

**Mega-Ships in the Indian Ocean:
Evaluating the Impact
and Exploring Littoral Cooperation**

GAYATHRI IYER

Mega-Ships in the Indian Ocean: Evaluating the Impact and Exploring Littoral Cooperation

GAYATHRI IYER

ABOUT THE AUTHOR

GAYATHRI IYER is a researcher for ORF's Strategic Studies Programme. She tracks maritime policy, ocean governance, and international maritime trade and sustainability for global security and development. She has worked at the Legal Department for Multilateral Diplomacy Programme with UNITAR, UNOG, and has trained as a Remote Participation Moderator for multilateral diplomacy and dialogue at the ITU in Geneva.

ISBN: 978-93-89094-52-7

Mega-Ships in the Indian Ocean: Evaluating the Impact and Exploring Littoral Cooperation

ABSTRACT

The Indian Ocean has seen a steady increase in the size and number of Ultra Large Container Vessels (ULCVs) or mega-ships equal to or in excess of 18,000 twenty-foot equivalent units (TEU) from 2014 onwards. This has created economic and infrastructural pressures on Indian Ocean littorals. With mega-ships growing on the Asia-Europe route, the Indian Ocean Region (IOR) will need to create flexibility in landside maritime infrastructure and hinterland transport systems to be able to respond adequately to a range of externalities. This paper analyses the challenges that are emerging due to the increased size of ships in the IOR. In the absence of any global regulation on the size of container vessels, the paper recommends that India take a lead in bringing together the IOR littorals to determine the point at which the economies of scale associated with mega-ships might decline.

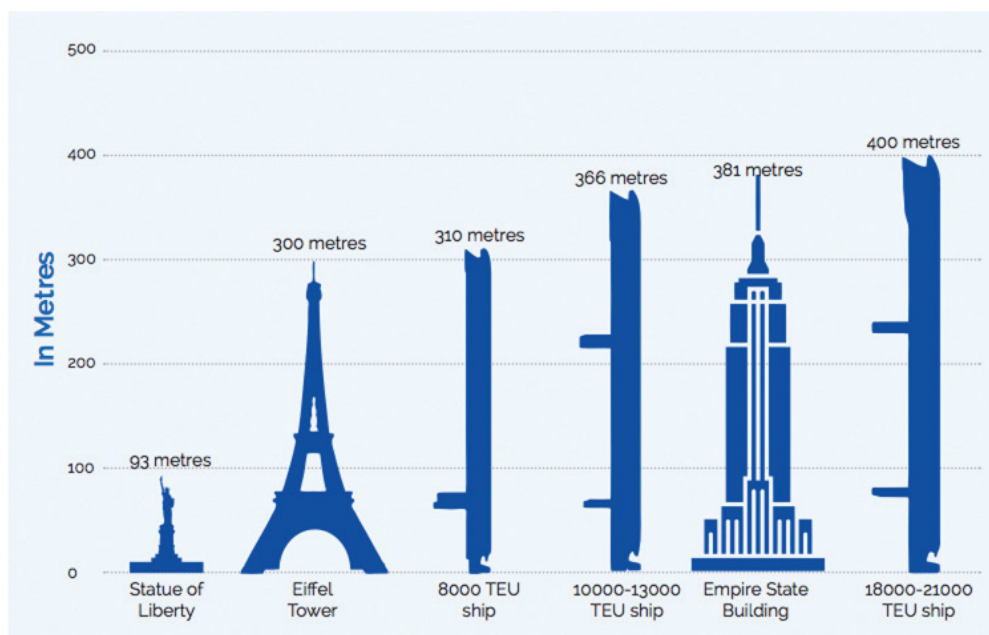
(This paper is part of ORF's series, 'India and Global Governance'. Find other research in the series here: <https://www.orfonline.org/series/india-and-global-governance/>)

Attribution: Gayathri Iyer, "Mega-Ships in the Indian Ocean: Evaluating the Impact and Exploring Littoral Cooperation", *ORF Occasional Paper No. 204*, July 2019, Observer Research Foundation.

INTRODUCTION

Over the last decade, the shipping industry has seen the doubling of container ship size worldwide—from an average capacity of 9,000 twenty-foot equivalent (TEU)ⁱ to 18,000 TEU. This has led to the reduction in costs of shipping by almost a third.¹ While the reduction of costs of transporting goods and reduction of fuel used is an advantage to global trade, after crossing a certain threshold in size, these advantages become disadvantages. The disadvantages are mainly felt on existing landside infrastructure, which has to adjust to the increased ship sizes

Figure 1: Comparison of container ship sizes



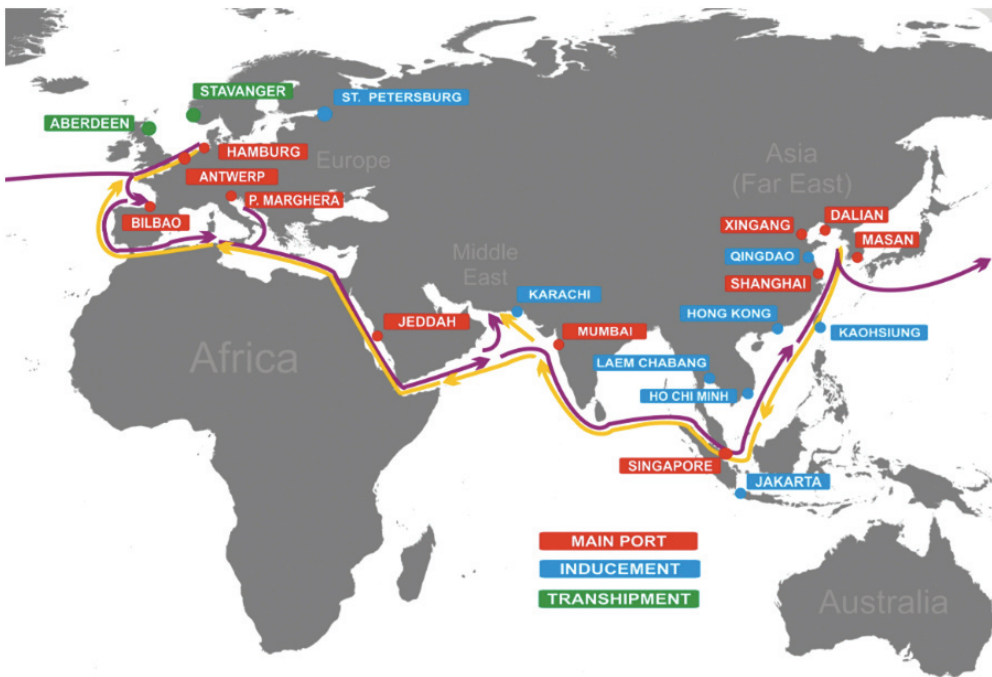
i The twenty-foot equivalent unit (often TEU or teu) is an inexact unit of cargo capacity often used to describe the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks. TEU is used to indicate the nominal capacity of container ships or container terminals and in statistics regarding container transit in ports.

in terms of physical capacity, equipment, and expertise, along with increased inland transportation logistics for the offloaded goods.²

Long-term market projections suggest that by mid-century, international trade could see orders for container ships increase from the current order size of 21,000 TEU to a capacity of 50,000 TEU.³ This is likely to necessitate that trade-related sails are conducted exclusively between mega trans-shipment terminals.⁴

In the Indian Ocean Region (IOR), the lack of landside port and terminal infrastructure to deal with mega-ships⁵ is cutting out direct port calls for most littorals. The region has seen the maximum deployment of Ultra Large Container Vessel (ULCVs) in excess of 18,000 TEU—or what are referred to as “mega-ships”.⁶ This is due to the Indian Ocean’s geographical location: it connects major engines of the international economy from the Northern Atlantic to the Asia-Pacific — facilitating

Figure 2: North Europe Far East Trade Route



global trade. Indeed, it is rapidly becoming the world's largest trade route by volume due to the greatest economies of scale along the North Europe to Far East trade route.

