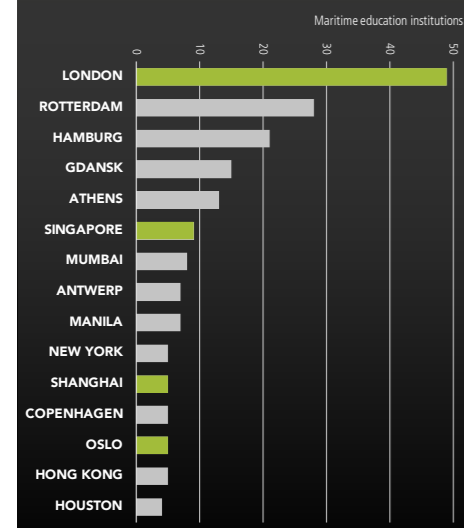
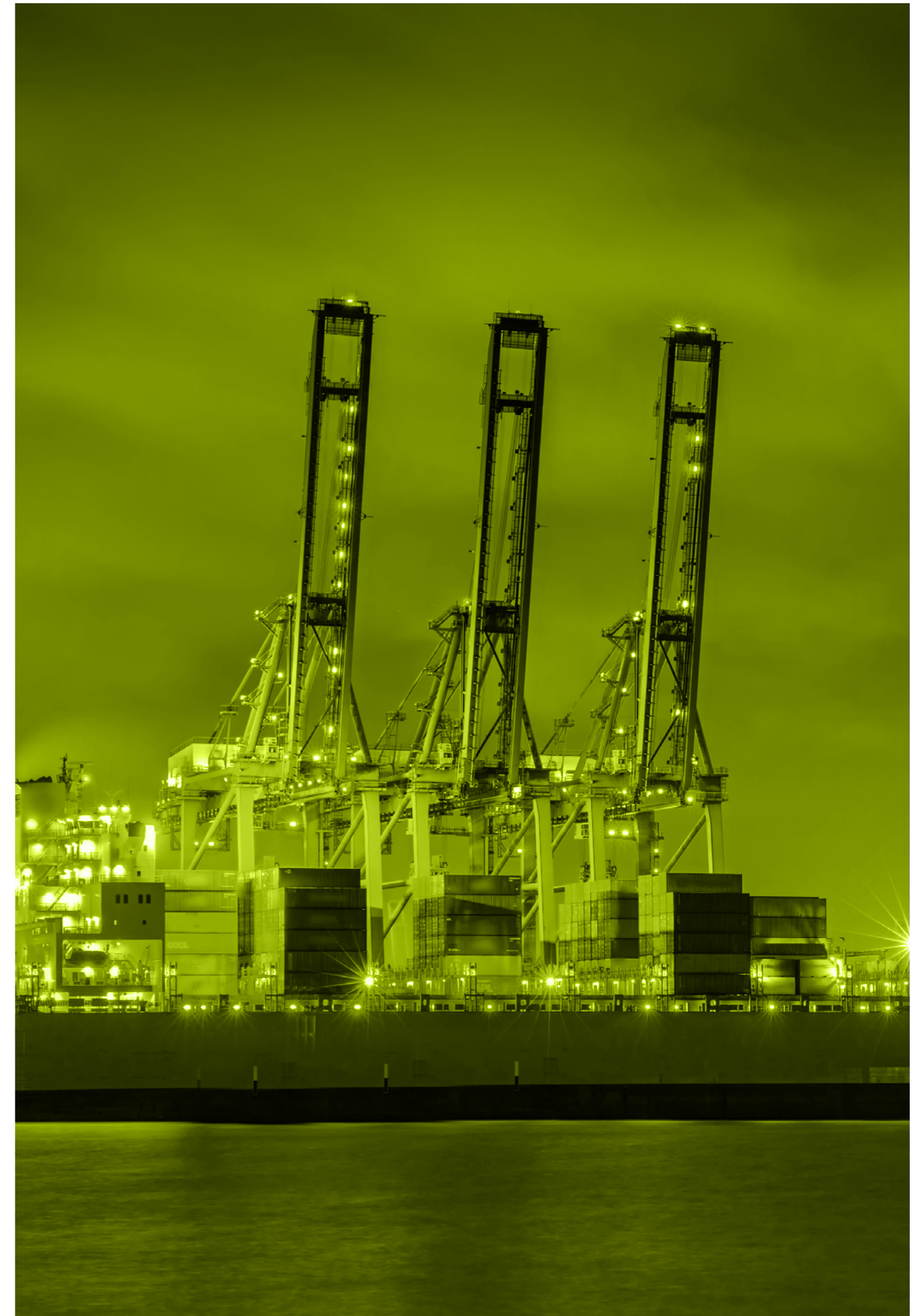
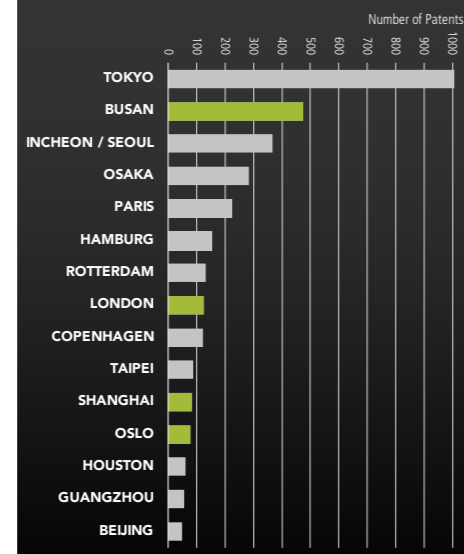


Fig. 28 - Number of patents produced by maritime firms with HQ in the city

Source: Bureau van Dijk (2024)



PORTS AND LOGISTICS SERVICES

“Rotterdam has a vision to build a sustainable maritime future and to remain relevant and competitive as a port city”

– MARITIME INSURANCE PROFESSIONAL IN ROTTERDAM

SUMMARY



Singapore returns to its leading position in the port and logistic services pillar in 2024, with substantial efforts to change the port operations in terms of reducing carbon emissions and increasing digitalization. Singapore is still considered as having the best port and logistics services by global experts. Strategically located on the East-West trade lane, Singapore boasts a connectivity to 130 countries. Its provision of port dues concessions, including discounts for container ships and incentives for green initiatives, enhances competitiveness and attracts shipping traffic. The commitment to sustainability is further underscored by Singapore’s support for vessel electrification and onshore charging, together with Ammonia and Methanol bunkering, promoting eco-friendly fuel alternatives. Additionally, Singapore is currently developing its container terminal at Tuas Port which will become the world’s largest fully automated terminal with a capacity of 65M TEU.

Shanghai stands at 2nd place due to its high weighted average score on port volume and the Port liner shipping connectivity index (PLSCI). Shanghai is the most well-connected port on the PLSCI scale, with 149 regular liner shipping services from and to its port, with a total of 60 million TEU handled. In 2023, the container throughput of Shanghai Port approached 49.16 million TEUs, maintaining its global supremacy and representing 3.6% of the world’s total trade volume.

Rotterdam is in 3rd position of leading port cities, followed by Ningbo and Hamburg. Whilst the world’s largest ports in terms of container volume handled are primarily in the Asian ports, Rotterdam’s strength on the ranking assessment is primarily due to its score for the size of the LNG bunker vessels deployed in that city. Rotterdam also has the largest port in Europe, with the

3rd largest port operator in the world. Its diverse port with well-established links to the European continent is supported by the expert assessment. The port remains on the forefront for its automation and innovation efforts to leverage new technology that will complement its core port activities. The Rotterdam Maasvlakte II terminal is a crucial player in global trade due to its immense capacity of 65 million TEUs and advanced automation, enhancing cargo flow and solidifying Rotterdam’s status as a leading maritime hub.

Ningbo climbs up from 7th and take the 4th rank for the ports and logistics pillar, due to its highest score on port volume and the PLSCI. However, as of 2024, Ningbo is not yet offering LNG fuel at their ports. Guangzhou lost its top 5 position in the ports primarily due to the separation of activities in Guangzhou and Shenzhen.

