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#### Key trends in international transport and implications for development

## Recent developments and trends in international maritime transport affecting trade of developing countries

Note by the UNCTAD secretariat

### *Executive summary*

A number of trends are currently reshaping international maritime transport and trade. By altering costs, prices, logistics structures, supply chains and comparative advantages, these trends are also defining countries' trade competitiveness and level of integration into the global transport and trading networks.

Two overarching trends are arising as particularly important, especially for developing countries. First, developing countries have, over recent years, been increasingly fuelling global economic growth, merchandise trade and demand for maritime transport services. Second, increased specialization in the supply of maritime transport services has gathered traction as developing countries continue to gain greater market share in maritime business.

Reflecting these trends and growing demand and supply as well as the expansion of trade in manufactured goods, parts and components, liner shipping connectivity is characterized by increasing container ship sizes and a reduction in the number of carriers per country. While this pattern could benefit shippers and translate into lower freight costs, it could also squeeze out smaller players and result in an oligopolistic market structure which may drive up costs. Another potentially game-changing trend relates to rising sustainability imperatives and climate change concerns moving to the centre stage of global policy agenda.

These factors have already been shaping transport policies and strategies of the future. For developing countries, implementing sustainable freight transport systems will be crucial to reduce the sector's high dependency on oil, minimize exposure to high transport costs, limit environmental degradation, and leapfrog to a sustainable low-carbon development path. Mainstreaming sustainability criteria into freight transportation planning, design and implementation will also help address persistent challenges posed by freight transport infrastructure deficit and inadequate transport services that often hinder effective integration into global transport and trading networks.

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## Introduction<sup>1</sup>

1. The present report, which draws mainly on the UNCTAD publication *Review of Maritime Transport 2012*, looks at four different but interlinked aspects of the transport of global trade: trends observed in the demand for maritime transport services; the participation of different maritime countries in several specialized industries; recent patterns detected in the offer of liner-shipping services; and issues and recent developments pertaining to the field of shipping sustainability.

2. Over the years, a number of developments have combined to define maritime transport and shape international seaborne trade patterns. Ranging from, among others, containerization and trade liberalization to deregulation, greater private sector involvement in transportation, as well as political and geopolitical transformations, some trends have particularly intensified over the past few years. These include a greater globalization in manufacturing activities, an extension of supply chains, growth in intracompany trade and in intermediate goods as well as an expansion in intraregional flows.

3. The evolution of maritime industries has also followed trends moulded by the emergence of new major players in different sectors, especially in developing countries. Identifying the main factors for a country's comparative or competitive advantage in a given port- or sea shipping-related business may provide for interesting growth opportunities for developing countries.

4. One important component of the competitiveness in trade of a country resides in its capability to connect with trade partners in the world. Such a capability, called connectivity in terms of transport, can be measured through the supply capacity put by regular shipping services at the disposal of given markets. Analysing relevant data on the capacity deployed by shipping services along given routes of world trade makes it possible to measure current capabilities and prospects of a country to trade over the oceans with its partners.

5. Today, the effects of the 2009 disruption in the business cycle continue to be felt, while a growing shift in global economic influence towards developing regions is being observed. Environmental concerns and sustainability imperatives are increasingly gaining momentum, with climate change, in particular, and the related energy nexus arising as potentially game-changing trends.

6. Due to its high dependency on oil for propulsion, and the impact of oil combustion on the environment and climate, freight transport as a whole, including maritime, is under pressure to shift towards greener, low-carbon and more environmentally friendly patterns. However such a shift entails financial implications. A combination of policy and finance instruments will need to be developed to reorient and leverage investment for more sustainable transport patterns.

7. A range of regulatory measures in support of sustainable shipping have either been adopted or are being considered. Two recent developments relating to two international legal instruments with implications for social and environmental sustainability in shipping appear particularly worth highlighting.

8. This document consists of four chapters: an overview of trends in global maritime transport with a focus on relevant developments affecting demand (seaborne trade); a similar consideration of supply (fleet, maritime industries and liner shipping connectivity); a consideration of the nexus between transport, energy, the environment and climate change

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<sup>1</sup> This document draws mainly upon the *Review of Maritime Transport 2012*.

and recent relevant regulatory developments; and finally some concluding remarks are set out in chapter IV.

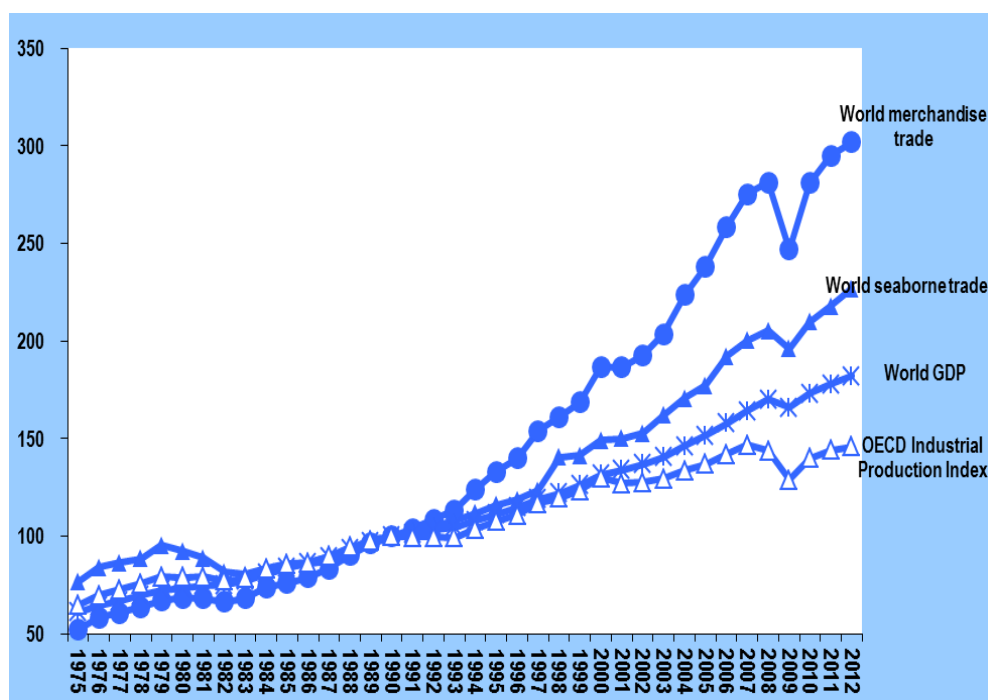
## I. Demand factors and international seaborne trade