Most port terminals on this route have to make adjustments to their landside infrastructure as a reactive manner, as ships get longer, wider, higher, and deeper. Shipping lines generally do not consult with other actors in the transport chain on their projects.⁷ According to a report by the International Transport Forum (ITF) at the Organisation for Economic Co-operation and Development (OECD), “While it takes approximately one and a half year between the order and delivery of a ship, the time for adaptations to infrastructure usually take longer. Dredging might take several years, extension and strengthening of quay walls one to two years, port hinterland connections easily more than five years, and new port terminals at least five but frequently more than ten years if land needs to be reclaimed. The emergence of mega-ships raises the issue of speediness of public decision-making.”⁸ Maritime infrastructure is a crucial geo-political investment for countries. There are three dimensions to a mega-port: the cargo volume it handles, the economic value it represents, and the land and water surface it utilises.⁹

Currently, just over 20 seaport terminals in the world are able to handle receiving vessels over 19,000 TEU¹⁰ and over half of these ports are in Asia.¹¹ Of the ports in Asia, only a few are located in the IOR—Singapore Port, Tanjung Pelepas in Malaysia, Jebel Ali in Dubai, and Hambantota in Sri Lanka—and the majority are located in China and South Korea.¹² India, the largest country in the Indian Ocean, currently has no deep-water terminal that can berth ULCVs larger than 18,000 TEU.

The predicted introduction of a hundred 24,000 TEU vessels by 2020 calls for the most vulnerable countries to formulate policies that take into account the pressures and costs on the public sector. This paper examines India's potential role in this policy formulation, suggesting

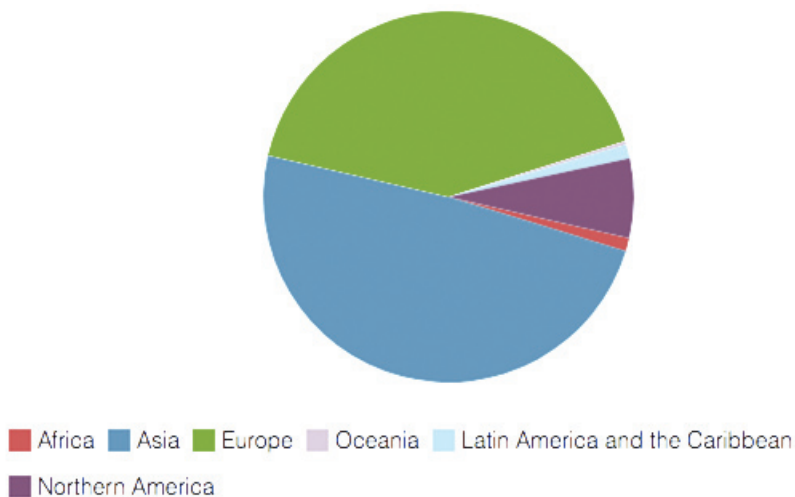
that there are various advantages to seizing this opportunity. The paper also underscores the challenges presented by the introduction of ULCVs in the IOR, and suggests practical measures to initiate greater littoral cooperation.

DISCUSSION: CHALLENGES POSED BY MEGA-SHIPS

1. *Oligopolistic structures can negatively impact shared prosperity and harmony across the region as shipping lines impose their standards on the wider transport chains.*

From a geo-political perspective, maritime infrastructure is an important investment, given that a few ship-owning countries have always dominated markets. Greece, Japan, China, and Germany together control over half of the total world ship capacity (46 percent), followed by Singapore, South Korea, Hong Kong (China), the US, UK, and Norway.¹³

Figure 3: Fleet ownership by region



Source: UNCTAD

The six nations of Greece, Germany, UK, Norway, Japan and the US together are classified as traditional maritime nations (TMNs).¹⁴ Since these countries also register their ships in international destinations, their control of shipping lanes stretches beyond their own borders. “The danger is that the growing market concentration in container shipping may lead to oligopolistic structures.”¹⁵

As per the United Nations Conference on Trade and Development (UNCTAD), the ownership and control location of a ship or a terminal has enormous commercial significance. Ship owning countries exert influence in the form of differing business philosophies and the existence or otherwise of institutional or governmental encouragement. As is evident, the handful of shipping lines have unilaterally dictated the size of ships without having to conform with other actors in the transport chains, “with overwhelming cost advantages, especially on fuel, and cheap finance readily available, the upsizing decision appears to have been a straightforward one for shipping lines.”¹⁶

Even though several Asian and Pacific Rim countries made large investments in seaport infrastructure during the 1980s and 1990s, their landside maritime infrastructure has yet to match the TMNs’ investment in industrial zones and logistical nodes.¹⁷ China (including Hong Kong) is an outlier in this respect. It has made massive land connectivity investments and has the highest number of mega-ports in the world.¹⁸ Chinese consolidation in the IOR through the Belt and Road Initiative (BRI) may be at the cost of negotiating powers for several countries in the region.

Most old seaports and trans-shipment hubs for large vessels in the Indian Ocean were closed down during colonial times to be replaced by new seaports and inland surface transport infrastructure that primarily sought to facilitate connectivity with Europe.¹⁹ Movement of import goods from seaports was restricted to a few distribution hubs and raw material for exports was fetched from a few locations.²⁰ Currently, Singapore is the only country in the IOR able to berth

19,000-plus TEU mega-ships.

While shipping companies are buying feeder vessel operators to pool cargo to fill up their 18,000-plus TEU ships, terminal operators are consolidating themselves by investing across new geographies and providing alternatives to their clients.²¹ The shipping lines and terminal operators may thus may exert undue market power, limit supply, and distort fair competition.

India, Myanmar, Thailand, Malaysia, and Indonesia are in the process of upgrading their infrastructure to accommodate mega-ships without any control or visibility on future ship size. Without a joint policy instrument, they cannot fight oligopolistic structures to bargain for equitable infrastructure investment and shared prosperity across the region. The disintegration of Hanjin Co. Ltd., South Korea's largest container line (one of the world's top ten container carriers in terms of capacity), in 2016 sent global supply chains into a state of unemployment chaos and financial losses.²² Thus, practical cooperation measures are also required to address potential supply chain disruptions that can follow the collapse of large shipping lines.