Hamburg and Hong Kong have swapped places in the 4th and 9th position compared to the previous report. Compared to the previous assessment, Hamburg has scored well in all the subjective indicators, but lower in objective indicators. Hong Kong faced a drop in total port cargo throughput by roughly 8% in 2023. However, it still retains a high core on the indicator for port liner shipping connectivity index. The Hong Kong ports play a vital role in the Maritime Silk Road, connecting the Chinese coast via the Suez Canal to the Mediterranean and further to the Upper Adriatic region of Trieste with rail connections to Central and Eastern Europe.

Compared to the previous assessment, Xiamen, Los Angeles, and Tokyo have dropped out of the top 15 ranking. Vancouver and Beijing claim the 13th and 14th spots respectively.



	PORTS AND LOGISTICS					
	TEU in port	Line Shipping Connectivity index	LNG available at ports	Q: Ports	Q: Digitalized ports	Q: Multifuel ports
SINGAPORE	2	3	2	1	1	1
SHANGHAI	1	1	4	2	3	4
ROTTERDAM	11	6	1	3	2	2
NINGBO	4	2	-	9	22	16
HAMBURG	16	13	7	6	5	5
DUBAI	12	12	-	4	4	3
ANTWERP	13	8	6	8	10	7
QINGDAO	3	4	-	21	14	22
HONG KONG	10	5	-	5	9	12
SHENZHEN	5	9	-	12	16	21
GUANGZHOU	6	11	-	16	23	28
KUALA LUMPUR	15	7	-	32	27	22
VANCOUVER	35	38	3	32	27	28
BEIJING	8	15	-	23	27	28
XIAMEN	17	10	-	32	27	28

EXPERT ASSESSMENT

The increasing size of modern cargo ships and increasing world trade puts pressure on ports to become larger and more automated. All around the world, ports are constantly upgraded and modernized to lower the cost of transportation and be more competitive. The shipping industry's ability to deliver reliable logistics services at a low cost is a prerequisite for the modern world economy. Many companies rely on supply chains that stretch across continents. It is important for cities that companies can use them as hubs for carrying out complex, highly specialized logistical services.

Over the past 8 years, experts' evaluations of the world's top centres for ports and logistics services have consistently favoured Singapore. Renowned as one of the busiest ports globally, Singapore benefits from its strategic location near the Asian market, conducive business environment, extensive connectivity, and rich trading heritage, complemented by its highly efficient and advanced port facilities. Moreover, experts note Singapore's proactive adoption of digital technologies in port operations and ongoing initiatives aimed at establishing it as a multi-fuel bunkering port. Thereby, ranking Singapore at the top for all the three subjective indicators as in Figure 30-32.

Shanghai's support by global experts is due to its role as the gigantic gateway to the world's manufacturing centre. It is now in second position, displacing Rotterdam in the experts' opinion from the 2022 ranking. However, Shanghai is ranked 3rd and 4th respectively in their adoption of digital technologies and infrastructure for alternative fuel bunkering activities.

Experts rank Rotterdam as the 3rd leading ports and logistics centre, as the city has the largest port in Europe with the capability to handle largest container vessels. From the city, goods are transported either by smaller ships, barges or trucks or by the railway system that is linked to the rest of Europe. Rotterdam's advantages include great

connectivity, a business-friendly maritime environment, stable political environment, favourable tax legislation and proximity to major ports. Rotterdam is still the second choice of global experts when it comes to adoption of digital technologies for automated ports and infrastructure for multi-fuel bunkering port. Port of Rotterdam offers a range of fuels, including ammonia (from 2024), biofuel, hydrogen (small scale), methanol, and LNG, and have established favourable policies to encourage the adoption of cleaner fuels.

Ranked 4th according to assessments by global experts, Dubai emerges as the foremost regional maritime hub in the Middle East. Dubai benefits from its strategic geographic location, serving as a gateway between East and West, which facilitates trade and enhances connectivity. Its advanced port and logistics infrastructure, free trade zones, rich trading history, and cosmopolitan nature contribute to its status as a major logistics hub. Furthermore, the city's pro-business environment, along with its strong support from the government, further strengthens its position as a preferred destination for maritime businesses and investments.

Hong Kong is continuing to lose its ground compared to Shanghai since 2019 and now stands at 5th in experts' assessment. Hamburg is next in

this subjective ranking and is by far the most important German port. The Hamburg city region includes the port of Bremen. Together they form the biggest port area in Europe. Eurogate with its head office in Bremen is one of Europe's leading container terminal logistics groups.

Ningbo, positioned 4th in the overall ports and logistics pillar, failed to secure a place in the top 15 ports deemed capable of embracing digital and green transformations. Nevertheless, it holds the 10th spot in the perception of leading ports and logistics centres.

"Rotterdam is evolving into a robust port-focused hub, emphasizing port orchestration, efficiency, planning, scheduling, and related aspects."

– Ship owner in Singapore

OBJECTIVE INDICATORS' ASSESSMENT

Three objective indicators were chosen to benchmark the leading port and logistics centres. This includes a measure of how busy the ports using the volume of TEU handled at the ports in the city and the liner shipping connectivity. It also includes an indicator on the LNG bunkering facilities at the port.

PORT VOLUME

Port cities are at the frontline of globalization, with approximately 90% of external trade volume transported by ship – loaded and unloaded at world ports. A study by the OECD concluded that well-run ports produce many economic benefits such as lowering the cost of trade, increasing value creation, job creation and attracting related

maritime services. To get the best economic benefit from port operations, port cities must facilitate an increase in the maritime service offering, and take advantage of possible spill-over effects for industrial development.

The largest container ports in the world, measured by TEU volume, is Shanghai, followed by Singapore. This is shown in Figure 33. Shanghai Port holds the prestigious title of the world's largest container port in terms of TEUs handled, playing a pivotal role in supporting regional manufacturing. Singapore and Hong Kong, on the other hand, serve as vital transshipment hubs. However, Singapore maintains its competitive edge through its role as a catch-up port in Asia, efficient container handling and serves as a key gateway to the thriving economies of Southeast Asia. China's significance as a global trade centre becomes even more apparent, with seven of the world's top ten container ports located in mainland China. In recent years, Hong Kong's status as a manufacturing sector gateway has faced challenges from the rapid growth of neighbouring cities like Shenzhen, Guangzhou, and Shanghai, resulting in a decline in its market share.

Of the top 5 pillar-specific cities, Rotterdam has the largest port in container handling after ten Asian ports and Los Angeles port. It is the largest cargo port in Europe with an extensive distribution system (rails/roads/waterways), offering port

"The bustling activity isn't solely due to those ships loading or discharging cargo in Singapore. Instead, it has naturally become a central location for various maritime activities such as bunkering, fares, repairs, and more."

– Ship Owner in Singapore

dues discounts (transshipment, cargo-specific, Environmental Ship Index, Green Award) and the Incentive Scheme for Climate-Friendly Shipping to support the shipping industry to impact cargo trade through its port.

PORT LINER SHIPPING CONNECTIVITY INDEX (PLSCI)

The Port Liner Shipping Connectivity Index (PLSCI) is generated annually by UNCTAD for more than 900 container ports in the world, by considering six key aspects of connectivity. This comprehensive index offers insights into the effectiveness of port operations and their integration into global maritime networks.

There was little movement in the rankings since the last evaluation. Figure 34 presents the top 15 cities with high port liner shipping connectivity index. Three of the top 5 best-connected ports are in China, namely Shanghai, Ningbo and Qingdao, together with the port of Singapore and Hong Kong. The top ten includes eight Southern or South-Eastern Asian ports and two European ports, namely Rotterdam and Antwerp.

Top of the ranking on this indicator is Shanghai, with a score of 149, with more than 2000 container ships departing from the port every month. Following Shanghai is Ningbo ranked 2nd with an index of 136 and Singapore ranked 3rd with an index of 130. Singapore is the centre of the main Europe-Far East trade and is well connected to all the ports in Southeast Asia, the Indian subcontinent and the Pacific countries. In 4th position is Qingdao, while Hong Kong takes the 5th rank. Hong Kong, although losing competitiveness to Shanghai, continues to serve as a significant logistics hub in the region, offering extensive container liner services connecting to numerous global destinations. Additionally, it provides a wide array of intra-Asia shipping services and maintains marine cargo movements with a considerable portion of countries involved in the Belt and Road Initiative.