9. Maritime transport is an integral part of international logistics and accounts for 80 per cent of the volume of global trade. While the physical continuity of freight movements requires the use of multimodal transport systems, shipping remains the backbone of globalized international trade.

10. As shipping is a derived demand, developments in maritime transport and international seaborne trade are shaped by worldwide macroeconomic conditions. Figure 1 illustrates the close association between the world gross domestic product (GDP), world merchandise trade and seaborne shipments. Reflecting the globalization of production processes, increased trade in intermediate goods and components, and the deepening and extension of global supply chains, global merchandise trade has been growing much faster than GDP.

Figure 1

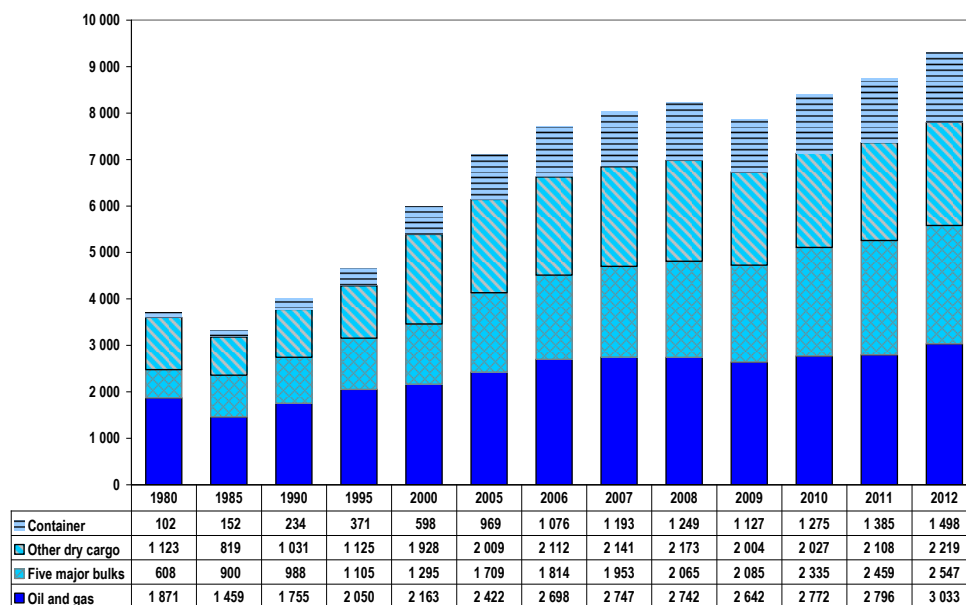
**Organization for Economic Cooperation and Development (OECD) Industrial Production Index and indices for world GDP, merchandise trade and seaborne trade (1975–2012) (1990 = 100)**



11. Over the past four decades, world seaborne shipments grew at an annual average rate of 3 per cent, rising from 2.6 billion tons in 1970 to 8.4 billion tons in 2010. In 2011, volumes increased at an annual rate of 4 per cent to reach 8.7 billion tons (figure 2). Rapid growth in dry cargo volumes (+5.6 per cent over 2010), in particular in containerized trade (8.6 per cent) and the five major bulk commodities (iron ore, coal, grain, bauxite and alumina, and phosphate rock) (5.4 per cent) were driving the expansion. The associated ton-miles – a measure of true demand for shipping services and tonnage which takes into account distance and ship availability – have increased for all cargoes. While seaborne

trade is projected to further grow in 2012 and 2013, these projections remain subject to several downside risks (for example, economic uncertainty, limited trade finance, maritime piracy and geopolitical tensions) that continue to stand in the way of a robust and sustainable recovery in shipping.

Figure 2  
International seaborne trade, selected years



12. Raw materials continue to dominate the structure of seaborne trade. In 2011, tanker cargo accounted for about one third of the total tonnage and “other dry cargo” including containerized represented about 40 per cent. The remaining share (28 per cent) was held by five major dry bulk commodities which are closely linked to a growing population in developing regions and the high infrastructural development needs of these countries. For example, in 2011 China alone accounted for about two thirds of global iron ore import volumes. As for oil trade, volumes have been growing at a slower rate, due, in particular to a reduced crude oil demand in advanced economies. However, liquefied natural gas (LNG) cargo is rapidly expanding due to improved global supply capacity and a growing demand for LNG given its potential as a greener alternative to other fossil fuels.

13. In 2011, global container trade was estimated at 151 million twenty-foot-equivalent units (TEUs), a 7.1 per cent increase over 2010. With globalization, increased trade in intermediate goods, growth in consumption and production levels (especially in developing regions), an expanding “containerizable” cargo base (for example, agricultural cargoes), and the effect of China moving up the value chain in global manufacturing, containerized trade and the underlying supply chains are set to change and grow significantly. Accordingly, the container shipping and port sectors continue to invest in larger container ships as well as in container port terminals across regions. Other developments worth noting as having some direct consequences for containerized trade include: the recent rebalancing of container flows (East–West route, eastbound), breaking away from past trends; the completion of the US\$5.3 billion Panama Canal expansion expected for 2015, which will allow for more all-water transits on the Asia–East Coast United States services.