2. Direct call trade-offs due to change in trade lanes to accommodate mega-ships can make countries lose their distinct competitive advantage and bargaining position.

According to the ITF, direct port calls by ships are considered important because they reduce risks, feeder vessel costs, and turnaround time in comparison to the option of trans-shipment feedingⁱⁱ via other ports.²³ Ports are considered competitive when they are chosen more regularly for direct calls than other ports.²⁴

ii Trans-shipment is the shipment of goods or containers to an intermediate destination, then to another destination. Feeder flow necessitates trans-shipment flow. A feeder ship picks up containers from different ports and transports them to different ports.

Maritime landside infrastructure limitations dictate direct call options. A terminal's integration with the wider set of requirements in the supply chain decides the choice of routes.²⁵ Even if a terminal is large enough to handle the berthing of a mega-ship, it needs several large cranes, better yard management capability, increased automation, larger storage facilities, more inland connectivity, and enhanced labour productivity. Mega vessels seek speedy unloading of the large volumes they carry.²⁶ Most countries in the Indian Ocean have to deal with reduced direct port calls due to their inability to serve mega-ship port calls.²⁷ With the size of ships predicted to grow beyond 21,000 TEU after 2020, more countries could be increasingly cut off from direct calls unless they undertake extensive modernisation.

India's largest port, the Adani CMA Mundra Terminal Private Limited on its west coast, can currently accommodate ships only up to 18,000 TEU. The majority of India's container traffic is therefore shipped through ports outside the country, mainly from Colombo and Singapore. India is developing six deep-water sea mega-ports for receiving mega-ships under its ambitious Sagarmala Project, though the project is still in its nascent stages.²⁸ Unless India invests in maritime infrastructure, it will be unable to attract direct port calls to its shores, and will be vulnerable to geopolitical risks emerging from the Chinese investments in Colombo's Hambantota mega-port and Pakistan's Gwadar mega-port.²⁹

Cities unable to manage land acquisition for mega-port complexes are in danger of becoming completely cut out of direct calls. Long-term market projections suggest that by mid-century, international trade could require container ships of up to 50,000 TEU capacity which are likely to sail exclusively between trans-shipment terminals and mega-port complexes.³⁰ Mega-ship port calls could therefore mark the beginning of the end for the link between cities and ports.³¹

China is investing in several mega-ports and inland infrastructure in the IOR through its BRI—consisting of a trans-continental passage

Silk Road Economic Belt linking China with Southeast Asia, South Asia, Central Asia, Russia, and Europe by land – and a 21st century Maritime Silk Road (MSR), connecting China’s coastal regions with south east and south Asia, the South Pacific, the Middle East and Eastern Africa, all the way to Europe.³² Overall, MSR can be envisaged as an economic corridor with unprecedented scale and depth. Sea routes through the Indian Ocean are very important to China’s maritime trade and energy supply. MSR represents a direct economic threat to India—in terms of trade competitiveness—but also to other countries in the region, as China could dictate the direct calls at ports to eliminate rivals.

3. *Infrastructure upsizing costs higher in comparison to the overall economic benefits.*

Unplanned dredging of ports and building of larger quays as a reactionary measure to accommodate mega-ships can be environmentally and socio-economically unsustainable. The ITF has drawn a relation between total ship volume (Gross Tonnage) calling at port and crane productivity per hour to show that the highest productivity is for ships with lower volumes.³³

“Industry intelligence shows that a yard occupancy ratio of around 70% will allow terminals to work at maximum efficiency, while working consistently above this threshold will reduce efficiency. Similarly, the optimum level of berth occupancy for a container terminal is estimated at around 65%; beyond this point ship queuing tends to increase significantly and service quality to drop. Dedicated terminals with tightly scheduled ship arrivals can achieve higher berth occupancy levels without congestion, whereas common-user terminals with a more mixed ship arrivals pattern reach their congestion point at a lower berth occupancy level.”³⁴

Mega-ships suffer from the lowest crane productivity because cranes require special manoeuvring to reach their width. Wharves need to be stronger to support the massive cranes.³⁵ The updating of port infrastructure requires extensive planning cycles, technology

investments, and environmental impact studies that can stretch into several years. However, because containerisation has made ports more exchangeable, “the ports are continuously adapting their facilities in a pre-emptive obedience due to the fierce competition amongst them”.³⁶ Best practices have to be deployed for the reuse of demolition materials, for the reuse of dredging material, and minimising environmental impact.³⁷

Bellini states that the “operational space of modern companies is global and has a growing asymmetry with the physical jurisdiction that political bodies have”.³⁸ Therefore arguing in favour of ‘denationalization’ without full loss of national reference, she highlights that the “role of states in an era of globalization is less and less about taking ‘whether choices’ (whether to accept integration in the international economy, whether to promote technological innovation etc.), but complex ‘how issues’ about the speed, the paths, the sustainability etc.”³⁹

Fostering coordination for projects under development with national or regional master plans that have a timeline of 10 to 20 years can reduce environment degradation, ecosystem imbalances, public outcry, and unnecessary use of public money on infrastructure.⁴⁰

4. Traditional and non-traditional security threats posed by mega-ports and mega-ships because of the size factor.

The emergence of mega-ships and mega-ports necessitates that governments respond to several traditional and non-traditional maritime security threats and vulnerabilities. Securing maritime supply chains against disruption presents an enormous challenge.

The increased size of ships increases the safety, security and rescue concerns at ports proportionally as mega-ships generate larger and more concentrated flows of containers in docks, stores and the hinterland. Mega-ships also increase the concentration of risk in the transit choke points that can have severe global food and energy

security implications.⁴¹ While more cargo on ships implies less number of ships, the supply chain becomes less resilient due to the large volume of goods on decreasing number of vessels.⁴²

The potential threat to international commerce by naval mines makes mega-ships most vulnerable near geographical bottlenecks, especially on routes that carry large oil and food supply. Destabilising any one choke point could not only lead to massive losses of goods, it may have considerable economic and even life-safety repercussions around the globe. Experts have already identified the growing threat of naval mines in the Strait of Mandeb that ties the Red Sea to the Gulf of Aden.⁴³ The joint naval mine countermeasure and clearing exercise off the coast of Bahrain in 2012—which saw participation from 30 states from six continents⁴⁴—drew attention to the need for greater clarity on the law governing the use of naval mines in times of both peace and war. The 1907 Hague VIII Convention, which is the only treaty that expressly governs naval mines in international law, is expressly limited to contact mines.ⁱⁱⁱ

Since larger container vessels can ply only in limited sea-lanes of communications and dock only in a few mega-ports, they are aggravating the disparity among maritime trade regions and stakeholders. There are inequalities arising in some littorals because of being left out of the direct port calls and the changes in the traditional sea-lanes of communication. These rapid changes in sea-lanes of communication can catalyse conditions for the rise of non-state actors. They can disrupt maritime supply chains and threaten the global economy.