LNG AVAILABLE AT PORTS

In order to meet IMO's revised strategy, ports around the world are thus looking into onshore power capabilities and offering alternative fuels such as LNG or other low-carbon fuels, to cater for the refuelling demands of vessels calling there. Note that this benchmarking indicator is expected to include other low- and zero-carbon fuels in the future, as they gradually will become commercially available in ports.

Currently, only 12 out of the 50 benchmarked cities have LNG available at port, representing an increase of 5 cities since 2022. As shown in Figure 35, among the top 5 pillar cities, only Rotterdam, Singapore, and Shanghai have LNG bunker vessels. However, beyond Northern Europe and the Americas, where emission control areas and stringent national environmental regulations enforce restrictions on shipping emissions, other cities in our pillar ranking are also making strides towards environmentally sustainable practices.

The list of cities may grow in the near future as almost 44 green shipping corridors (a route between two ports where zero-emission shipping solutions are demonstrated and reported) have been announced as of December 2023. These corridors are essential for reducing emissions from the maritime sector by promoting sustainable practices and alternative fuels. They facilitate the adoption of low-carbon and zero-emission fuels such as LNG, hydrogen, ammonia, and methanol, incentivising their use over traditional fossil fuels. Additionally, green corridors prioritise infrastructure development at key ports, including LNG bunkering stations and methanol storage facilities, reducing reliance on high-emission fuels like heavy fuel oil. Through collaboration among port authorities, shipping companies, and governments, these corridors establish common standards for bunkering procedures and fuel quality, ensuring smooth operations and encouraging widespread adoption of cleaner fuels to meet IMO targets.

Fig. 30 - "Which cities do you consider the five leading centres for ports and logistics of the world?"

Source: Menon Economics & DNV (2024)

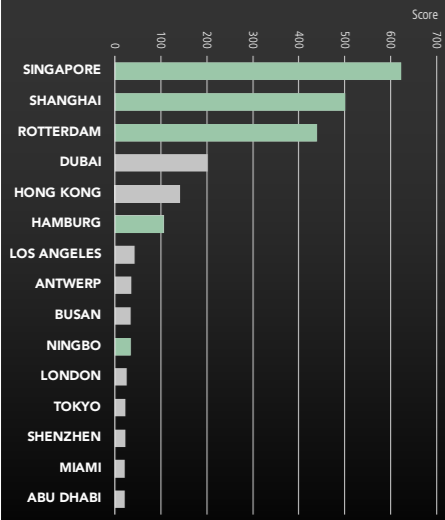


Fig. 31 - "Which cities have the strongest capabilities in the adoption of digital technologies and automated processes for port operations?"

Source: Lloyd's (2024)

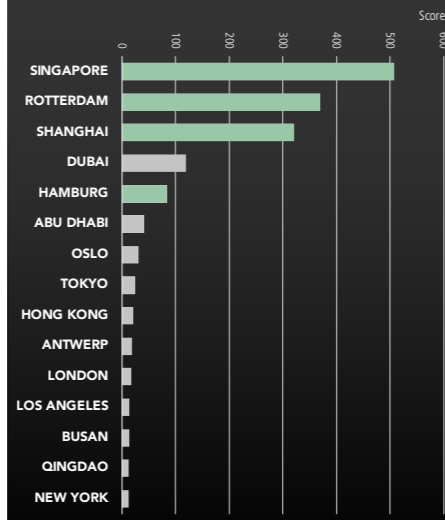


Fig. 32 - "Which cities have the strongest capabilities and infrastructure to be best positioned as a leading multi-fuel bunkering port?"

Source: Drewry (2024)

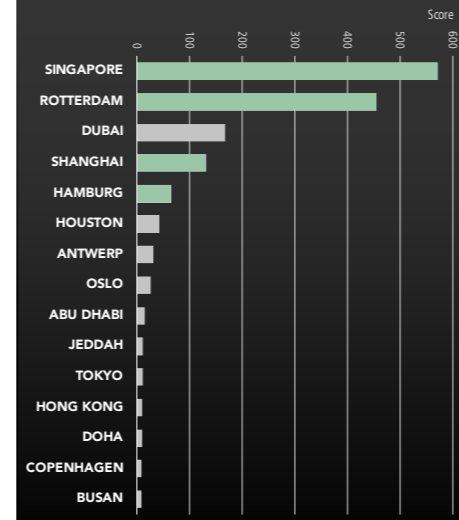


Fig. 33 - Volume of TEU handled by ports around the world, 2022

Source: Lloyd's (2024)

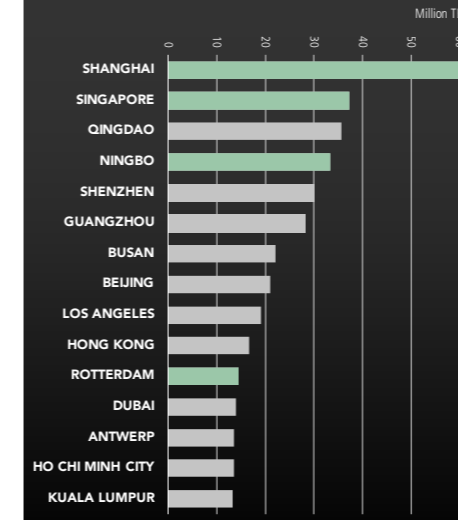


Fig. 34 - Port Liner Shipping Connectivity Index

Source: UNCTAD (2023)

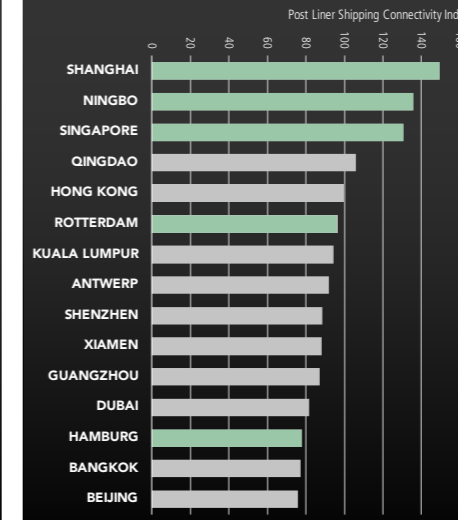
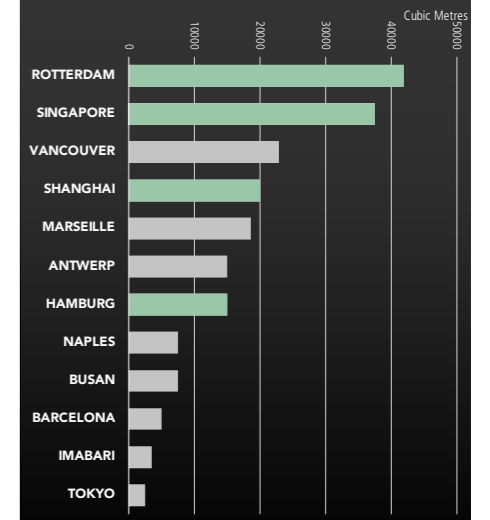


Fig. 35 - LNG available at ports

Source: DNV (2024)



ATTRACTIVENESS AND COMPETITIVENESS

SUMMARY



“A large variety of sectors are available in Singapore, including ship finance, maritime insurance and law, ship-owning management agencies and others. There is an attraction for setting up these companies supported by the government.”

– SHIP MANAGER IN SINGAPORE

The final pillar in our ranking, the attractiveness and competitiveness of the cities, points to the future. The more attractive a city is, the stronger the growth that can be expected for it in the future. To retain their incumbent companies and attract external ones, cities must be considered attractive. Cities are complex economies with a range of factors that impact the decision-making process of a business to stay in an existing location or to move to a new one. Hence, industry experts’ judgement and objective indicators related to cities’ ease of doing business, the health of the entrepreneurship ecosystem, the competitiveness of maritime companies as shaped by cities’ cluster dynamics, cities’ attractiveness for relocating headquarters, operations, and R&D, were used to benchmark the maritime cities in this study.

Overall, Singapore continues to remain the most attractive and competitive maritime city in the world, measured by objective indicators and experts’ assessments. Singapore is unsurpassed in all the subjective indicators used in this pillar and continues to retain its top position in Ease of Doing Business Index. Furthermore, experts continue to prefer Singapore for their business activities backed by its pro-business policies, supportive governance, transparency and political stability.