14. As developing countries contribute increasingly larger shares and growth to both world GDP and merchandise trade, their contribution to world seaborne trade has also been

increasing. In 2011, 60 per cent of the volume of world seaborne trade originated in developing countries and 57 per cent of this trade was delivered in their territories. As a result, developing countries are emerging as major world exporters and importers. This contrasts with previous trading patterns when developing countries mainly served as loading areas for high volume goods (for example, raw materials and natural resources). Currently, Asia is by far the most important loading and unloading area, followed by Europe, continental America, Africa and Oceania.

15. The growing energy needs of developing countries and the expansion of South–South trade are contributing to recharting tanker shipping and trade maps. Combined with new oil discoveries and the emergence of new market suppliers and consumers, these developments are altering the patterns of tanker shipping and are likely to change further as the United States pursues its energy independence and as China looks at various sources of supply. Recent growth in unconventional fossil fuels and the rise in LNG are also driving the change. As the new source map of energy supplies is being drawn up developing countries will have a larger role to play both as energy producers and consumers. China, in particular, will have a significant impact owing to its active strategy to secure its energy supply and its aim to ensure that, by 2015, 50 per cent of its crude imports are shipped on national ship tonnage.

16. In sum, the evolving global economic architecture is already causing a shift in global trade flows, direction and structure and is, by extension, reshaping demand for maritime transport services, although market segments are being affected differently.

## **II. Supply and participation of developing countries in maritime businesses**

17. The shipping industry has also endured strong transformation in past decades. Today many countries, both developed and developing, are specializing in a selection of maritime businesses. A typical ship servicing international trade may actually be built, owned, manned, insured, operated and registered in different countries. While there are few countries that are significant market players in more than one or two sectors, there are today many players that participate in one way or another in maritime businesses.

18. Below is presented a brief overview of the current situation of world markets share in selected sectors of the maritime industry in 2012.

### **Ship building**

19. Almost 39 per cent of gross tonnage delivered in 2011 was built by Chinese ship yards, followed by shipyards from the Republic of Korea (35 per cent), Japan (19 per cent) and the Philippines (1.6 per cent). The rest of the world, mostly Viet Nam, Brazil and India, accounted for only 5.3 per cent of gross tonnage. More than half of dry bulk carriers were built by China, while the Republic of Korea had a 55 per cent share of container and other dry-cargo ships.

### **Ship recycling**

20. India accounted for 33 per cent of gross tonnage demolished in 2011, followed by China (23.9 per cent), Bangladesh (22.4 per cent) and Pakistan (13 per cent). There is also a pattern of specialization in this industry. India had its highest market share in the scrapping

of container and other dry-cargo ships, while scrapyards of Bangladesh and China purchased more tonnage on bulk carriers, and Pakistan mostly demolished tankers.

### **Ship registration**

21. In 2012, for more than 70 per cent of the world's gross tonnage, the nationality of the owner was different from the nationality of the flag State, that is, the ship is "flagged out". The share of the foreign-flagged gross tonnage has grown continuously over the last few decades. As more and more registries compete for business, the traditional distinction between "national" and "open" flags of registration has become increasingly blurred. Today, almost all registries cater for national and foreign owners.

### **Ship ownership**

22. Among the top 35 ship-owning economies in early 2012, 17 were in Asia, 14 in Europe, and 4 in continental America. In January 2012, practically half of the world gross tonnage (49.7 per cent) was owned by shipping companies from just four countries, notably Greece, Japan, Germany and China. The Republic of Korea and Singapore are two other developing countries among today's top 10 ship owners.

### **Liner shipping companies**

23. In early 2012, the 20 leading operators accounted for about 70 per cent of the total container capacity deployed. The three largest companies are based in Europe, while six of the remaining top 10 are based in Asia.

### **Seafarer supply**

24. For most ships today, the nationality of the seafarers is different from the country where the ship is commercially controlled. Today, less than 20 per cent of ratings and less than 30 per cent of officers come from countries in the OECD. Seven out of the ten biggest suppliers of ratings as per the definition of the Baltic and International Maritime Council are developing countries (2010 data). China ranks first with a share of 12.1 per cent, followed by Indonesia. Increasingly, developing countries are also supplying officers. While the largest academies for marine officers have traditionally been in developed countries, the six largest suppliers today are in developing/transition economies. The Philippines leads the ranking, followed by China and India; taken together, these three countries account for one quarter of the world's supply of officers.

### **Other maritime-related sectors and services**

25. Financial, classification, insurance and other services in the maritime sector are still largely provided by companies from the traditional maritime countries. One exception is that of the global port operators, where the largest players are from Asia.

### **Specialization and concentration**

26. Looking at the developments in the different maritime businesses, two key trends may be worth highlighting:



(a) First, the increased specialization in just a few sectors: Maritime transport is produced globally, with goods and services for its delivery purchased in many different countries. It is not that two countries, each one having its own nationally built, manned and flagged ships, would compete with each other, but rather that two shipping companies may use ships built in country X, manned by the nationals of country Y, and flagged in country Z;

(b) Second, the increased participation of many developing countries in different sectors: Shipping businesses are no longer the domain of rich countries, but rather many developing countries have benefited from liberalized markets and found niches where they can participate in parts of the supply chain of maritime transport services provision.

27. What policies were successful in the past and what lessons to draw for the future development of maritime businesses appear to be relevant questions for debate and future research and advisory services by UNCTAD for the benefit of member States.