Unplanned port expansion activities impact urban crime and human rights violation patterns. With the exception of India, the bulk of Asia's population of 3.5 billion is coastal or near-coastal. Over 60 percent — 2.1 billion people — live within 400 kilometres of a coast.

iii While international rules applicable to naval mines have expanded significantly over the last century, the laws remain unsettled and ambiguous.

Such population clusters along coasts commonly results in serious conflicts over shared resources including water and land, unplanned urbanisation, and continued pollution of coastal waters.⁴⁵ The current coastal population growth is not being managed equitably, reflecting these concerns.⁴⁶

Port developments may also produce tensions based on historical development and socio-cultural composition. The social composition of most ports has been influenced by centuries of migration. Ports serve as entry and exit points for migration and act as employment hubs; as a result, port demographics change continually over time. This has given them distinct advantages in promoting social interaction, intellectual tolerance, and religious exchanges. At the same time, however, the complex distribution of communities that has developed as a result of successive phases of migration can lead to security threats in locations where human development is compromised. Mega-port development and expansion represents an unprecedented scale of intervention in an otherwise organically constituted settlement. This in turn can lead to the relocation of people, or trigger tribal, cultural, economic, and even religious conflict.⁴⁷ Since the Indian Ocean littoral has always been vulnerable to criminals and anti-national activities⁴⁸—some internal and localised⁴⁹ and others of global significance⁵⁰—state policies need to move towards balancing development of human capital with physical capital to create sustainable solutions.

The expansions required to accommodate mega-ships are problematic for other reasons. They are mostly unplanned—with short-term gains in mind—aggravating existing issues of urban congestion and related crime. Karachi seaport in Pakistan is cited as a prime example of a well-located international trading port asset that grapples with unplanned port expansions, population overflow, complex urban demography, urban poverty, and violent crime.⁵¹ It is a key geopolitical asset in South Asian international trades as the largest warm water deep-seaport in South Asia, and owing to its proximity to the Strait of Hormuz.

Singapore, by contrast, has been able to leverage its human capital to create wider economic benefits for its people by planning its port expansion activities. Successfully planned port development has played a significant role in the country's development and trade competitiveness.^{52, iv}

As the example of Karachi shows (and inversely, Singapore implies), most of developing Asia lacks the political motivation, expertise, or money to introduce comprehensive coastal management plans at individual country level. It is thus important for these countries to select best practices and introduce joint policies for port expansion and development that examine ways of permitting economic growth while ensuring a better quality of life for all coastal dwellers.

The highest rate of urban land conversion (increased urban extension) in the coastal zone, is taking place in China and Southwest Asia.⁵³ Trade flows between the two regions through the Indian Ocean account for almost 30 percent of world trade. The trends of urban land and population expansion rates in these and Southeast Asian coastal zones is expected to continue or even increase into the future if countries are pushed into expanding ports rapidly to accommodate mega-ships.

Since littorals support intricate maritime infrastructure including ports, harbours, oil and gas terminals, and rail/road systems, they can create favourable conditions for illegal activities. Their governance can be a major challenge for civil security agencies if they are socially dysfunctional due to economic or resource disparities. It is therefore important to consider policy frameworks that examine port expansion plans taking into account not only economic development but the planning required to address issues including increasing crime, human rights violations, ethnic conflicts, and the dislocation of people.

iv According to UN data for 2011, Singapore has the second lowest murder rate in the world.

Piracy

The location of piracy has changed in recent years. Data released by the International Chamber of Commerce and the International Maritime Bureau shows that sea piracy is concentrated in Southeast Asia.⁵⁴ Somali pirates accounted for four percent of global activity in 2014 while Indonesia and Bangladesh accounted for approximately 30 percent of the global total attacks on vessels in 2014.⁵⁵ Chittagong port in Bangladesh was rated the world's most dangerous port in relation to piracy.

Since the cargo-carrying capacity of containers has increased by over 70 percent in the past decade, piracy has turned from a marginal economic problem into a global security problem. The capture or destruction of single mega vessel can have significant economic consequences. The effective management of and solution to the problem of piracy requires major States' willingness to act. In the past, countries have come together to patrol sensitive areas to reduce piracy on an ad hoc basis. The actual threat of modern-day piracy may be controllable—as demonstrated by joint patrols to reduce piracy near Somalia—if the governance of piracy moves away from incidental interventions and geopolitical dynamics and countries cooperate to remove current legal and practical obstacles and prepare a comprehensive anti-piracy regime.

Terrorism

The Bay of Bengal and the IOR have been assessed by a number of national intelligence agencies and counter-terrorism experts⁵⁶ as being most vulnerable to maritime terrorism.⁵⁷ Several small islands in the Bay of Bengal act as potential sanctuaries and operational bases for terrorists. Terrorists can use captured oil or gas tanker vessels to cause explosions in busy seaports.⁵⁸ The port cities of Kolkata and Dhaka are both over ten million-population agglomerations.⁵⁹ A single explosion from even a medium-sized vessel can have massive implications; a mega-vessel exploding would bring more catastrophic harm.

Mega-port hubs close to such small island sanctuaries or transnational crime centres can be susceptible to the potential threat of containers being used by terrorists as a delivery vehicle for chemical, biological, radiological, or nuclear weapons. The hub-and-spoke model^v of transport chains adopted by mega-ports increases their vulnerability. This is due to the coordination required in security links across multiple industries, regulatory agencies, modes, operating systems, liability regimes, and legal frameworks to fill a single large vessel.

Most ports use existing security frameworks to protect containers from terrorist activity. However, most international and bilateral security initiatives—as codified in the Safety of Life at Sea Convention⁶⁰ and the International Ship and Port Facility Security Code⁶¹—have been focused on the larger actors and the middle of the chain ports and maritime transport. There is a lack of international frameworks for security checks at inland transport or the outer edges of the chain.

Since the hub-and-spoke model adopted by mega-ships is characterised by complex simultaneous movement of containers on the outer edge of a port over feeder channels and inner edges in the form of large swathes of trucks and rails, the security threat increases. Vulnerabilities in the container environment are highest in rail yards, road stops, and parking and shipping/loading terminal facilities.

The hub-and-spoke model increases the necessity to speed up operations while tightening margins, aggravating the security risk. The loading or unloading of very large vessels becomes more complicated. Amidst the chaos that ensues, terrorists targeting the container transport chain can intercept a legitimate consignment by hijacking it or may develop a legitimate trading identity to use Trojan horses for

v The Hub and Spoke (H&S) model is used when there are multiple locations sourcing, with a *central* location called the 'Hub.' The location provides a single point of contact to the client, whilst the in-country extensions, called 'Spokes', are spread across the globe.

dangerous consignments. Measures to mitigate such threats involve container scanning and container screening. Experts point out that while 100 percent container screening is possible, it is not practical with current technologies.⁶² Security inspections are time- and space-consuming, and expensive. Since the mega-ship and mega-port models primarily aim to reduce costs, few ports may invest in enough space and resources to adequately conduct these activities unless an international governance mechanism makes it mandatory.