Rotterdam and London are next in the ranking behind Singapore for this pillar. Rotterdam has significantly improved its score for the attractiveness and competitiveness pillar compared to 2022 where it held 4th rank, improving on both subjective and objec-

tive indicators. London tops the list of OECD Services Trade Restrictiveness Index (STRI). London is also perceived as a very attractive city for locating businesses, particularly head-quarter functions.

Copenhagen secured 4th with its main strength lying in its top scores for several of the objective indicators, including ease of doing business, quality of living, economic freedom and for being the most transparent and uncorrupted city in the world. Hamburg, Oslo and Vancouver are next in the ranking for this pillar.

Dubai is a rising star amongst other traditional maritime cities of the world, and it has made to the top 15 in the combined ranking in terms of attractiveness and competitiveness. Dubai ranks low for the objective indicators as these are measured on the country level, but is ranked much higher for subjective indicators, and is regarded by the industry experts as one of the top five most attractive locations to set up their operational offices.



ATTRACTIVENESS AND COMPETITIVENESS

	Ease of doing business	Transparency/corruption	Entrepreneurship	STRI Index	Global Innovation Index	Quality of Living	Index of Economic Freedom	Q: Maritime Center	Q: HQ
SINGAPORE	1	3	-	28	6	7	1	1	1
ROTTERDAM	37	4	6	2	7	4	2	3	4
LONDON	10	9	31	1	5	11	14	6	2
COPENHAGEN	2	1	-	22	9	1	3	8	7
HAMBURG	18	5	25	3	8	6	6	7	6
OSLO	11	2	19	23	27	5	4	5	5
VANCOUVER	19	8	24	9	25	2	6	30	30
NEW YORK	4	16	20	32	1	10	10	13	13
TOKYO	20	9	28	4	22	13	15	9	12
HOUSTON	4	16	20	32	1	16	10	22	14
MIAMI	4	16	20	32	1	17	10	20	22
LOS ANGELES	4	16	20	32	1	18	10	15	30
OSAKA	20	9	28	4	22	15	15	30	30
SYDNEY	13	7	-	10	29	3	5	20	30
DUBAI	14	21	1	-	34	20	8	4	3

OBJECTIVE INDICATORS' ASSESSMENT

Seven objective indicators were chosen to benchmark the attractiveness and competitiveness of leading maritime cities. These indicators include a measure of ease of doing business, perceived level of public sector corruption, health of entrepreneurial and innovation ecosystem, maritime logistics and cargo handling capacities. It also includes the quality of life for expats in the city, the level of economic freedom for people living in the city.

EASE OF DOING BUSINESS

The maritime industry is international in nature, and that makes competitive regulation important for cities to attract and retain business. Both maritime specific regulations and the overall regulatory framework for conducting business are important in this aspect. While it is difficult to measure maritime specific regulations on a global scale, the Ease of Doing Business Index developed by the World Bank gives an insight into the wider set of regulatory environments. A higher ranking indicates better, usually simpler, regulations for businesses and stronger protections of property rights. Empirical research suggests a strong impact on economic growth through the improvement of these regulations.

Looking at the maritime cities in the report, small city states perform very well on the index, with Singapore, Hong Kong and Copenhagen the top three performers.

Singapore ranks 1st, representing a competitive, growing economy, where incorporating a company takes only a short amount of time, is available at a low cost, and the process is largely digitized. It maintains a flat corporate tax rate of 17%, making it one of the lowest corporate tax rates in the world. Hong Kong ranking 2nd is also a strong city in terms of doing business owing to the policies of starting a business (less bureaucracy with simple procedures resulting in a cost and time efficient process) and taxation system in the city. Copenhagen also ranks 2nd, tying with Hong Kong. It has adopted fast-paced, digitized, one-window policies for business start-ups, and gains its strength from a very efficient public sector, which in turn ensures fast acquirement of permits, ease of paying taxes and fees, and ease of cross-border trading.

TRANSPARENCY / CORRUPTION

The Corruption Perceptions Index by Transparency International is used to rank the maritime cities for their transparency and corruption level. The index ranks 180 countries and territories by their perceived levels of public sector corruption according to experts and business organizations. A scale of 0 to 100 is used, where 0 is highly corrupt and 100 is "very clean". In 2023, more than two-thirds of the countries scored below 50, which indicates that most countries fail to address corruption in their public system. The average score across all countries is 43.

Few movements have occurred since the previous assessment. For the maritime cities in this study, the Scandinavian cities and Singapore remain strong in this category. China's maritime cities come out poorly in this indicator, with a value of 42 which is on par with the global average score, thereby ranking it at 76th.

ENTREPRENEURSHIP

Entrepreneurship is one of the key drivers of economic growth and development and is used to assess a city's relative attractiveness and competitiveness. The Global Entrepreneurship Index was selected to evaluate the health of the entrepreneurship ecosystem in each location which was further complemented by the results from the experts' assessment.

For the third consecutive year, the United Arab Emirates tops this indicator with the highest score ever recorded. Thereby, Dubai and Abu Dhabi are ranked 1st in this indicator, followed by Saudi Arabia at 3rd. The United Arab Emirates scored highest across the entire sample of 49 economies in all but one of the EFCs (slightly behind Saudi Arabia for Ease of Entry: Burdens and Regulations).

Taipei and Mumbai are ranked 4th and 5th as they recently managed to demonstrate exceptional growth in their respective start-up ecosystems, also taking advantage of highly qualified local talent and cheaper operating costs. They have managed to develop vibrant start-up ecosystems, clustered in specific centres, at the forefront of technological advancements. Traditional maritime cities such as Rotterdam scores 6th, whilst the other Asian maritime cities such as Singapore and Shanghai are not within the top 15, they have a general high score in this category.

"I believe the analogy of a flower accurately reflects the necessity of incorporating various elements from business, academia, and government. This includes entities such as banks, charterers, and insurance companies."

– Maritime Insurance Professional in London

SERVICES TRADE RESTRICTIVENESS

Obstacles to global services trade are pervasive as national trade and regulatory policies in individual services sectors are often made with limited regard for economy-wide impacts. The OECD Services Trade Restrictiveness Index (STRI) provides information about regulations that affect trade in services in 22 sectors. For this study, only maritime transport and logistics cargo handling sector has been considered.

London leads this indicator, followed by Rotterdam, Hamburg, Tokyo and Osaka. London and Rotterdam have been at the forefront for many decades, owning some of the most

advanced trade facilities globally, and has been the gateway for much of Europe's total incoming and outgoing trade, taking advantage of the national government policies on instituting few legislative barriers on foreign trade. Local educational & research centres have been the benefactors of many financial incentives' programs, originating from the city administration or other business stakeholders, pursuing innovative solutions for the provision of streamlined, high quality cargo handling services.

GLOBAL INNOVATION

The Global Innovation Index (GII) provides insights into global innovation trends amid an economically uncertain environment. It ranks the most innovative economies worldwide among 132 economies and identifies the top 100 science and technology innovation clusters.

Of the maritime cities benchmarked in this report, American cities such as New York, Los Angeles, Miami and Houston are ranked at the top in this indicator. United States of America ranks highest in Market sophistication (1st) and Business sophistication, Knowledge, and technology outputs (2nd).

Following the United States is London and Singapore. United Kingdom is seen to produce more innovation outputs relative to its level of innovation investments. On the other hand, Singapore has seen ever-growing number of start-ups and is an important hub for R&D and high-tech industries, as the local economic policies based on low fees and taxes have attracted venture capital funds keen on investing in cutting-edge technologies.

European cities on the forefront of innovation are Rotterdam, Hamburg, and Copenhagen, with adoption of smart technology based on IoT, improving energy efficiency, city transportation and access to open data, which makes it easier for entrepreneurs, innovators, and others to identify problems and opportunities and develop solutions.

QUALITY OF LIVING

Quality of Living data serves as a key indicator for assessing the attractiveness of a city for maritime business. It evaluates the practical aspects of daily life for expatriate employees and their families, considering factors like work-life balance and overall quality of life. Economic conditions influence these considerations. As employees prioritise their own and their families' well-being, the importance of quality of life in both residential and work areas is increasingly emphasized.

Among the cities benchmarked in this report, Copenhagen tops the list followed by Vancouver, Sydney, Rotterdam, and Oslo. Singapore, top in this overall pillar, is ranked 7th in the quality of living index. This is consistent with the assessments by Singaporean experts, that to a lesser degree than Oslo and Rotterdam experts agree with the following statement "Taking all living conditions into consideration, this city is a good place to live and work for a family".