#### **Determinants of a country's participation in a given maritime business**

The review of past trends points to some potential factors that play a role in enabling countries' participation in maritime businesses. These include:

(a) Clusters: There may be synergies among different sectors. Clusters, including but not limited to maritime industry, could benefit from geographical concentration. Insurance and banking businesses, for example, have clustered in London. Economies of scale have benefited the ship-building business in East Asian countries;

(b) Labour costs and productivity: Some sectors require more qualified (and more expensive) human resources than others. Correlating the GDP per capita of the strongest market players with the market shares in different business clearly suggests that low labour costs are a key determinant for the location of ship recycling in South Asian countries, while a higher GDP per capita is found in the countries that provide services such as insurance or classification;

(c) First mover: Being among the first in a market may help to maintain and strengthen positions. Know-how and economies of scale would make it rather difficult today for a new registry to start from zero and compete with Panama or Liberia and their established networks of offices and contracts with classification societies. Dubai Ports or Hutchison have an established network of port concessions, from which to derive experience and negotiating power when purchasing new cranes or developing new software;

(d) Captive markets: Having a national or regional basis with some comparative advantages may help gain the experience and economies of scale to later expand also into international markets. For example, the Indian Classification Society initially serviced largely the home market, but has also recently become a member of the International Association of Classification Societies Ltd. and aims at expanding abroad. Brazil and Argentina have reportedly been in talks to strengthen collaboration so as to become more competitive in ship building;

(e) Policies: Policymakers need to be realistic about their countries' potential in different sectors: nationally owned, operated, built, manned and flagged fleets may prove difficult in many cases. However, given that the shipping business is likely to continue to outgrow the global production, it is certainly worthwhile to seize opportunities in some maritime businesses. Several of the main players in some maritime sectors have benefited from industrial policies and government support to establish and expand their exports of, for example, ships, port operating services, or seafarers.

### III. Liner Shipping Connectivity

28. Liner shipping services form a global maritime transport network which moves most of the international trade in manufactured goods. The level of “connectivity” to the global liner shipping network varies. The UNCTAD Liner Shipping Connectivity Index (LSCI), published since 2004, aims at capturing a country’s level of access to overseas markets through the liner shipping network.

#### A. The UNCTAD Liner Shipping Connectivity Index

29. The UNCTAD LSCI is generated from five components, each of which is considered to be a possible indicator of a country’s connectivity to the global liner shipping network:

(a) The number of companies that provide services from and to a country’s ports. These companies do not need to be operated or owned by nationals of the same country. In fact, in the large majority of cases, a country’s trade is mostly moved by foreign companies, and all major carriers earn most of their income transporting third countries’ imports and exports. The more carriers compete for a country’s trade, the more choices the country’s importers and exporters have and the lower are likely to be the freight rates;

(b) The size of the largest ship that is deployed to provide services from and to a country’s ports, measured in TEUs. This is an indicator of economies of scale and infrastructure. Ports need to provide adequate equipment, such as ship-to-shore gantry cranes, and to dredge their access channels to allow for large containerships to be deployed;

(c) The number of services that connect a country’s ports to other countries. The more lines that connect a country’s ports, the more likely an importer or exporter will be able to find a suitable transport connection for its foreign trade;

(d) The total number of ships that are deployed on services from/to a country’s ports. While on its own, this information does not necessarily mean a high frequency of services, *ceteris paribus*, a larger number of vessels is likely to imply a better connectivity;

(e) The total container-carrying capacity of the ships that provide services from/to a country ports, measured in TEU. While on its own, this information does not necessarily mean that a country’s importers and exporters can actually make use of this capacity (the ships may in theory be full), a larger total TEU capacity is likely to imply more available space.

30. The data for these five components is obtained annually from Lloyds List Intelligence. The information used to generate the LSCI is based on hard data, and not on perceptions or polls among a sample of experts. In fact, the underlying data of the LSCI is not a sample, but covers the reported deployment of each and every containership at a given point in time. This methodology also allows for comparisons over time, as the “sample” is always complete and does not vary with sample composition.

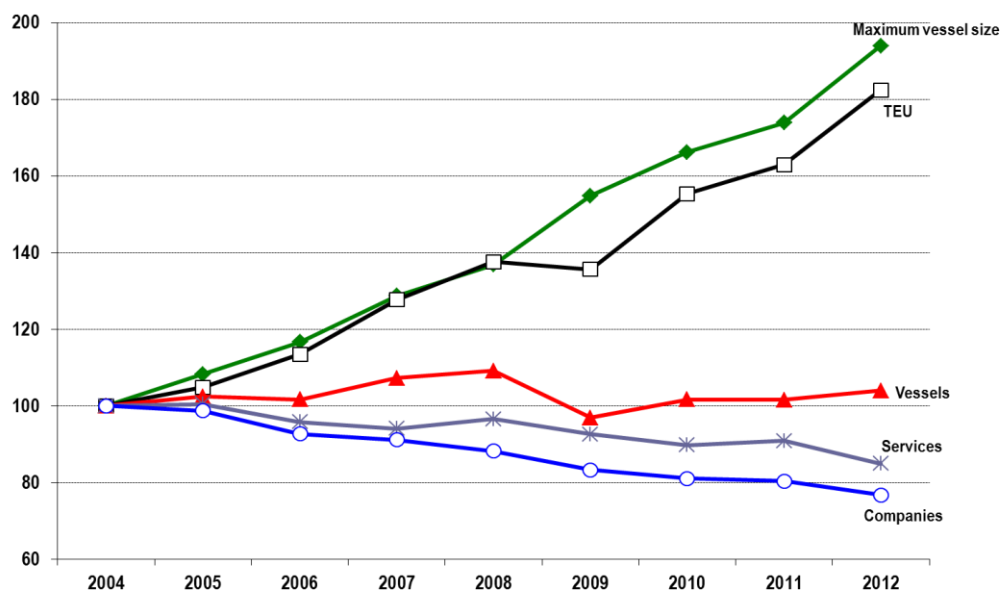
#### Trends in the Liner Shipping Connectivity Index components

31. Figure 3 depicts the development of the five components of the LSCI. On average (that is, the statistical mean of the 159 countries covered by the LSCI), the size of the largest vessel has almost doubled between 2004 and 2011. The chart also illustrates the impact of the economic crisis of 2009, when many ships were idle and not deployed, and equally not included in the LSCI. Another trend that can be observed by analysing the LSCI component is the continued process of concentration. Although there have not been many mergers and acquisitions among carries in recent years, the average number of services

providers (with their own deployed ships) per country has decreased by more than 20 per cent between 2004 and 2012.