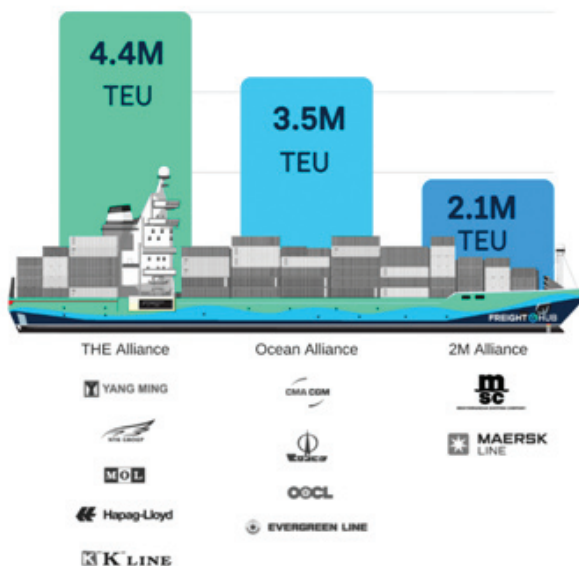
There is a potential risk of non-state actors abusing loopholes in cyber security to target vessels and specific ports. Hackers can infiltrate cyber systems in a port to locate specific containers loaded with illegal drugs or completely shut port activities for some hours or days. No state is equipped to unilaterally handle the rising challenges in the digital security or physical security domain. Further, lack of unanimity in understanding the magnitude of the threat distorts physical security priorities of ships and ports. Navy-to-navy cooperation among nations also has to go beyond periodical exercises for effective control of regional terrorism and transnational activists.

In the case of mega-ports and mega-ships, emphasis should be placed on terrorism or cyber-attacks not because governments have a clear and informed view of the threats, or their vulnerabilities, but rather because the rapid evolution in size of ships and unplanned port expansions preclude a clear view of any potential threat.

5. The edging out of smaller vessels from Asia-Europe trade route

Container ships of 14,000-22,000 TEU are nudging out 10,000-13,000 TEU vessels from the Far East-North West Europe trade route due to overcapacity-led pricing disruption in freight rates.⁶³ Mega vessels have caused related displacements: since mega-ships are largely locked into the Asia-Europe trade route, smaller ships are being displaced into Trans-Pacific service while former Trans-Pacific carriers are being moved to the Trans-Atlantic route.⁶⁴ The cascade is leading to a potentially

destructive phase in the maritime sector.⁶⁵ While smaller vessels are becoming unprofitable, mega-ships are introducing costs like feeder vessel legs and operational delay led losses that are diminishing savings.⁶⁶ This is impacting the container shipping industry's profitability. Countries in the IOR need to put together a cross-port alignment framework to deal with a potentially more destructive phase of bigger ships.



Further, shipping alliances are choosing to dictate trade routes and choice of vessels.⁶⁷ The Federal Maritime Commission⁶⁸ has approved of three major alliances that represent 77.2 percent of global container capacity and 96 percent of all East-West trade:⁶⁹

- The Transport High Efficiency Alliance: K-Line, Hapag-Lloyd, NYK, MOL and Yang Ming
- The Ocean Alliance: CGM, CMA, Evergreen, Cosco Shipping and Orient Overseas Container Line
- The 2M Alliance: Maersk and Mediterranean Shipping Co.⁷⁰

The volumes controlled by these alliances give them serious negotiating powers over ports and the ability to pressure them for more favourable conditions and improved services.⁷¹ The alliances will take delivery of several mega-ships by 2021 - most of which are expected to ply only a few Indian Ocean hubs.⁷² Secondary lanes are developing for medium and smaller ships in the Indian subcontinent, the intra-Asian

region, and the Oceania region to support a complex mechanism of feeder ships and land transport legs. This is leading to challenges in coordination and infrastructure planning.

The mega-ships alliances do not take cargo from vessels that are not a part of their alliance.⁷³ Earlier, shipping lines arrived at separate terminals with goods loaded in a particular order for sequential distribution across various locations. However, these alliances impose unintended costs on shippers, port operators, freight forwarders, logistics firms, and insurers, as they have to sort containers at the ports by different liners and deal with delays in aligning efficiently with trucks.

Countries and companies can neither veer from scaling up nor risk being less competitive by running half loaded mega-ships. So almost all countries are creating redundancies without reaping the real benefits.

The ITF/OECD Megaship Project report recommends that countries study the impact of mega-ships on emerging mega-ship routes to “develop a focused national ports policy with a clear articulation of which ports are considered to fulfil which roles; develop at least one container port that can as act as a strategic gateway for trade and freight for the whole country”.⁷⁴

6. Environmental Challenges: Real efficiencies vs. deficiencies of mega-ships

Mega-ships are environmentally cleaner and more fuel-efficient for cargo owners and shipping lines. However, the endeavour to create fuel and time efficiency at sea is being offset by inefficiencies at ports, where both resources and time are wasted in dealing with the loading or unloading of these large vessels.⁷⁵ Containers choke the terminal’s yard for two to three days till they are sorted and taken by the truckers. Clearance of large amounts of waste left by mega-ships creates delays and financial losses due to shortage of labour and time.⁷⁶ The feast-and-

famine cycle of mega-ships landing on ports cause congestion even in the surrounding roads and waterways. “The problem for global supply chains is that the big ships don’t exist in a void. They must link up with ports, intermodal yards, trucks, railroads, highways and distribution centres – all of which are in danger of being paralyzed by the huge wave of containers that are offloaded from a single vessel.”⁷⁷ A deficiency in one location can impact another location in form of a series of delayed or cancelled transactions leading to loss of business.⁷⁸

Modern ships require exhaust gas boiler cleaning activities at the seaports every two or three months. New vessel engine designs have increased thermal efficiency and slow steaming practices.⁷⁹ However, they have to deal with the problem of unburnt wet soot, which reduces the efficiency of the boiler, and also increase the chances of fire. The larger the ship, the longer such cleaning activities require. Providing such a facility becomes either a competitive edge, or a loss for seaports depending on their ability to manage the fresh water for rinsing and acidic wastewater during the treatment.⁸⁰ Such an activity also causes queuing and invariably, smaller ships have to wait the period out.

‘Time barriers to trade’ are often a trigger for eco-innovations when a loss has materialised. Having a view into such barriers can also be a trigger for proactive research and invention. Currently, most of the older seaports are retrofitting environmentally friendly technologies and services into their systems to remain compliant with regulations or to solve some visible efficiency challenges. They are however struggling to cope with the unpredictable parts of the challenge in the wake of the ever-growing ship size.