ECONOMIC FREEDOM

The Index of Economic Freedom, with its analysis of 184 economies worldwide, provides insights for stakeholders ranging from policymakers and academics to professionals in business and finance. It serves as a tool for businesses to assess risks, looking at the economic conditions and policies.

Singapore has maintained its status as the world's freest economy, demonstrating a high level of economic resilience, followed by Rotterdam, Copenhagen, Oslo, and Sydney.

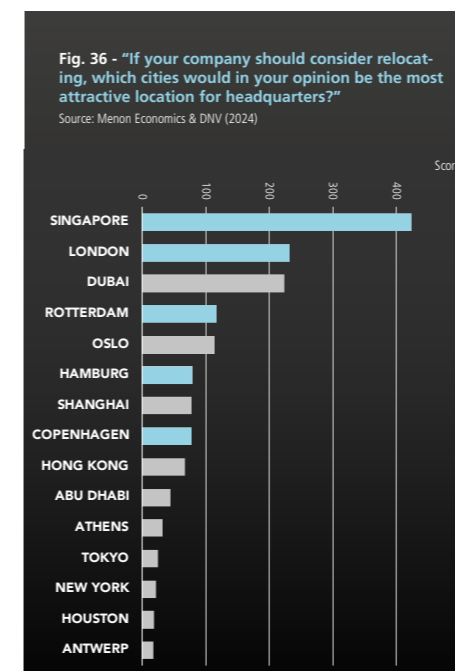
EXPERT ASSESSMENT

Any company will seek to be present in a location which will cater for its business needs, provide the necessary environment for it to grow in a cost-efficient manner, and support as far as possible the desired work benefits and lifestyle of its employees and new recruits. The industry experts in this study were thus asked to rank their choice of the most attractive maritime cities, with the following questions:

- "Looking forward 5 years from now: Which cities will be the five leading maritime centres of the world?"
- "If your company should consider relocating, which cities would in your opinion be the most attractive location for headquarters?"

"A complete ecosystem with a focus on shipowning, with a critical mass of owners/operators, is important for becoming a leading maritime city"

– Ship Manager in Europe



As presented in Figure 36-37, Singapore stands out as the most attractive city on both dimensions, while Shanghai, and London take the second place on each of these.

MOST ATTRACTIVE CITIES FOR RELOCATION OF HEADQUARTERS

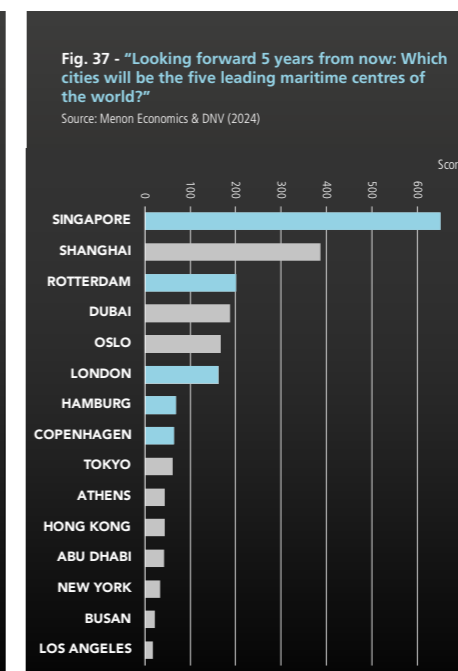
When industry experts are asked to rank cities that they find most appealing for relocating their headquarters, Singapore emerges as the top choice, followed by London, Dubai, Rotterdam, and Oslo.

Singapore has consistently attracted international maritime firms to set up their base, strategically positioned at the crossroads of major trade and shipping routes connecting the East and the West, enjoying a tremendous aviation connectivity level, and serving as gateway for businesses to access high growth markets, such as China, Southeast Asia, and India.

Presumably unaffected by Brexit, London has kept its position as the second most attractive city for maritime headquarters, assisted by the high competency level of its training centres, maritime education institutions, maritime law & finance establishments. In East Asia, Shanghai has dropped its attractiveness for HQ relocation, from 3rd to 7th place. Dubai now stands at 3rd place and Rotterdam have strengthened its attractiveness in recent years, moving up to 4th place from 9th in the previous LMC publication. For other cities, there are only minor changes.

LOOKING FORWARD: LEADING MARITIME CITIES OF THE WORLD IN 5 YEARS

The maritime experts were asked to make predictions about the leading maritime cities of the world five years ahead. Experts appear to agree that Singapore will maintain its position as the foremost maritime city in 2029, with Shanghai projected to ascend to the second position in importance. Singapore is expected to retain its



position as the leading maritime city of the world due to the size of its port, number of internationally focused shipbrokers, financiers, lawyers, and insurers present there.

Shanghai's increased importance is related to the size and growing influence of the Chinese economy, its technology prowess, the growth of Chinese fleet, and increasing maritime related services to capitalize on its proximity to the Chinese production bases. China has the world's second-largest economy, and its export-oriented business environment is dependent on the trade of goods. China is expected to bypass the US as the world's largest economy before 2030 (Centre for Economics and Business Research, 2020).

Dubai has earned a spot in the top 5, ranked 4th by the experts, placing it alongside other well-established maritime cities. The maritime industry experts recognize that the city is quickly developing its general business and modern infrastructure, cosmopolitan environment and ease of attracting foreign talent due to the strong backing from the local government. It is today an important trading centre and is becoming the preferred city for maritime activities within its wider region covering the Middle East, the Indian subcontinent and Africa.

Of the European cities, Rotterdam and Oslo take up the 3rd and 5th place, respectively. Rotterdam is renowned for its extensive maritime heritage and proactive efforts in spearheading industry transformation towards decarbonisation and digitalization. Oslo, on the other hand, is esteemed by maritime experts, as the global hub for "green" technologies and a centre for advanced maritime research and development, encompassing testing and piloting initiatives. London lost its place in top 5 and stands currently at 6th, followed by Hamburg and Copenhagen.