Figure 3

**Trends in the five components of the UNCTAD Liner Shipping Connectivity Index (2004 = 100)**



32. Both of the trends of larger ships and smaller number of carriers per country are two sides of the same coin. On the one hand, larger ships allow economies of scale, which (in a functioning free market) would translate into lower freight costs to shippers. On the other hand, the larger ships require larger companies, which often means that smaller players are squeezed out of the market, which in turn may lead to less competition. If the reduced competition leads to an oligopolistic market structure, it is no longer assured that the reduced costs will effectively be passed on to the client in the form of lower prices.

### Liner shipping connectivity and trade competitiveness

33. Several recent empirical studies have found strong correlations between liner shipping connectivity and trade costs, in particular transport costs. A recent research project by the United Nations Economic and Social Commission for Asia and the Pacific included the LSCI in an empirical study on trade costs, and concluded that “about 25 per cent of the changes in non-tariff policy-related trade costs can be explained by the liner shipping connectivity index”.<sup>2</sup> For the estimated trade costs between a number of Asian exporters and importers, the Economic and Social Commission for Asia and the Pacific study found that the exporting country’s LSCI had a higher correlation with the trade costs than the importing country’s LSCI.

<sup>2</sup> Duval Y and C Utoktham (2011). Trade facilitation in Asia and the Pacific: which policies and measures affect trade costs the most? Staff working paper. United Nations Economic and Social Commission for Asia and the Pacific. Bangkok. Available at <http://www.unescap.org/tid/publication/swp111.pdf> (accessed 4 April 2013).

## B. Sustainability in shipping: the energy and environment nexus; policy and financing issues

### Shifting towards sustainable freight transport

34. As environmental sustainability is increasingly recognized as an important consideration for transport, the sector is coming under greater pressure to break away from resource-intensive growth and to shift towards greener, low-carbon and more environmentally friendly patterns. Over recent years, the transport sector, including the maritime sector, is attracting particular attention given its fast growth, which has been keeping pace with growth in the world economy, trade and population. More importantly, greater focus on transport can be explained by the sector's high dependency on oil for propulsion, and the impact of oil combustion on the environment and climate.

35. The transport sector including freight is rapidly evolving, especially in emerging and developing economies. One study has predicted that world freight flows will grow by three to four times above 2010 levels over the next four decades.<sup>3</sup> The sector consumes over 50 per cent of global liquid fossil fuels and is projected to grow over 45 per cent overall from 2008 to 2035. While the sector is estimated to have emitted about 22 per cent of global carbon dioxide (CO<sub>2</sub>) emissions in 2010,<sup>4</sup> these emissions are projected to increase by 57 per cent worldwide over the period 2005–2030.<sup>5</sup> More than 80 per cent of the predicted growth in transport emissions would be in developing countries (with China and India alone accounting for more than 50 per cent of the global increase)<sup>6</sup> and with most of the emissions being generated by land transport.<sup>7</sup>

36. Against this background, a shift to sustainable transport becomes crucial for sustainable growth in the future, as reflected by ongoing efforts by countries, industry and the international community to comply with sustainability imperatives. Sustainability in freight transport entails the ability to provide fuel-efficient, cost-effective, environmentally friendly, low-carbon and climate-resilient transport systems. Recent key regulatory developments include the technical and operational measures adopted under the auspices of the International Maritime Organization (IMO) in July 2011 to increase energy efficiency and reduce greenhouse gas emissions from international shipping. International shipping has been estimated to emit 2.7 per cent of global CO<sub>2</sub> emissions (2007 data). The IMO estimates that in the absence of global control policies and in view of the projected growth in the global seaborne trade, ship carbon emissions can be expected to increase by 200–300 per cent between 2007 and 2050.

37. Several government- and industry-led initiatives have emerged to mainstream sustainability criteria into planning processes, policies, and investment strategies. Some of the salient measures can generally be associated with three main areas for action –

<sup>3</sup> Available at <http://www.internationaltransportforum.org/Pub/pdf/12Outlook.pdf> (accessed 2 April 2013).

<sup>4</sup> According to the International Energy Agency's *CO<sub>2</sub> Emissions from Fuel Combustion*, 2012 edition.

<sup>5</sup> Partnership on Sustainable Low Carbon Transport (2010). Policy options for transport. Prepared for consideration by the United Nations Department of Economic and Social Affairs Commission on Sustainable Development, eighteenth session, 3–14 May, 2010. Available at <http://esci-ksp.org/wp/wp-content/uploads/2012/04/Policy-Options-for-Transport.pdf> (accessed 2 April 2013).

<sup>6</sup> United Nations Environment Programme (2012). *Global Environment Outlook 5. Summary for Asia and the Pacific*. Available at [http://www.unep.org/geo/pdfs/geo5/RS\\_AsiaPacific\\_en.pdf](http://www.unep.org/geo/pdfs/geo5/RS_AsiaPacific_en.pdf) (accessed 2 April 2013).