The IMO states that although accidental pollution can be spectacular, operational pollution can be a bigger threat.⁸¹ “The IMO set up four ‘emission-control areas’—the Baltic Sea, the North Sea, the US Caribbean and the coastal waters of Canada and the United States—where ships are required to minimize emissions mainly of SO_x and NO_x. These regions exclude the world’s ten largest container ports, such as the

Chinese ports of Shanghai, Shenzhen, Hong Kong and the South Korean port of Busan or the Singapore port, which are all in Asia.”⁸² Since the IOR is not part of the IMO ‘emission-control areas’, institutionalising waste management and green practices in the IOR is left to individual vessels and terminals, making them highly susceptible to exploitation.

A clear policy framework can allow Indian Ocean nations to demand a predictable model for growth in ship size in the region within specific timelines to help ports facilitate economic convergence without decreasing members’ individual competitive edge. If ship sizes continue to grow in a wilful manner, ports will never be able to optimise efficiency.

7. *Insurability*

Maritime experts and insurance companies like Lloyds and Allianz Global Corporate and Specialty have identified the increased concentration of risk caused by mega-ships as being limited to a small number of deep-water ports. Such complex vessels require human skilling expertise. The concern is the lack of infrastructure and skilled labour to deal with the unloading of ships during disasters like fires, water ingress, and storms or even from an unprecedented case of the two forms of breakage are referred to as ‘sagging’ (V shaped break) and ‘hogging’ (inverted V shaped break) of the ship from the middle on the back of very large waves during large hurricanes and storms⁸³ The potential loss is predicted to be upwards of \$1 billion for each mega-ship. Cyber-attacks, piracy, or terrorism threats that target major hubs could lead to significant business interruption costs, reputational losses, loss of confidential data, liability, or even closure of terminals. While smaller ships can have berthing or passage alternates, mega-ships are limited by their size and depth requirements in case of a mega-port lockdown crisis. The damage from a bigger vessel is proportional, if not higher. The maximum exposure is not necessarily limited by the value of a vessel and carried cargo but also environmental, social, or business interruption costs.⁸⁴

The Strait of Malacca, connecting the Pacific and Indian Ocean, is one of the world's narrowest straits, prone to accidents occurring near Singapore. The area also suffers from poor visibility due to haze from forest fires. Indonesia, Malaysia, and Singapore, the countries surrounding the Strait, are already working on joint steps to reduce potential accidents.⁸⁵ IOR nations have an opportunity to limit the size of ship that can pass through. "The first 23,000 TEU plus vessels are expected to ply on the Far East-Europe route 2020, and vessels of 30,000 TEU could be expected from 2025 onwards. As this size would correspond with approximately 20 m draught, it should be the ultimate limit for the time being due to the depth of the Malacca Strait".⁸⁶

CONCLUSION

Mega-ships in the Far East-Europe trade route bring times of high and low activity to ports. They have begun forcing new levels of flexibility on the entire maritime infrastructure value chain. IOR countries have to collectively examine the levels at which the effects of lower slot costs lessen while ships get larger. They also have to collectively evaluate if there is a real requirement for further increases in ship size to significantly reduce transport costs without damaging the environment, or affecting biodiversity and human development. Is the pre-emptive obedience due to fierce competition actually bringing further sustainable benefits for the ports, for the liners, or even for countries? Or are public resources just being spent to allow those container lines that can afford to invest in such mega-ships to have a theoretical cost advantage over their competitor? Is there a way to rationalise the growth in size and limit it such that the public sector does not bear a major portion of the costs of such competition?

It is also unclear whether a balance exists between state control and markets to remove conflicts and mutually reinforce the ultimate desired outcomes of human development, economic development, and environment protection. If ship sizes continue to grow in this manner, ports will never be able to optimise efficiency.


India has a lot to lose when it comes to mega-ships due to its lack of mega-port facilities, which keeps it out of the running for direct mega-ship calls. However, short-term solutions for accommodating mega-ships can be a burden on port infrastructure and on public spending. Authorities need to consider the costs of accommodating mega-ships versus the overall economic benefits which includes port income, savings to local shippers, importers, exporters, environmental detriment at ports, and whether the savings that come with mega-ships are sufficient to pay for these costs.⁸⁷

With the increased risks surrounding bigger ships, a regional platform for discussion on policy options on the regulation of competition can include whether or how to regulate ship size. To be able to handle mega-ships, countries, port authorities, and regulators should increasingly consolidate and cooperate at a strategic planning level, as the container shipping lines have.⁸⁸ IOR countries should pave the way for a closer cooperation among governments, shipping line owners, maritime infrastructure investors, terminal operators, and all other stakeholders to limit unnecessary and unproductive activities. They should jointly evaluate the necessary changes required to reduce port inefficiencies but also agree on a joint policy with regard to dealing with the inflow of mega-ships.

Developing a regional policy framework can allow Indian Ocean nations to demand a predictable model for growth in ship size in the region, within specific timelines, to help ports facilitate economic convergence without decreasing members' individual competitive edge. Dialogue between stakeholders—governmental and private—can help synergise fragmented port systems in the region to increase bargaining power. This will help strengthen the collective bargaining position of the landside supply chain.⁸⁹ As a regional power, India should coordinate cross-port alignment and coordination on policy to ensure proper allocation of resources while protecting the interest of the supply chain users. The platform can provide for dialogue to enable better port planning, landside infrastructure and hinterland transport

coordination in sustainable fashion.

Since the biggest vessels have always been introduced in the Far East-North Europe route, such limit from either the Indian Ocean side or the European side would have a productive global impact. The European end of this route has an established platform for deliberation and discussion to ensure sustainability in the region. It is important for a regional framework in the Indian Ocean Region to ensure the sustainable development of the countries in the region.

While shipping and container lines have not consulted anyone on bringing in mega-ships, a constructive discussion with relevant transport stakeholders is essential to facilitate an exchange of views to understand objectives and plans. This will ultimately lead to better coordination to ensure optimum supply chain configurations and optimised use of mega-ships. In the absence of any global regulation on the size of container vessels, India should take a lead in bringing together IOR littorals to develop collective foresight. The start could be a forum for joint evaluation of the required infrastructure adaptations to make policy recommendations that help share existing resources, optimise new investments, and increase port efficiencies while reducing costs to the public sector of individual countries. 