APPENDIX A – INDICATOR RANKINGS FOR TOP 50 MARITIME CITIES GLOBALLY

	SHIPPING										MARITIME FINANCE AND LAW									
	Fleet size - management	Fleet size - owner	Fleet value - owner	Number of shipping HQ	Turnover shipping companies	Env. friendly fleet size - owner	Q: Shipping	Q: Operations	Q: Cargo owners and charterers	Legal experts	Maritime lawyers	Insurance premiums	Shipping banks portfolio	Number of listed maritime owner groups	Market cap maritime companies	IPO/Bonds/Follow ons	Green IPO/Bonds/Follow ons	Q: Finance	Q: Sustainable finance	
SINGAPORE	2	2	3	3	12	4	1	1	1	4	7	4	14	6	8	9	5	2	3	
ROTTERDAM	8	11	10	4	19	17	6	4	5	7	5	10	4	-	-	12	7	10	5	
LONDON	7	9	8	14	5	7	2	7	3	1	1	1	5	13	16	18	3	1	1	
SHANGHAI	5	5	5	7	9	8	3	3	2	14	14	7	-	8	2	4	9	5	9	
OSLO	23	17	9	27	8	5	5	6	8	11	16	8	9	2	9	2	8	4	2	
NEW YORK	31	23	16	22	17	18	12	30	12	3	2	21	10	1	1	1	-	3	4	
TOKYO	6	3	2	9	4	2	10	13	10	11	25	2	1	5	4	15	12	7	11	
HAMBURG	4	6	7	6	6	3	8	5	8	4	8	39	15	24	24	-	-	8	7	
COPENHAGEN	13	13	12	33	1	11	11	10	6	15	34	30	11	19	15	5	2	13	6	
BUSAN	11	32	32	18	18	36	14	17	29	29	-	-	-	8	5	8	-	23	23	
DUBAI	9	15	22	11	46	33	9	2	7	21	18	19	-	26	25	-	-	9	9	
HONG KONG	3	4	17	12	26	9	7	12	13	2	9	18	-	4	3	14	6	6	13	
VANCOUVER	28	42	33	39	47	31	20	34	29	19	21	-	-	-	-	-	-	28	23	
PARIS	47	43	42	47	31	19	28	34	25	11	11	5	2	18	11	-	-	11	8	
HOUSTON	20	22	14	27	25	15	17	22	11	24	13	-	-	-	-	-	-	17	18	
BEIJING	29	18	20	21	2	26	20	34	17	24	23	3	3	-	-	16	-	23	15	
ANTWERP	33	24	26	20	15	24	15	15	25	18	6	11	-	20	22	-	-	17	18	
SYDNEY	44	47	46	43	23	38	31	27	17	9	20	12	-	20	19	7	4	20	18	
LOS ANGELES	41	41	38	40	45	42	16	34	29	21	21	36	-	-	-	-	-	28	18	
OSAKA	25	28	27	17	13	30	31	34	29	-	42	-	-	-	-	-	-	28	23	
MIAMI	15	16	11	31	14	12	18	34	29	29	11	37	-	27	25	-	-	20	23	
ABU DHABI	35	31	37	30	21	20	13	11	14	-	27	25	-	20	26	10	-	14	12	
SHENZHEN	40	27	31	31	37	23	20	20	15	-	44	38	12	15	13	3	11	28	18	
NINGBO	19	19	21	5	22	37	26	20	15	-	35	-	-	-	-	-	-	28	23	
GUANGZHOU	21	21	23	18	36	21	31	31	25	27	39	28	-	-	-	-	-	20	23	
INCHEON / SEOUL	17	7	6	13	7	6	31	34	24	16	34	9	5	-	-	-	-	17	23	
BARCELONA	50	50	49	49	43	43	20	18	29	29	16	-	-	-	-	-	-	28	23	
QINGDAO	27	34	35	35	38	35	31	27	21	-	44	-	-	-	-	-	-	28	23	
MADRID	45	44	43	43	10	25	-	-	-	16	15	14	-	-	-	6	1	-	-	
MARSEILLE	30	20	15	40	3	10	30	34	23	-	31	-	-	-	-	-	-	27	23	
IMABARI	16	8	4	10	24	29	31	34	29	-	34	7	-	-	-	-	-	28	23	
KUALA LUMPUR	24	29	30	25	30	14	31	15	19	-	27	13	-	10	10	-	-	16	23	
XIAMEN	36	38	39	36	41	40	31	31	29	-	44	31	-	-	-	-	-	28	23	
DALIAN	34	35	36	23	40	39	31	34	29	-	44	33	-	-	-	-	-	28	23	
ATHENS	1	1	1	2	35	1	4	8	4	19	3	26	8	16	20	-	-	12	14	
TAIPEI	18	12	13	27	42	22	31	31	29	29	25	20	-	11	7	-	-	28	23	
GENOVA	42	40	25	40	16	27	28	26	29	7	19	6	-	-	-	-	-	28	23	
MUMBAI	14	25	29	16	33	28	18	9	21	29	23	23	-	7	6	13	-	14	23	
GDANSK	46	48	48	48	39	43	31	22	29	-	42	-	-	-	-	-	-	28	23	
ISTANBUL	12	14	18	8	34	34	31	25	29	21	10	24	-	20	23	-	-	28	23	
DOHA	39	26	34	38	49	16	20	22	25	-	39	15	-	26	17	-	-	23	17	
BANGKOK	37	36	40	24	27	41	-	-	-	29	27	17	-	12	18	17	10	-	-	
JEDDAH	48	46	44	45	48	43	26	27	19	-	34	29	-	-	-	-	-	26	15	
JAKARTA	10	10	24	1	32	32	31	34	29	29	27	16	-	3	14	11	-	28	23	
NAPLES	22	33	19	37	29	13	-	-	-	24	34	-	-	-	-	-	-	-	-	
HO CHI MINH CITY	38	37	41	33	28	43	31	34	29	-	31	22	13	13	21	-	-	28	23	
PANAMA CITY	43	45	47	45	11	43	20	34	29	9	4	27	-	26	28	-	-	28	23	
RIO DE JANEIRO	32	30	28	25	20	43	31	18	29	6	34	-	-	-	-	-	-	28	23	
MANILA	26	39	45	15	44	43	31	14	29	27	33	32	-	16	12	-	-	28	23	
COLOMBO	49	49	-	49	50	43	31	34	29	-	39	-	-	24	27	-	-	28	23	

	MARITIME TECHNOLOGY										PORTS AND LOGISTICS					ATTRACTIVENESS AND COMPETITIVENESS											
	Shipyard deliveries	Shipyard deliveries - eco friendly ships	Turnover shipyards	Classified fleet	Market value of ships	Maritime patents owned by companies	Maritime education institutions	Q: Technology	Q: Sustainable	Q: Digital	Q: R&D	TEU in port	Line Shipping Connectivity index	LNG available at ports	Q: Ports	Q: Digitalized ports	Q: Multifuel ports	Ease of doing business	Transparency/corruption	Entrepreneurship	STRI Index	Global Innovation Index	Quality of Living	Index of Economic Freedom	Q: Maritime Center	Q: HQ	
SINGAPORE	15	13	3	17	9	23	6	1	1	1	1	1	2	3	2	1	1	1	1	3	-	28	6	7	1	1	1
ROTTERDAM	8	12	11	-	21	7	2	5	3	4	3	11	6	1	3	2	2	37	4	6	2	7	4	2	3	4	
LONDON	40	26	9	3	-	8	1	8	6	6	5	22	24	-	11	11	16	10	9	31	1	5	11	14	6	2	
SHANGHAI	2	2	5	18	2	11	10	2	5	3	4	1	1	4	2	3	4	23	34	11	14	14	28	39	2	7	
OSLO	26	18	21	1	12	12	10	3	2	2	2	-	46	-	28	7	8	11	2	19	23	27	5	4	5	5	
NEW YORK	19	16	22	-	-	31	10	23	25	10	15	18	28	-	18	14	18	4	16	20	32	1	10	10	13	13	
TOKYO	10	21	6	2	7	1	16	6	9	9	11	24	20	12	12	8	10	20	9	28	4	22	13	15	9	12	
HAMBURG	13	14	25	20	8	6	3	7	7	8	8	16	13	7	6	5	5	18	5	25	3	8	6	6	7	6	
COPENHAGEN	41	26	36	-	24	9	10	10	4	5	7	-	47	-	21	17	14	2	1	-	22	9	1	3	8	7	
BUSAN	1	1	2	7	1	2	29	4	21	13	13	7	44	8	9	12	14	4	23	8	-	10	26	-	14	18	
DUBAI	18	26	40	19	15	-	22	11	8	7	6	12	12	-	4	4	3	14	21	1	-	34	20	8	4	3	
HONG KONG	21	22	39	25	25	25	10	12	14	13	11	10	5	-	5	9	12	2	6	-	-	26	19	-	10	9	
VANCOUVER	29	26	44	-	-	33	16	34	21	27	23	35	38	3	32	27	28	19	8	24	9	25	2	6	30	30	
PARIS	-	-	8	6	10	5	29	34	19	23	32	-	-	-	32	27	28	33	14	26	11	12	8	25	23	22	
HOUSTON	32	26	24	4	-	13	15	21	25	27	23	33	41	-	17	23	6	4	16	20	32	1	16	10	22	14	
BEIJING	11	6	1	5	20	15	22	16	25	24	19	8	15	-	23	27	28	23	34	11	14	14	32	39	30	20	
ANTWERP	37	26	28	-	-	19	8	20	11	12	14	13	8	6	8	10	7	38	9	-	27	28	9	21	17	15	
SYDNEY	-	-	41	-	-	36	22	34	25	20	23	38	42	-	32	20	28	13	7	-	10	29	3	5	20	30	
LOS ANGELES	-	-	37	-	-	28	-	34	11	18	27	9	33	-	7	12	22	4	16	20	32	1	18	10	15	30	
OSAKA	23	25	18	-	11	4	22	28	25	27	34	30	29	-	32	27	28	20	9	28	4	22	15	15	30	30	
MIAMI	-	-	15	15	-	26	16	34	25	27	34	-	43	-	14	27	28	4	16	20	32	1	17	10	20	22	
ABU DHABI	35	26	35	21	-	29	21	10	10	9	32	22	-	14	6	9	14	21	1	-	34	23	8	12	10		
SHENZHEN	24	26	46	-	20	-	27	15	19	19	5	9	-	12	16	21	23	34	11	14	14	14	36	39	16	30	
NINGBO	5	5	23	-	4	28	29	18	19	27	17	4	2	-	9	22	16	23	34	11	14	14	-	39	23	22	
GUANGZHOU	4	3	10	-	5	14	-	13	21	22	19	6	11	-	16	23	28	23	34	11	14	14	33	39	18	29	
INCHEON / SEOUL	30	23	4	24	-	3	29	9	13	13	15	37	-	-	23	27	28	4	23	8	-	10	21	-	23	30	
BARCELONA	36	26	34	-	-	32	29	23	25	27	27	36	17	10	28	23	22	23	25	36	7	32	14	22	30	22	

APPENDIX B: METHODOLOGY AND DATA SOURCES

DEFINITIONS

WHAT IS THE DEFINITION OF MARITIME ACTIVITY?