<sup>7</sup> The travel activity of surface freight transport, including rail, medium-duty and heavy truck, in ton-kilometres worldwide is expected to grow by an average annual rate of 2.3 per cent from 2000 to 2050.

described as the “avoid–shift–improve approach”: avoiding inefficient freight transport and operations such as empty trips; shifting to cleaner modes of transport such as rail and water transport where possible; shifting to clean fuel sources and technologies and to appropriate vehicle sizes, loads and routes; improving infrastructure, logistics, and operations.

38. Specific actions may involve, for example, reshaping transport architecture and networks, optimizing the performance of multimodal logistics chains, balancing transport modes, using clean sources of energy, adapting and developing low-carbon and climate-resilient infrastructure, supporting information and communications, new technologies or engineering-based measures to improve the sector’s energy efficiency, reduce fuel consumption and emissions, and building the capacity of transport systems to cope with projected climate change impacts.

#### **Financing the change**

While it is an imperative, shifting towards sustainable freight transport nevertheless entails financial implications. The following points outline some possible mechanisms that could address financing issues related to this change:

(a) A combination of policy and finance instruments need to be developed to reorient and leverage investment for more sustainable transport patterns. These may take various forms, such as: the phasing out of fuel subsidies, as deemed appropriate; supporting greener freight modes; applying appropriate pricing mechanisms (such as road pricing taking into account actual externalities); supporting investment (through guarantee/funding mechanisms);

(b) A fundamental element is the promotion of a collaborative approach between public and private partners to meet the increased investment requirements and promote the development and operation of sustainable freight transport systems. Governments may therefore explore alternative collaboration models of sustainable public–private partnerships with appropriate risk-sharing frameworks and administrative and institutional arrangements supported by the necessary legal, regulatory and policy provisions;

(c) Climate finance instruments (such as the United Nations Green Climate Fund, the Clean Development Mechanism, or other funds for transport-specific or capacity-building technology) can be used to complement or leverage investment and cooperation into sustainable freight transport in several ways. These include awareness raising and capacity building, supporting national assessment and policy reforms, implementing pilot measures, identifying and implementing pilot projects, making marginal projects financially viable, and leveraging other funding flows.

#### **Climate change impacts and adaptation**

39. Over the past few years, maritime transport has increasingly moved to the centre stage of discussions on climate change and energy sustainability. The drive to improve the sector’s environmental and energy performance, including its carbon footprint, is driven both by regulation (for example, the IMO) and by customers’ demands for greater corporate social responsibility in global supply chains.

40. Like other economic sectors, maritime transport is facing a dual challenge in relation to climate change. The sector needs to cut its greenhouse gas emissions as well as build its resilience in the face of the negative impacts of climate change. While mitigating action is crucial, it is not sufficient to effectively address the projected impacts of climate change on

maritime transport infrastructure and services. Climate-related risks (for example, arising as a result of sea-level rise, extreme weather events<sup>8</sup> and changes in precipitation), vulnerabilities and costs may be considerable, particularly for ports in developing regions, with low adaptive capacity. These can be further amplified by global economic interconnectedness and integration with global supply chains acting as transmission channels. Given the strategic importance of ports for global trade flows, and the strong interdependency of global supply chains, ensuring the climate resilience of ports in both developing and developed countries is critical.

41. Adaptation strategies to enhance the resilience of maritime transport systems may vary (for example, retreat/relocate, protect and/or accommodate). However, given the long service life of port infrastructure, effective adaptation requires rethinking established approaches and practices early, as today's decisions may determine future vulnerability to climate change. Adaptation action entails some financial implications. Existing studies quantifying adaptation expenditure in transport are scarce, provide only imprecise estimates and have many information gaps.<sup>9</sup> However, in general the benefits of adaptation in terms of the effects on frictions to international trade and development are expected to outweigh the costs. Thus, raising awareness and improving the understanding of the climate change-related impacts (types, range, geographical distribution, costs, and the like) on maritime transport, in particular ports, is crucial for the design of adequate adaptation measures and allocation of the requisite financial resources. For developing countries, especially those that are most vulnerable such as small island developing states, adaptation action in maritime transport needs to be considered within the broader development context and mainstreamed into development plans and decisions.

#### **Energy, fuel prices and transport costs**

42. Maritime transport is highly fossil fuel dependent and not yet in a position to fully adopt other fuel types and technologies. Today, rising energy prices and fuel costs continue to pose a great challenge for the sector as they can have a dampening effect on growth as well as cause an upward pressure on fuel costs and ship operating expenditure. With fuel costs in some cases accounting for as much as 60 per cent of ship operating costs,<sup>10</sup> a rise in oil prices may increase the bill for shippers and potentially act as a barrier to trade.

43. While shipping costs vary significantly across countries and commodity types, an empirical study by UNCTAD<sup>11</sup> has shown that an increase in oil prices raises transport costs for all cargo types, including dry and wet bulk commodities and containerized goods. Another study has found that, in the longer term, a change in fuel costs may alter patterns of trade as the competitiveness of producers in different locations may be affected by rising

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<sup>8</sup> Ports are potentially particularly vulnerable to storm surges and other extreme weather events, as recently illustrated by super storm *Sandy* that crippled the New York region, leading to a week-long shutdown of one of the largest container ports in the United States and generating economic damages which was estimated to reach up to \$50 billion. See "Post-landfall loss estimates – Hurricane Sandy. Insured losses: \$10 – 20 Billion; Total economic Damage: \$30 – 50 Billion", EQECAT Inc., 1 November 2012; and the Port Authority of New York and New Jersey press release 183-2012, 4 November 2012.