ENDNOTES

1. Olaf Merk, Bénédicte Busquet and Raimonds Aronietis, “The impact of Megaships”, *International Transport Forum, OECD* (Spring 2015) https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf
2. Ibid
3. Olaf Merk, Bénédicte Busquet and Raimonds Aronietis, “The Impact of Mega-Ships: The Case of Gothenburg”, *International Transport Forum, OECD* (Spring 2017), <https://www.itf-oecd.org/sites/default/files/impact-mega-ships-göthenburg.pdf>
4. Ibid
5. Ibid
6. Knowler, Greg, “Asia-Europe ocean capacity and demand diverge” JOC.com, Oct 26, 2018, <http://www.tpm-asia.com/comment/13561>
7. Olaf Merk, Bénédicte Busquet and Raimonds Aronietis, “The Impact of Mega-Ships: The Case of Gothenburg”, *International Transport Forum, OECD* (Spring 2017), <https://www.itf-oecd.org/sites/default/files/impact-mega-ships-göthenburg.pdf>
8. Ibid
9. Olaf Merk, “The New Era of Mega-Ports”, *The Journal on Ports and Terminals*, Edition 72, October 1, 2015, https://www.porttechnology.org/technical_papers/the_new_era_of_mega_ports
10. “How Megaships Are Changing The Shipping Industry And Reshaping Ports”, iContainers, <https://www.icontainers.com/us/2016/08/25/how-megaships-are-changing-the-shipping-industry-and-reshaping-ports/>
11. Ibid
12. Ibid

13. Jan Hoffmann, et al, “Review of Maritime Transport 2017”, UNCTAD, *United Nations Publication*, UNCTAD/RMT/2017, ISBN 978-92-1-112922-9, https://unctad.org/en/PublicationChapters/rmt2017ch2_en.pdf
14. Iheduru, Okechuwu C., *The Political Economy of International Shipping in Developing Countries*, Univ of Delaware Press, 1996, [https://books.google.co.in/books?id=qxDejU2pdVgC&pg=PA22&lpg=PA22&dq=traditional+maritime+nations+\(TMNs\).&source=bl&ots=1IdKhL4Dht&sig=ACfU3U2mYYPinGO5Z5GJTsn4YCVyf75Fag&hl=en&sa=X&ved=2ahUKEwjL297cqLbjAhVo4nMBHaY0A8kQ6AEwCXoECAUQAQ#v=onepage&q=traditional%20maritime%20nations%20\(TMNs\).&f=false](https://books.google.co.in/books?id=qxDejU2pdVgC&pg=PA22&lpg=PA22&dq=traditional+maritime+nations+(TMNs).&source=bl&ots=1IdKhL4Dht&sig=ACfU3U2mYYPinGO5Z5GJTsn4YCVyf75Fag&hl=en&sa=X&ved=2ahUKEwjL297cqLbjAhVo4nMBHaY0A8kQ6AEwCXoECAUQAQ#v=onepage&q=traditional%20maritime%20nations%20(TMNs).&f=false)
15. Hoffmann, Jan, et al, “Review of Maritime Transport 2017”, UNCTAD, *United Nations Publication*, UNCTAD/RMT/2017, ISBN 978-92-1-112922-9, https://unctad.org/en/PublicationChapters/rmt2017ch2_en.pdf
16. Kemp. John, “COLUMN-Megaships are worsening overcapacity in the container market: Kemp”, Reuters, Sept 22, 2015, <https://www.reuters.com/article/shipping-megaships-kemp-idUSL5N11S2JW20150922?feedType=RSS&feedName=industrialsSector>
17. Jean-Paul Rodrigue, Claude Comtois and Brian Slack, *The Geography of Transport Systems*, New York, Routledge, Edition 3, 2013, https://transportgeography.org/wp-content/uploads/GTS_Third_Edition.pdf
18. “Top 50 Container Ports”, World Shipping Council, <http://www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports>
19. “The Shifting Geography of Global Value Chains: Implications for Developing Countries and Trade Policy”, World Economic Forum, http://www3.weforum.org/docs/WEF_GAC_GlobalTradeSystem_Report_2012.pdf
20. Ibid

21. Jan Hoffmann, et al, “Review of Maritime Transport 2017”, UNCTAD, *United Nations Publication*, UNCTAD/RMT/2017, ISBN 978-92-1-112922-9, https://unctad.org/en/PublicationChapters/rmt2017ch2_en.pdf
22. “New shipping alliances: What you need to know”, iContainers, <https://www.icontainers.com/us/2017/03/21/new-shipping-alliances-what-you-need-to-know/>
23. Olaf Merk, Bénédicte Busquet and Raimonds Aronietis, “The Impact of Mega-Ships: The Case of Gothenburg”, *International Transport Forum, OECD* (Spring 2017), <https://www.itf-oecd.org/sites/default/files/impact-mega-ships-göthenburg.pdf>
24. Ibid
25. Ibid
26. Ibid
27. Ibid
28. Acharyya, Kangkan, “India to get six new mega ports under Ministry of Shipping’s Sagarmala project”, Firstpost, Nov 1, 2016, <http://www.firstpost.com/india/india-to-get-six-new-mega-ports-under-ministry-of-shippings-sagarmala-project-3082626.html>
29. Pauley, Logan, Shad, Hamza, “Gwadar: Emerging Port City or Chinese Colony?”, *The Diplomat*, October 5, 2018, <https://thediplomat.com/2018/10/gwadar-emerging-port-city-or-chinese-colony/>
30. Valentine, Harry, “New Sailing Routes for Future Container Mega-Ships”, *The Maritime Executive*, Nov 13, 2017, <https://www.maritime-executive.com/editorials/new-sailing-routes-for-future-container-mega-ships>
31. Ibid
32. “Belt and Road Initiative (BRI)”, *European Bank*, <https://www.ebrd.com/what-we-do/belt-and-road/overview.html>
33. Olaf Merk, Bénédicte Busquet and Raimonds Aronietis, “The impact

of Megaships”, *International Transport Forum, OECD* (Spring 2015) https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf

34. Olaf Merk, et al, “The Competitiveness of Global Port-Cities: Synthesis Report”, *OECD*, Feb 13, 2013, <https://www.oecd.org/cfe/regional-policy/Competitiveness-of-Global-Port-Cities-Synthesis-Report.pdf>
35. Mongelluzzo, Bill, “Mega-ships dealing worst congestion hand to LA-LB, NY-NJ”, Jul 1, 2015, https://www.joc.com/port-news/us-ports/port-new-york-and-new-jersey/mega-ships-dealing-worst-congestion-hand-la-lb-ny-nj_20150701.html
36. Malchow, Ulrich, “Growth in containership sizes to be stopped?”, *Maritime Business Review*, 2017, Vol. 2 Issue: 3, pp.199-210, <https://doi.org/10.1108/MABR-01-2017-0001>
37. Ibid
38. Bellini, Nicola, “Market-Driven Management: the Policy Implications” *Symphonya. Emerging Issues in Management*, (2008), doi: 10.4468/2008.1.04bellini
39. Ibid
40. Ibid
41. Merk, Olaf, et al, “The impact of Megaships”, *International Transport Forum, OECD*, 20 April 2015 https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf
42. Ibid
43. Coffey, Luke, “Bab el-Mandeb: The U.S. Ignores the Most Dangerous Strait in the World at Its Peril”, *The National Interest*, 28 June 2018, <https://nationalinterest.org/feature/bab-el-mandeb-us-ignores-most-dangerous-strait-world-its-peril-24577>
44. “International Law Applicable to Naval Mines” *International Security Department Workshop Summary*, Chatham House, Oct 2014, https://www.chathamhouse.org/sites/files/chathamhouse/field/field_document/20140226NavalMines.pdf