During almost 20 years of research, Menon Economics has defined maritime activity as: "All companies that own, operate, design, build or deliver equipment or specialized services to all kinds of ships and other floating units." More specifically, for data collection purposes, we defined the maritime industry as economic activity of firms registered in the following NACE rev. 2 codes: 5010, 5020, 5030, 5040, 3011, 3012, 3315, 5222, 5224 and 7734. This industry categorization is broad in the sense that it covers four different sub-sectors, which all include maritime activity. The NACE rev. 2 codes 5010, 5020, 5030 and 5040 account for the shipping industry, while the codes 3011, 3012, 3315 account for the shipyard industry. The NACE rev. 2 codes 5222 and 5224 account for the Ports & Logistics industry and the last code, 7734, leasing and renting activities. For a detailed description of the different NACE rev. 2 codes, please visit <https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF>. For countries that do not report data on NACE, we have used the corresponding alternative to NACE (e.g. NAICS in the United States).

Where we use data sources which are specialized at providing maritime data only, such as Clarksons Research and Lloyd's List, we have not made use of these NACE rev. 2 codes.

WHAT IS A CITY AND ITS GEOGRAPHIC BOUNDARIES?

In this report, we defined a city as encompassing an area that can be reached within a two-hour drive from the city center, approximating to a radius of 200 km from the city's center. This definition is not sensitive to artificial administrative borders, and captures most, if not all, relevant maritime economic activity related to a city.

DESCRIPTION OF DATA SOURCES AND METHODOLOGY EXPERTS' ASSESSMENT

We have built up a global panel of Maritime Industry Experts who have made thorough assessments of their own cities as well as ranked the nominated cities on a wide range of indicators. From a total of 190 respondents, all 190 experts stated a city. These experts are based in 33 different cities, from a total of 25 countries.

Almost 31% of the experts are from Asian countries, in particular from Singapore. Accordingly, 34 out of 190 experts are from Singapore, followed by 26 experts from Abu Dhabi, and 20 experts from Dubai. To prevent home bias, we have only used the questions where we asked experts to rank cities based on various factors and indicators and have not used self-city evaluations.

SHIPPING CENTERS

CLARKSONS DATABASE

The Clarksons database (World Fleet Register) was used in multiple indicators. Under the shipping pillar, we have utilized information about both owners and managers, fleet size in terms of CGT, fleet value in terms of USD billions and number of shipping companies with HQ in each shipowners' city of registration (for shipping companies with more than five vessels in their portfolio). To evaluate fleet value at city level we have used WFM Vol 14 No 11 November 2023. We have used Clarksons database also to assess environmental friendliness of the world fleet where we utilized information about vessels' engine and fuel type to measure carbon intensity in accordance with DNV's Alternative Fuel Insights. The data were analyzed by Menon Economics.

BUREAU VAN DIJK - ORBIS DATABASE

Bureau van Dijk's Orbis database was used to gather information about operational revenue of shipping companies, which are defined as companies with NACE rev.2 codes: 5010 and 5020. The values were then allocated to the cities based on where the companies are registered.

MARITIME FINANCE AND LAW

WHO'S WHO LEGAL (Lexology) AND WORLD SHIPPING REGISTER (WORLD-SHIPS.COM)

In each of the cities, Menon has identified the number of experts in maritime law on

Who's Who Legal (Lexology) and the number of maritime lawyers on World Shipping Register. These two sources include a comprehensive list of experts and firms in over 100 national jurisdictions, and the two sources enable us to capture both the expertise and the extensiveness of maritime law activity in each city.

THE INTERNATIONAL UNION OF MARINE INSURANCE & BUREAU VAN DIJK

The International Union of Marine Insurance (IUMI) reported the amount of marine insurance premiums paid by each country to insurance companies for Hull Transport/Cargo, Marine Liability Offshore Energy. It also included premiums for P&I clubs. National values are then allocated to cities based on their corresponding maritime financial and insurance activity/importance. To calculate each city's share, the national values by a ratio that compares each city's non-life insurance premiums is multiplied with total national non-life insurance premiums. This assumes that all the firms in the ratio are allocated to cities according to the location of their headquarter.

PETROFIN RESEARCH

Based on Petrofin Research's report of the top 40 shipping banks in the world, we assigned the values of their current shipping portfolio to cities where their maritime head offices are located. The data comes from Petrofin's publication from 2023 and reflects the full year of 2022.

BUREAU VAN DIJK - ORBIS DATABASE

To get the number of listed maritime companies in each city's stock exchange, we used Orbis database from Bureau van Dijk. We defined maritime companies as those with NACE rev.2 codes: 5010, 5020, 5030, 5040, 3011, 3012, 3315, 5222, 5224 and 7734. We also used Orbis database to get the market capitalization of listed maritime companies with the same NACE codes and assigned them to cities based on where their stock exchanges were located.

CLARKSONS SHIPPING INTELLIGENCE NETWORK

To evaluate the trade level on stock exchange in each selected city, we analyzed the data on the number of listed companies retrieved from the Clarksons Research Capital Markets (Shipping Intelligence Network). Furthermore, on each city's stock exchange the team also analyzed the trading volume of bonds, IPO and Follow Ons for the years of 2023 (up to December 2023). The number of listed companies measures the relative importance of each city as a maritime finance hub, while the trading volume tells us something about the volume of financial activity in each city. These two data sources combined give us a good measure of each city's relative importance as a maritime finance hub. All companies that own, operate, design, build or deliver equipment or

specialized services to all kinds of ships and other floating units were considered.

MARITIME TECHNOLOGY

CLARKSONS DATABASE

The Clarkson Database was also used to measure the size of fleet (CGT) built later than 2020 by active shipyards and their orderbook. The fleet size per yard was aggregated and then distributed to the different cities based on the location of the shipyards. The database was also used to identify the environmentally friendly fleet that has been built after 2020, where we utilized information about GT, vessels engine and fuel type to assess carbon intensity in accordance with DNV's Alternative Fuel Insights. The data were analyzed by Menon Economics.

Using total CGT of each ship retrieved from the Clarksons Research World Fleet Register, we determined the size of each classification society's classified fleet (measured as CGT) that is allocated to cities by using the location of classification societies' respective headquarter.

Finally, we used the Clarksons Database to compute the purchasing price of ships sold in the years of 2020-2022. These purchasing prices are allocated to cities based on where the corresponding builder shipyards are located.

BUREAU VAN DIJK - ORBIS DATABASE

We use Bureau van Dijk's Orbis database to obtain operational revenue (turnover) of companies in the maritime technology industry which we define as companies with NACE rev. 2 codes: 3011, 3012, 3315. Turnover values were then aggregated for each city based on companies' location.

The Orbis database was also used to collect information about number of active maritime patents owned by companies registered, which was later allocated to cities based on the location of the headquarter of the owner company. Maritime patents are defined as patents with the following IPC codes: B63B, B63C, B63G, B63H, B63J.

WORLD SHIPPING REGISTER (world-ships.com)

Data from World Shipping Register was used to collect information about the number of maritime schools located in the different cities.

PORTS AND LOGISTICS

LLOYD'S LIST TOP 100 PORTS 2023

Lloyd's List rates the top 100 ports in the world based on TEU throughput. We use the 2023 report which contains data from 2022. Values were allocated to cities based on the location of the port.

UNCTAD

We used Liner Shipping Connectivity Index from UNCTAD to measure port performance. The index is based on 6 components that measure both connectivity and capacity of

ports. We then allocate the LSCI index to cities based on the location of the ports.