<sup>9</sup> See for example: World Bank (2010). The economics of adaptation to climate change. Economics of Adaptation to Climate Change synthesis report. For further references, see also the UNCTAD *Review of Maritime Transport 2012*, p. 22–25.

<sup>10</sup> World Shipping Council (2008). Record fuel prices place stress on ocean shipping. 2 May.

<sup>11</sup> UNCTAD (2010). Oil prices and maritime freight rates: An empirical investigation. UNCTAD/DTL/TLB/2009/2. 1 April.

transport costs.<sup>12</sup> Thus, cost control and fuel consumption management are key factors; they may involve a range of strategies (for example, speed management through slow steaming, selection of the most economical routing options and technology-based solutions) which may have a broad range of impacts, including on the design of vessels and propulsion systems. Owing in part to a more stringent environmental regulatory framework<sup>13</sup> as well as increasing concerns over elevated bunker fuel prices and climate change, efforts, in terms of ship and engine design, to optimize fuel consumption within the shipping industry have intensified, with new options and solutions being increasingly developed and tested.

44. Thus, while globalization was favoured by cheap oil and efficient maritime transportation, today the nexus between energy, environment and costs is increasingly affecting maritime transport and could, in the longer term lead to broader changes in the structure and distribution of global production processes and a shift of seaborne trade patterns towards greater regionalization.

### C. Recent regulatory developments

45. While information about a broad range of legal and regulatory issues is provided in the UNCTAD *Review of Maritime Transport 2012*, recent developments relating to two international legal instruments with implications for social and environmental sustainability in shipping appear particularly worth highlighting.<sup>14</sup>

#### **Entry into force of the 2006 Maritime Labour Convention**

46. Following ratification by the Russian Federation and the Philippines on 20 August 2012, the Maritime Labour Convention (MLC), which had been adopted in 2006 under the joint auspices of the International Labour Organization and IMO, is set to enter into force on 20 August 2013.<sup>15</sup> The 2006 MLC consolidates and updates more than 65 international labour standards relating to seafarers and is considered an important fourth pillar, complementing three major IMO conventions, namely: the International Convention for the Safety of Life at Sea, 1974; the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978; the International Convention for the Prevention of Pollution from Ships.

47. The 2006 MLC aims to achieve both decent conditions of work for the world's more than 1.2 million seafarers and to create conditions of fair competition for shipowners. Following entry into force of the 2006 MLC, seafarers working on more than 50 per cent of the world's international shipping tonnage will be covered by the new Convention. The Convention establishes minimum requirements for almost all aspects of working conditions for seafarers, including conditions of employment, hours of work and rest, accommodation, recreational facilities, food and catering, health protection, medical care, welfare and social security protection. It also establishes a strong compliance and enforcement mechanism based on flag State inspection and certification of seafarers' working and living conditions.

<sup>12</sup> Vivideconomics (2010). Assessment of the economic impact of market-based measures. Prepared for the Expert Group on Market-based Measures, IMO. August.

<sup>13</sup> See chapters 1 and 5 of the *Review of Maritime Transport 2012*. A recent development with a bearing on the bunker market and fuel costs include, for example, requirements under the IMO International Convention for the Prevention of Pollution from Ships Annex VI for ships to use more expensive low-sulphur fuels (for example, distillate-grade fuel).

<sup>14</sup> Both of these legal instruments were considered as part of the deliberations of experts at the UNCTAD Multi-year Expert Meeting on Transport and Trade Facilitation, 2010.

<sup>15</sup> The MLC 2006 enters into force 12 months after the date on which it was ratified by 30 Members accounting for a total share in the world gross tonnage of ships of at least 33 per cent.

With the ratification by Morocco, Greece, Finland and most recently Malta, 34 International Labour Organization members representing 68.2 per cent of the world gross tonnage of ships have now ratified the Convention.<sup>16</sup>

**Developments regarding the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996, as amended by its 2010 Protocol**

48. As may be recalled, in 2012 a report with a focus on ship-source oil pollution was published by the UNCTAD secretariat. The report, entitled *Liability and Compensation for Ship-Source Oil Pollution: An Overview of the International Legal Framework for Oil Pollution Damage from Tankers*,<sup>17</sup> was prepared to assist policy makers, particularly in developing countries, in their understanding of the complex international legal framework and in assessing the merits of accession to the latest of the relevant international legal instruments. As noted in the report, accession could offer considerable benefits to a number of coastal developing States that may be vulnerable to oil pollution from tankers.

49. While the report focuses on the international liability and compensation framework for oil pollution from tankers, known as the International Oil Pollution Compensation Fund (IOPC Fund) regime,<sup>18</sup> it also highlights some of the key features of two important related international conventions that provide for liability and compensation in respect of other types of ship-source pollution. These are the 2001 Bunker Oil Pollution Convention (2001 BOPC),<sup>19</sup> which covers bunker oil spills from ships other than oil tankers, and the 1996 International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea Convention (1996 HNS Convention), which deals with liability and compensation arising in connection with the carriage of a broad range of hazardous and noxious substances (HNS). An amending Protocol to the 1996 HNS Convention had been adopted in April 2010<sup>20</sup> to address a range of practical problems that had prevented many States from ratifying the 1996 HNS Convention.

50. While the 2001 BOPC is in force internationally, the 1996 HNS Convention, as amended by its 2010 Protocol (2010 HNS Convention) has not yet attracted the required number of accessions for its entry into force. Thus, at present, no international regime is in

<sup>16</sup> The status of ratification of the 2006 MLC is based on information on the International Labour Organization website, as of 25 February 2013.