45. Don Hinrichsen, *Coastal Waters of the World: Trends, Threats, and Strategies*, Island Press, Washington, DC, CA, 1998, https://www.researchgate.net/publication/45258004_Coastal_Waters_of_the_World_Trends_Threats_and_Strategies
46. Ibid
47. Ibid
48. Ibid
49. Ibid
50. Ibid
51. “The Rise of Karachi as a Mega-City: Issues and Challenges”, Briefing paper, Mahbub ul Haq Centre, Sept 2014, http://mhhdc.org/wp-content/themes/mhdc/data/publications/The_Rise_of_Karachi_as_a_Mega_City.pdf; pg 1
52. Lim, Hank, “Country Report: Singapore”, ASEAN@50 Volume 3, http://www.eria.org/3.11.ASEAN_50_Vol_3_Country_Reports_Singapore.pdf
53. Barbara Neumann, et al, “Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment”, *PLOS ONE* 10(6): e0131375, <https://doi.org/10.1371/journal.pone.0131375>
54. “Piracy and Armed Robbery Against Ships: Report”, ICC International Maritime Bureau, April 2019, https://www.icc-ccs.org/reports/2019Q1_IMB_PiracyReport.pdf
55. Patterson, Tom, “Maritime Risks Rise Even As Somali Piracy Recedes”, *Forbes*, Feb 10, 2015, <https://www.forbes.com/sites/riskmap/2015/02/10/maritime-risks-rise-even-as-somali-piracy-recedes/#3f2a79e463cd>
56. Raman, B, “Still at Sea” Outlook, 4 Sept 2007, <https://www.outlookindia.com/website/story/still-at-sea/235482>
57. Raman, B, “Future threat: Terror from the sea”, *Rediff*, 6 Sept, 2007,

<http://www.rediff.com/news/2007/sep/06raman.htm>

58. Ibid
59. Dan Hoornweg and Kayla Pope, “Population predictions for the worlds largest cities in the 21st century”, *Environment and Urbanization*, (2016), doi 10.1177/0956247816663557, https://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch6s6-2-2.html
60. International Maritime Organisation, Maritime Security, http://www.imo.org/en/OurWork/Security/Guide_to_Maritime_Security/Pages/Default.aspx
61. Ibid
62. “Supply Chain Security Guide”, The International Bank for Reconstruction and Development / The World Bank, Washington, 2009, http://siteresources.worldbank.org/INTTRANSPORT/Resources/336291-1239112757744/5997693-1252703593834/6433604-1256564181444/guide_full_version.pdf
63. Merk, Olaf, et al, “The impact of Megaships”, International Transport Forum, OECD, 20 April 2015 https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf
64. Kemp, John, “Megaships Economics Nearing Its Limit”, Reuters, 22 Sept 2015, <https://www.maritime-executive.com/editorials/megaships-economics-nearing-its-limit#gs.nG1JKD8>
65. Jan Hoffmann, et al, “Review of Maritime Transport 2017”, UNCTAD, *United Nations Publication*, UNCTAD/RMT/2017, ISBN 978-92-1-112922-9, https://unctad.org/en/PublicationChapters/rmt2017ch2_en.pdf
66. Olaf Merk, Bénédicte Busquet and Raimonds Aronietis, “The impact of Megaships”, *International Transport Forum, OECD* (Spring 2015) https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf
67. “Shipping Alliances: What Do They Do and What Does it Mean?”, Freight Hub, Mar 9, 2017, <https://freighthub.com/en/blog/shipping->

alliances-mean/

68. Ibid
69. Ibid
70. Ibid
71. Ibid
72. Knowler, Greg, “Mega-ships drive capacity upgrades across three alliances”, JOC.com, Sept 15, 2017, https://www.joc.com/maritime-news/container-lines/mega-ships-drive-capacity-upgrades-across-three-alliances_20170905.html
73. Kirkham, Chris, Khouri, Andrew, “L.A., Long Beach ports losing to rivals amid struggle with giant ships” Los Angeles Times, 2 June 2015, <http://www.latimes.com/business/la-fi-big-ships-ports-20150602-story.html>
74. Merk, Olaf, et al, “The impact of Megaships”, International Transport Forum, OECD, 20 April 2015 https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf
75. Ibid
76. Ibid
77. Bowman, Robert J., “Container Shipping Today: Mega-Ships and Mega-Problems”, Scarbrough, 17 Mar 2015, <https://www.scarbrough-intl.com/container-shipping-today-mega-ships-and-mega-problems/>
78. Ibid
79. Merk, Olaf, et al, “The impact of Megaships”, International Transport Forum, OECD, 20 April 2015 https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf
80. Ibid
81. “MARPOL - 25 years” International Maritime Organisation, Oct 1998, [http://www.imo.org/en/KnowledgeCentre/ReferencesAndArchives/FocusOnIMO\(Archives\)/Documents/Focus%20on%20IMO%20](http://www.imo.org/en/KnowledgeCentre/ReferencesAndArchives/FocusOnIMO(Archives)/Documents/Focus%20on%20IMO%20)

-%20MARPOL%20-%2025%20years%20(October%201998).pdf

82. Zheng Wan, Mo Zhu, Shun Chen and Daniel Sperling, “Pollution: Three steps to a green shipping industry”, *Nature, International Journal of Science*, (2016): 275 277, doi:10.1038/530275a, <https://www.nature.com/news/pollution-three-steps-to-a-green-shipping-industry-1.19369>
83. Cassidy, William B., “Mega-ships bring mega-risks, former ship captains tell TPM”, JOC.com, 2 Mar 2016, https://www.joc.com/maritime-news/container-lines/mega-ships-bring-mega-risks-former-ship-captains-tell-tpm_20160302.html
84. “Shipping losses lowest for 10 years, but mega-ships and cyber-attacks pose new threats for maritime sector”, Press Release, Allianz, 24 Mar 2015, <https://www.agcs.allianz.com/news-and-insights/news/safety-shipping-review-2015.html>
85. Calamur, Krishnadev, “High Traffic, High Risk in the Strait of Malacca”, *The Atlantic*, 21 Aug 2017, <https://www.theatlantic.com/international/archive/2017/08/strait-of-malacca-uss-john-mccain/537471/>
86. Ibid
87. Merk, Olaf, et al, “The impact of Megaships”, International Transport Forum, OECD, 20 April 2015 https://www.itf-oecd.org/sites/default/files/docs/15cspa_mega-ships.pdf
88. Ibid
89. Ibid

Observer Research Foundation (ORF) is a public policy think-tank that aims to influence formulation of policies for building a strong and prosperous India. ORF pursues these goals by providing informed and productive inputs, in-depth research, and stimulating discussion. The Foundation is supported in its mission by a cross-section of India's leading public figures, academic and business leaders.



Ideas • Forums • Leadership • Impact

20, Rouse Avenue Institutional Area, New Delhi - 110 002, INDIA
Ph. : +91-11-43520020, 30220020. Fax : +91-11-43520003, 23210773
E-mail: contactus@orfonline.org
Website: www.orfonline.org