ALTERNATIVE FUEL INSIGHTS, DNV

DNV Alternative Fuel Insights was used to gather information about ports with available LNG bunkering facilities. Ports were ranked based on the aggregate tank capacity of LNG bunker vessels who use the port for bunkering. Then the values for ports were allocated to cities they are located at.

ATTRACTIVENESS AND COMPETITIVENESS

THE WORLD BANK

We have used the Ease of Doing Business Index and the Burden of Customs Procedure Index provided by the World Bank. These indexes are on the national level, but since laws, rules and regulations often are identical across cities within a country, we argue that the indexes are representative on the city level.

TRANSPARENCY INTERNATIONAL

The Corruption Perceptions Index, which measures the perceived level of public sector corruption, is based on data from Transparency International.

GLOBAL ENTREPRENEURSHIP MONITOR

The Global Entrepreneurship Monitor (GEM) 2022/2023 report provides the percentage of adults engaged in Total Early-Stage Entrepreneurial Activity (TEA), based on interviews with over 175,000 individuals and experts from 51 economies.

OECD

The OECD Services Trade Restrictiveness Index (STRI) provides up-to-date information on regulatory changes that affect trade in services in 46 countries across 22 sectors. We use the STRI index on maritime transport sector to measure restrictiveness in countries.

WIPO

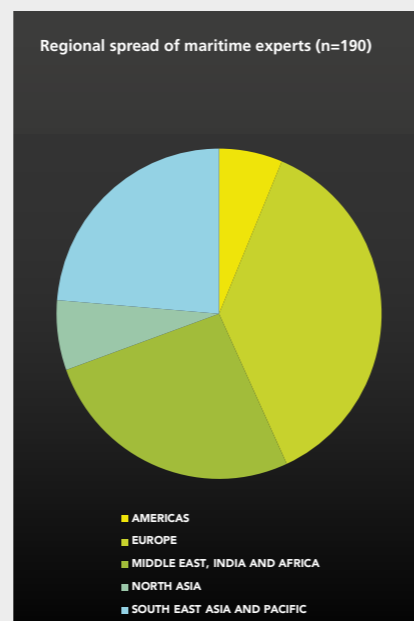
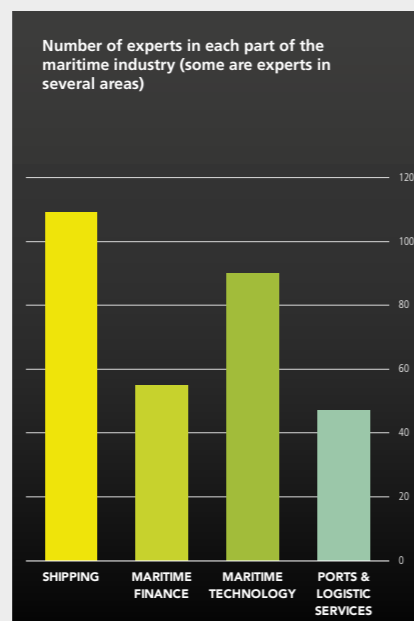
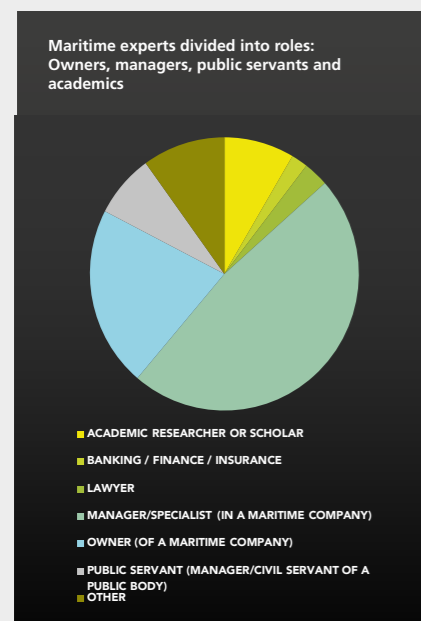
We measure Entrepreneurship using Global Innovation Index (GII), published by The World Intellectual Property Organization (WIPO), which measures the innovation performance of countries by tracking their innovation investments, technological advancements, technology adoption, and their social and economic impact.

MERCER

The Mercer Quality of Living City Ranking 2023 evaluates and ranks cities worldwide based on the quality of life they offer to expatriate employees and their families.

THE HERITAGE FOUNDATION

The Index of Economic Freedom, jointly developed by the Heritage Foundation and the Wall Street Journal, evaluates and ranks world economies based on their relative



freedom, considering the positive relationship between economic freedom and progress.

METHODOLOGY

The methodology for the current edition closely follows the framework updated in the 2022 edition, ensuring continuity in the evaluation process. This approach is characterized by uniform weighting across all pillars and indicators in both the initial and final rankings, maintaining consistency and fairness in the assessment of cities.

Employing a bottom-up approach, we initially identify the top 50 maritime cities from a global pool exceeding 15,000 cities engaged in maritime activities. This selection process is grounded in a comprehensive evaluation of 24 objective maritime indicators across four key pillars: “Shipping,” “Maritime Finance & Law,” “Maritime Technology,” and “Port & Logistics.” Notably, the “Attractiveness & Competitiveness” pillar is excluded from the initial ranking phase. This exclusion addresses the potential for data discrepancies due to its objective indicators being available predominantly at a national level—with the Mercer Quality of Living City Ranking as an exception. This measure effectively mitigates the risk of unfairly advantaging cities that might otherwise underperform in the other four pillars, particularly preventing smaller cities in countries like Denmark, Norway, Iceland, and New Zealand from being unjustly elevated in the overall rankings due to favourable national metrics.

Subsequently, the selected cities undergo a rigorous assessment by maritime experts worldwide, covering all five pillars. This final round of assessment, leveraging a total of 45 indicators, culminates in the identification of the top 50 leading maritime cities internally. This methodology ensures that the final ranking is the result of a thorough analysis integrating both objective and subjective data across all pillars, thereby enhancing the depth and inclusivity of the evaluation process.

To derive the pillar rankings and, subsequently, the overall rankings, a classical machine learning technique is employed for normalizing each indicator’s values. This process standardizes indicators to a mean of zero and a standard deviation of one by subtracting the mean and dividing by the standard deviation of the series. To counteract the high levels of kurtosis (skewness) observed in some indicators, all normalized indicators are further adjusted by dividing them by their maximum value. This step ensures that extreme values are moderated, preventing skewness from unduly influencing the pillar scores. Moreover, cities with missing indicator values incur a minor penalty—a standardized deduction—to maintain data integrity and comparability, ensuring that missing data does not artificially inflate a city’s performance.

QUALITY ASSURANCE AND CHANGES IN INDICATORS FROM THE 2022 EDITION

To ensure that each of the 4 maritime-related pillars accurately reflects current industry standards and trends, we have implemented modifications to some pillar-specific indicators for this edition. The changes are as follows:

Pillar “Shipping”: addition of 1 new subjective indicator assessing cargo owners and charterers: (Which cities host the most influential cargo owners and charterers capable of reshaping traditional shipping activities?).

Pillar “Maritime Finance and Law”: addition of 1 new objective indicator on Green IPOs/bonds/follow-ons, 1 new subjective indicator on Sustainable Maritime Finance (Which cities are perceived to be proactive in implementing green and sustainable financing practices?) and removal of 1 objective indicator on mandated loans due to the unavailability of updated, reliable data.

Pillar “Ports & Logistics”: removal of 1 objective indicator regarding the size of port operators (since updated reliable data could not be sourced), and addition of 2 new subjective indicators on Digitalized Ports (Which cities have the strongest capabilities in the adoption of digital technologies and automated processes for port operations?) and Multifuel Ports (Which cities have the strongest capabilities and infrastructure to be best positioned as a leading multi-fuel bunkering port?).

Pillar “Attractiveness & Competitiveness”: addition of 3 objective indicators on Global Innovation Index from the World Intellectual Property Organization, Quality of Living from Mercer, and Index of Economic Freedom from the Heritage Foundation.

Additionally, we have updated some data sources across all pillars to ensure the use of the latest, most reliable information. Significant efforts have been made to enhance the quality check of raw data and the aggregation of cities, adhering to the ‘2-hour drive rule’—a criterion ensuring that the data accurately represents the city’s immediate economic and logistical sphere of influence.



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