<sup>17</sup> UNCTAD (2012). *Liability and Compensation for Ship-Source Oil Pollution: An Overview of the International Legal Framework for Oil Pollution Damage from Tankers*. United Nations publication. UNCTAD/DTL/TLB/2011/4. New York and Geneva. Available at [http://unctad.org/en/PublicationsLibrary/dtltlb20114\\_en.pdf](http://unctad.org/en/PublicationsLibrary/dtltlb20114_en.pdf) (accessed 4 April 2013). The report highlights central features of the international legal framework and provides an analytical overview of key provisions of the most recent of the international legal instruments in force. It also offers considerations for national policymaking.

<sup>18</sup> This covers the International Convention on Civil Liability for Oil Pollution Damage 1969 and its 1992 Protocol as well as the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention) 1971 and its 1992 and 2003 Protocols.

<sup>19</sup> The International Convention on Civil Liability for Bunker Oil Pollution Damage 2001. The Convention entered into force on 21 November 2008 and as of 31 January 2013 had 68 States parties. The convention covers oil pollution from ships other than tankers, for example, container vessels, reefers, chemical tankers, general cargo ships, cruise ships and ferries.

<sup>20</sup> The 2010 Protocol to the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996. The Protocol has not yet entered into force. See also the UNCTAD *Review of Maritime Transport 2010*, p. 124–125.



force to provide for liability and compensation arising in connection with the carriage of HNS cargos. This is a matter of concern, given the potential for coastal pollution, as well as personal injury and death that may be associated with an incident involving the carriage of chemicals and other HNS cargos.

51. The 1996 HNS Convention is modelled on the IOPC Fund regime and establishes a two-tier system for compensation to be paid in the event of pollution incidents involving HNS such as chemicals. Tier 1 provides for shipowner liability, backed by compulsory insurance cover. Tier 2 provides for compensation from a fund, financed through contributions from the receivers of HNS in cases when the shipowner's insurance does not cover a given HNS incident or is insufficient to cover the claim.

52. One of the major obstacles to ratification of the 1996 HNS Convention had been difficulties regarding one of the key requirements under the Convention, the submission of reports on "contributing cargo", that is, on HNS cargo received in each State. Other obstacles appeared to be related to the setting up of a reporting system for packaged goods and the difficulty of enforcing payment in non-State Parties of contributions to the liquefied natural gas account established under the Convention. By addressing these problems, the 2010 Protocol to the 1996 HNS Convention was considered an important development towards the strengthening of the international liability framework for ship-source pollution. The 2010 HNS Protocol was open for signature from 1 November 2010 to 31 October 2011 and thereafter has been open for accession.

53. While so far no State has yet acceded to the Protocol, it should be noted that a set of guidelines for reporting contributing cargo under the 2010 HNS Convention<sup>21</sup> was recently agreed by delegates from 29 States at a workshop on the reporting of HNS organized by the IMO in cooperation with the IOPC Funds.<sup>22</sup> The guidelines are intended to assist States with the Convention's accession or ratification and will be submitted to the Legal Committee of the IMO for consideration at its next session, in April 2013. It is hoped that the international community's collective efforts towards entry into force of the 2010 HNS Convention will continue and eventually be successful, thus closing an important regulatory gap

#### IV. Concluding Remarks

54. Over the years, maritime transport has evolved in response to the changing economic, institutional, regulatory and operational setting. In view of some emerging issues, including a changing global economic architecture, rising environmental and energy sustainability imperatives and growing climate change concerns, maritime transport will have to cope with several new trends.

55. By altering costs, prices, logistics structures and supply chains as well as comparative advantages, these developments and related impacts can greatly determine countries' trade performances and competitiveness, especially in developing regions. While more work is needed to help improve understanding of the precise implications of these trends, it is clear that optimizing maritime transportation systems will require their due consideration, taking account also of the external costs arising from maritime transport activities.

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<sup>21</sup> Available at <http://hnsconvention.org/Documents/guidelines.pdf> (accessed 3 April 2013).

<sup>22</sup> The workshop took place in London, in November 2012. For further information see <http://www.hnsconvention.org> (accessed 3 April 2013).

56. The review of the evolution of different sectors of the maritime industry points to some potential factors that developing countries may consider assisting their national industries in becoming large players. These include: development of maritime clusters; supporting labour productivity; and adopting policies adapted to national realities. Several of the current main players in some maritime sectors have benefited from industrial policies and government support to establish and expand their exports of, for example, ships, port operating services, or seafarers.

57. Access to regular shipping services will continue to be an important aspect of developing countries' trade competitiveness. Some determinants of liner shipping connectivity are largely beyond the control of policy makers, notably a country's geographic position within the global service network and the volume of captive cargo. At the same time, investments in port infrastructure and modernization, combined with trade and transit facilitation that enhance a port's hinterland, can have an important impact on the services and vessel deployment of liner shipping companies.

58. The nexus between transport, energy, environment and climate change is a strong one and will continue to shape transport policies and strategies of the future. The momentum is growing to advance in this direction. For developing countries, evolving towards sustainable freight transport is particularly relevant since freight transport activities are growing substantially and transport systems are being developed.

59. Implementing sustainability principles in freight transport, would not only help reduce dependency on oil, minimize exposure to high transport costs and limit environmental impacts, but it would also provide an opportunity to leapfrog to a sustainable and low-carbon development path, while at the same time tackling persistent challenges of freight transport infrastructure deficit and inadequate transport services.

60. Missing these opportunities may lead to more costs in the future, as governments and industries would eventually face additional expenses such as infrastructure and technical retrofits and to design and implement maintenance strategies to adapt to new operating conditions. For developing countries, the challenge is to initiate the shift towards sustainable freight transport systems which reflect their respective conditions. There will be a need for these countries to formulate their own approach to promote sustainable transport policies, programmes and investment strategies that balance economic, environmental and social objectives towards sustainable and inclusive development.

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